

CE6302 MECHANICS OF SOLIDS

DETAILED SYLLABUS

UNIT I STRESS AND STRAIN

Stress and strain at a point – Tension, Compression, Shear Stress – Hooke's Law – Relationship among elastic constants – Stress Strain Diagram for Mild Steel, TOR steel, Concrete – Ultimate Stress – Yield Stress – Factor of Safety – Thermal Stresses – Thin Cylinders and Shells – Strain Energy due to Axial Force – Resilience – Stresses due to impact and Suddenly Applied Load – Compound Bars.

UNIT II SHEAR AND BENDING IN BEAMS

Beams and Bending- Types of loads, supports – Shear Force and Bending Moment Diagrams for statically determinate beam with concentrated load, UDL, uniformly varying load. Theory of Simple Bending – Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions - Flitched Beams.

UNIT III DEFLECTION

Double integration method - Macaulay's methods - Area moment method - conjugate beam method for computation of slopes and deflections of determinant beams.

UNIT IV TORSION

Torsion of Circular and Hollow Shafts – Elastic Theory of Torsion – Stresses and Deflection in Circular Solid and Hollow Shafts – combined bending moment and torsion of shafts - strain energy due to torsion - Modulus of Rupture – Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – Leaf Springs – Springs in series and parallel – Design of buffer springs.

UNIT V COMPLEX STRESSES AND PLANE TRUSSES

2 D State of Stress – 2 D Normal and Shear Stresses on any plane – Principal Stresses and Principal Planes – Mohr's circle - Plane trusses: Analysis of plane trusses - method of joints - method of sections.

For Syllabus, Question Papers, Notes & many More

TEXTBOOKS

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.

REFERENCES

1. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.
2. Timoshenko.S.B. and Gere.J.M, "Mechanics of Materials", Van Nos Reinhold, New Delhi 1995.
3. Vazirani.V.N and Ratwani.M.M, "Analysis of Structures", Vol I Khanna Publishers, New Delhi,1995.
4. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol I, Charotar Publishing House, New Delhi 1997.
5. Ugural. A.C., "Mechanics of Materials", Wiley India Pvt. Ltd., New Delhi, 2013.

OBJECTIVES

- To learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyse a complex two dimensional state of stress and plane trusses