GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED MECHANICS OF SOLIDS

Course Code: GR15A2030   L:3 T:1 P:0 C:4
II Year II Semester

Prerequisites: Basic Knowledge in Mechanics of Solids and Engineering Mechanics

Course Objectives
- To solve the advanced mechanics of solid related problems using classical methods
- Concepts and laws of Mechanics of Deformable Solids and Strength of Materials;
- Methods for modelling the behaviour of engineering materials;
- Various failure mechanisms and the appropriate criteria for their assessment

Course Outcomes
- Mathematical interpretation of several individual structural and mechanical parts can be known thoroughly by which these will be helpful for future design engineers
- Various analytical and numerical methods can be studied for applying to various static and dynamic problems
- All the hand calculations involving diagrams, illustrations, and graphs can be practiced which can be programmed in the future suitably
- To understand and analyse the concept of types of beams for engineering applications
- The graduate is in a position to analyse and suggest practical solutions to various structural related problems

Unit-I
Thin Cylinders and Spherical Shells: Stresses and strains in thin cylinders, thin spherical shell.

Thick cylinders: Thick cylinders subjected to internal and external pressure and compound cylinders.

Unit-II
Fixed Beams: Fixing moments and Reactions for a fixed beam of uniform section, Effect of sinking support, slope and deflection. Construction of shear force and bending moment diagrams.

Unit-III
Continuous Beams: Reaction at the supports, and support moments Effect of sinking of supports.

Unit-IV
Columns and Struts: Columns with one end free and the other fixed, Both ends fixed, One end fixed and other hinged, Limitation of Euler's formula, Rankine's Formula, Column with initial curvature, Column carrying eccentric load, Laterally loaded columns.

Unit-V
Bending of Curved Beams: Stresses in bars of circular, rectangular and trapezoidal sections.

Stresses due to rotation: Wheel rim, disc of uniform thickness, disc of uniform strength.

Teaching Methodology
Power point Presentations, Working models, white board & marker

Text Books
1. Strength of materials by Dr. Sadhu Singh, Khanna Publishers
2. Strength of Materials by R.K .Rajput

Reference Books
1. Analysis of Structures, Vol. 1, 1993 edition, by Vazirani and Ratwani.
2. Mechanics of solids by Crandal, Dahl and Lardner.
3. Theory of structures by S.Ramamrutham and R. Narayan, Dhanpat Rai Publishers