

| Course Type | Course Code | Name of the course | L | T | P | Credit |
|-------------|-------------|--------------------|---|---|---|--------|
| ESO         | CEE201      | Mechanics of Solid | 3 | 0 | 0 | 9      |

| Course Objective   |
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| This course deals with the study of the effects of forces and moments on the deformation of a solid body.  |
| Learning Outcomes  |
| After studying this course, students should be able to: <ul style="list-style-type: none"> <li>Understand the fundamental principles of stresses and strains and deformations of solids.</li> <li>An in-depth knowledge of shear force and bending moment diagrams, and different stresses in a loaded element</li> <li>To know the torsional effect on a structural element and to know the stresses in thin and thick walled structures <ul style="list-style-type: none"> <li>Understand the stability of a strut and to know the stresses due to unsymmetrical loading.</li> </ul> </li> </ul> |

| Unit No. | Topics to be Covered   | Lectures | Learning Outcome  |
|----------|--|----------|---|
| 1        | Stress strain behavior of engineering materials, Concept of stress and strain field, stress tensor, stress-strain transformation, stress invariants, Temperature Stress and Strain, Mohr's Circle for plane stress and plane strain, Relations between Elastic Constants, Hooke's law and compatibility conditions, differential equation of equilibrium. Different theories of failure. | 11       | Understand the fundamental principles of stresses and strains and deformations of solids.                         |
| 2        | Shear Force and Bending Moment Diagrams, Energy methods, Bending analysis, Composite section analysis, Combined Bending and Direct Stresses, Shear Stress Distributions.   | 10       | An in-depth knowledge of shear force and bending moment diagrams, and different stresses in a loaded element      |
| 3        | Torsion of circular members and thin walled tubes, Introduction to torsion of bars with non-circular sections. Analysis of thick and thin cylinders, compound cylinders  | 8        | To know the torsional effect on a structural element and to know the stresses in thin and thick walled structures |
| 4        | Elastic stability of columns, Euler's Buckling load, Close and Open-Coiled Helical Springs, Unsymmetrical Bending and Shear Centre.  | 10       | Understand the stability of a strut and to know the stresses due to unsymmetrical loading.                        |
| 5        | Numerical examples of bending, torsion, elastic stability, and unsymmetrical bending of beams.   | 3        | Learn how to apply the theories to solve practical problems.  |

#### Recommended Text Books:

1. R.C. Hibbeler. Mechanics of Materials, Pearson India Education Services Pvt. Ltd
2. F.P. Beer, E.R. Johnston, J.T. DeWolf, D.F. Mazurek. Mechanics of Materials, Tata McGraw- Hill Publishing Company Limited.

#### Recommended References:

1. J.M. Gere and B.J. Goodno. Mechanics of Materials, Cengage Learning.
2. S. Timoshenko. Strength of Materials, Part 1 and Part 2, CBS Publishers & Distributors.