



STRUCTURAL ANALYSIS - I

PROF. AMIT SHAW

Department of Civil Engineering
IIT Kharagpur

INTENDED AUDIENCE : Civil Engineering Architecture

PRE-REQUISITES : Solid Mechanics

INDUSTRIES APPLICABLE TO : All civil engineering companies

COURSE OUTLINE :

This is an elementary course on Structural Analysis. Various methods and their underlying mechanics in determining response of structures when subjected to external agitation will be discussed in this course. This course is comprehensive at the basic level. Journey through this course will help students to build the foundation for more advanced courses related to structural engineering.

ABOUT INSTRUCTOR :

Prof. Amit Shaw is presently an Associate Professor in the Department of Civil Engineering, IIT Kharagpur. He obtained his Bachelors degree in Civil Engineering from IEST Shibpur (formerly Bengal Engineering College Shibpur) in 2000, MTech in Structures from IIT Roorkee in 2003 and PhD in Computational Mechanics from IISc Bangalore in 2007. Prior to joining IIT Kharagpur, Professor Shaw spent two years as Research Fellow in University of Aberdeen, UK. He also worked for some time in industries like Gammon India Limited and L&T ECC.

COURSE PLAN :

Week 1: Equilibrium, Stability and Determinacy of structures; Review of shear force and bending moment diagram in beams and frames

Week 2: Analysis of statically determinate structures 1; Plane truss: method of joints and method of sections

Week 3: Analysis of statically determinate structures 2; Deflection of truss: Method of virtual work

Week 4: Analysis of statically determinate structures 3; Deflection of beams and frames 1: Moment area method, conjugate beam method and virtual work method

Week 5: Analysis of statically determinate structures 4; Deflection of beams and frames 2: Moment area method, conjugate beam method and virtual work method

Week 6: Analysis of statically determinate structures 5; Influence line diagram and moving loads

Week 7: Analysis of statically indeterminate structures 1; Introduction to force and stiffness method

Week 8: Analysis of statically indeterminate structures 2; Plane truss using method of consistent deformations

Week 9: Analysis of statically indeterminate structures 3; Beams and Frames: Method of consistent deformations

Week 10: Analysis of statically indeterminate structures 4; Beams and Frames: Moment distribution method

Week 11: Analysis of statically indeterminate structures 5; Beams and Frames: Slope deflection method

Week 12: Introduction to direct stiffness method