

22BEAS116 STRENGTH OF MATERIALS

Hours Per Week :

L	T	P	C
1	0	2	2

PREREQUISITE KNOWLEDGE:

COURSE DESCRIPTION AND OBJECTIVES:

This objective of this course is to acknowledge concepts of mechanics of deformable solids including static equilibrium. Know the behaviour of materials when subjected different loading and boundary condition. Enable the students to have an exposure to the systematic methods of solving engineering problems in solid mechanics. In addition, it also provides the basic mechanical principles underlying modern approaches for design of various types of structural members subject to axial, torsion, bending, transverse shear, and combined loading.

MODULE-1

UNIT-1

4L+0T+8P=12 Hours

SLOPE AND DEFLECTION OF BEAMS:

Slope and deflection of beams using integration techniques, moment area theorems and conjugate beam method.

UNIT-2

4L+0T+8P=12Hours

COLUMNS AND STRUTS:

Columns and Struts. Riveted and welded connections. Stability of masonry dams.

PRACTICES:

- To perform the tension test on metal specimen (M.S., C.I.).
- to observe the behaviour of materials under load.
- to calculate the value of E, ultimate stress, permissible stress, percentage elongation.
- etc. and to study its fracture.
- To perform the compression test on.
- Concrete cylinders & cubes.
- C.I., M.S. & Wood specimens and to determine various physical and mechanical properties.
- To perform the bending test on the specimens; M.S. Girder, Wooden beam, Plain concrete beams & R.C.C. beam, and to determine the various physical and mechanical properties.
- To determine Young's modulus of elasticity of beam with the help of deflection produced at centre due to loads placed at centre & quarter points.
- To study the behaviour of materials (G.I. pipes, M.S., C.I.) under torsion and to evaluate various elastic constants.

MODULE-2

UNIT-1

4L+0T+8P=12 Hours

INTERMEDIATE BEAMS:

Analysis of statically intermediate beams. Propped beams.



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UNIT-2**4L+0T+8P=12 Hours****FIXED AND CONTINUOUS BEAM:**

Fixed and continuous beam analysis using superposition, three moment equation and moment distribution methods.

PRACTICES:

- To study load deflection and other physical properties of closely coiled helical spring in tension and compression.
- To perform the Rockwell, Vicker's and Brinell's Hardness tests on the given specimens.
- To perform the Drop Hammer Test.
- Izod Test and Charpy's impact tests on the given specimens.
- To determine compressive & tensile strength of cement after making cubes and briquettes.
- To measure workability of concrete (slump test, compaction factor test).
- To determine voids ratio & bulk density of cement, fine aggregates and coarse aggregates.
- To determine fatigue strength of a given specimen.
- To write detail report emphasizing engineering importance of performing tension, compression, bending, torsion, impact and hardness tests on the materials.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the various stresses acting on elastic materials for different loading conditions.	Apply	1	1, 2, 5
2	Apply the concept of elasticity in project, research and industry.	Apply	1	1, 2, 8, 9, 10
3	Analyze the strength of riveted and welded connections.	Analyze	2	1, 4, 5, 6
4	Apply, Design of beams having different boundary conditions, under different types of loading conditions.	Create	2	1, 2, 3, 5, 8

TEXT BOOK:

1. Khurmi R.S., "Strength of Materials", S. Chand & Co., Ltd., New Delhi, 2001.

REFERENCE BOOKS:

1. Junarkar S.B. 2001, "Mechanics of Structures (Vo-I)". Choratar Publishing House, Anand.
2. Ramamrutham S. 2003, "Strengths of Materials", Dhanpat Rai and Sons, Nai Sarak, New Delhi.

SKILLS:

- ✓ Measure tensile and compressive strength of materials using UTM.
- ✓ Measures shear strength of materials.