

IIT Mandi
Proposal for a New Laboratory Course

Course number	: CE310 P
Name	: Strength of Materials and Structures Lab
Credit	: 1
Distribution	: L-T-P-C 0-0-2-1
Intended for	: UG Program
Prerequisite	: CE310: Strength of Materials and Structures/Equivalent
Mutual Exclusion	: -

1. Preamble:

This course is intended for students to understand in practice how the different structural systems behave depending on the type of loadings and the system configuration. In this lab course, the students will get practical aspects of the concepts they learned from the Strength of Materials and Structures course (CE 310). The course is essential in understanding the differences between theory and practice, further recognizing the limitations of analysis approaches..

2. Course Modules with quantitative lecture hours:

Laboratory/practical/tutorial Modules: -

The curriculum is split into eleven experiments encompassing different structural engineering analysis and strength testing problems typically encountered in the field practices. Validation of the concept through computer programming will also be made as part of this course. The duration of each lab session shall be 3 hours

1. Study of stress-strain characteristics of civil engineering materials.
2. Study of reactions in beams with different support conditions.
3. Study of variation of bending moment and shearing force in a beam subjected to various loading conditions.
4. Study of load-deflection characteristics of trusses.
5. Study of load-deflection characteristics of rectangular portal frames with uniform and nonuniform sections.
6. Study of stress and strains in the members of pin jointed frames.
7. Study of plastic bending of portal frames.
8. Load-deflection study of pinned arches.
9. Study of buckling characteristics of struts.
10. Study of horizontal and vertical deflections of asymmetric sections at various angles and loads.
11. Study of behaviour of circular section under torsion.

3. Text books:

For conceptual understanding

1. Hibbeler, RC, Structural Analysis, Pearson Education, 9th edition, New Delhi, 2017.
2. Hibbeler, RC, Mechanics of Materials, Pearson Education, 10th edition, New Delhi, 2016.

4. References:

For conceptual understanding

1. Timoshenko, S.P., and Young, D.H., Elements of Strength of Materials, 5th Edition, 2003.
2. Beer, F.P., Johnston, E.R., DeWolf, J, and Mazurek, D.F., Engineering Mechanics of Solids by Egor P. Popov, 2nd Edition Pearson Education Inc, 2009
3. Gere and Timoshenko, Mechanics of Materials, 2nd Edition, CBS Publishers, 2004.
4. Reddy, CS, Basic Structural Analysis, Tata McGraw Hill, New Delhi, 2001.
5. Menon, D, Structural Analysis, Narosa Publishing House, 2008.
6. Ross, C.T.F, Case, J, and Chivler, L, Strength of Materials and Structures, 4th edition, Butterworth Heinemann, UK, 1999.
7. Megson, THG, Structural and Stress Analysis, Butterworth-Heinemann, UK and USA, 2014.

5. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.	-	-	-	-

6. Justification of new course proposal if cumulative similarity content is >30%: