

STRENGTH OF MATERIALS LABORATORY

| IV SEMESTER: CE | | | | | | | | |
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| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
| ACEC13 | Core | L | T | P | C | CIA | SEE | Total |
| | | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| Contact Classes: Nil | | Tutorial Classes: Nil | | Practical Classes: 36 | | | Total Classes: 36 | |
| Prerequisite: No prerequisites required | | | | | | | | |
| <p>I. COURSE OVERVIEW Students will be able to understand the theoretical concepts of solid mechanics course and enable them to apply it practically in this laboratory. Different types of tests are conducted in this laboratory as per standards (ASTM and IS) to know the various mechanical properties of a material such as young's modulus, shear modulus, hardness, toughness, deflection, fatigue strength etc.</p> <p>II. COURSE OBJECTIVES The students will try to learn: I. The mechanical properties of different solid engineering materials. II. The behavior of various material samples under different loads and equilibrium conditions. III. The experiments with materials subjected to tension, compression, shear, torsion, bending and impact. IV. The material testing data and its interpretation.</p> <p>III. COURSE SYLLABUS Week-1: DIRECT TENSION TEST Direct Tension test: To evaluate the tensile strength, the elastic limits and the young modulus of a mild steel bar in tension using the universal testing machine.</p> <p>Week-2: BENDING TEST ON CANTILEVER BEAM To evaluate the deflections of the beam made of wood and steel.</p> <p>Week-3: BENDING TEST ON SIMPLY SUPPORTED BEAM To evaluate the deflections of the beam made of wood and steel.</p> <p>Week-4: TORSION TEST To conduct torsion test on mild steel or cast iron specimen to determine modulus of rigidity.</p> <p>Week-5: HARDNESS TEST To conduct hardness test on mild steel, carbon steel, brass and aluminum specimens using Brinell's Hardness Test and Rockwell's Hardness Test</p> <p>Week-6: SPRING TEST To determine the stiffness and modulus of rigidity of a spring wire.</p> <p>Week-7: COMPRESSION TEST To perform compression test on UTM for Wooden block and Concrete block.</p> <p>Week-8: IMPACT TEST To evaluate the impact strength of steel specimen using Izod test and Charpy Test</p> <p>Week-9: SHEAR TEST To evaluate the shear strength of the given specimens using universal testing machine.</p> <p>Week-10: BEAM DEFLECTIONS To verify the Maxwell's reciprocal theorem for beam deflections.</p> | | | | | | | | |

Week-11: STRAIN MEASUREMENT

Use of electrical resistance strain gauges.

Week-12: DEFLECTION OF CONTINUOUS BEAM

To evaluate deflections on a continuous beam.

IV. REFERENCE BOOKS

1. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004
2. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd Edition. New York, NY: McGraw Hill, 1979.
3. William Kendrick Hatt, "Laboratory Manual of Testing Materials", Andesite Press, 2017.

V. WEB REFERENCES

1. <https://home.iitm.ac.in/kramesh/Strength%20of%20Materials%20Laboratory%20Manual.pdf>
2. <http://www.atri.edu.in/images/pdf/departments/SOM%20LAB%20MANUAL.pdf>
3. https://www.iitg.ac.in/mech/lab_sml.php