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COURSE OUTLINE

The primary focus of this course is "Analysis of Statically Indeterminate Structures":

- Introduction; Concept of kinematic indeterminacy; Degrees of freedom (**1-2**)
- Development of slope-deflection equations; Concept of relative stiffness; Application of slope-deflection method to beams and simple frames (**5-7**)
- Moment distribution method and application to beams and simple frames (**4-5**)
- Matrix formulation of force and displacement methods — basic framework (**4**)
- Matrix formulation of force method (flexibility matrix approach): (**5**)
  o Analysis of simple statically determinate and indeterminate structures
- Matrix formulation of stiffness method (stiffness matrix approach), with reference to computer application: (**10**)
  o Generation of 1-dimensional frame element stiffness matrix; Flexural, axial & shear deformations; Torsional effects
  o Concept of local effects; Generation of load vector; Effects of finite joints
  o Application to plane frames, space frames, grid structures
- Introduction to finite elements method for 2-D problems (**1-2**)

Figures in parentheses denote approximate lecture hours for each topic.

BOOKS

There will be no specific textbook for this course. Here are a few books that you may like to refer to.

Reference Books

Weaver, W. & Gere, G.M., *Matrix Analysis of Framed Structures (3rd Ed.)*, Kluwer Academic Publishers, 1990.

Hibbeler, R.C., *Structural Analysis (5th Ed.)*, Pearson Education India, 2005.

West, H.H. & Geschwindner, L.F., *Fundamentals of Structural Analysis (2nd Ed.)*, Wiley, 2007.

Reddy, C.S., *Basic Structural Analysis (2nd Ed.)*, Tata McGraw-Hill, 2001.

Pandit, G.S. & Gupta, S.P., *Structural Analysis — A Matrix Approach (2nd Ed.)*, Tata McGraw-Hill, 2008.

Norris, C.H., Wilbur, J.B., & Utku, S., *Elementary Structural Analysis*, McGraw-Hill, 1990.

COURSE WEBSITE

www.civil.iitb.ac.in/~sghosh/CE317/

COURSE REQUIREMENTS

Attendance

A **minimum of 80% attendance** in class (instruction) hours is required from each student as per the institute regulations; same for the tutorials as well.

Office Hours

Teaching Assistants (graduate students from the Department of Civil Engineering) will hold office hours to assist the students. Students can seek their help for tutorial (or other) problems and any course related material.

Tutorials Problems

Tutorial problems will be assigned tentatively in a weekly schedule. Problems will be simple and based on the basics learned in the class. Generally, solutions are due in class on the same date. Permission of the instructor will be needed for a late submission.

Examinations

There will be **one mid-term** and **one final** exam. There will be **two quizzes** – one before the mid-term and the other between the mid-term and the final. Dates are to be announced later.

Grading

Quiz I	10%
Mid-term exam	30%
Quiz II	10%
Final exam	50%

Total	100%