Mechanics of Solids-II

Course Code	Credit Hours
CE-205	2-1

Course Description

This subject is designed to cover the structural computations of load and stresses on a member when subjected to different loading conditions. Mainly it covers the basic analysis of structural members like beams and columns.

Text Book:

1. Mechanics of Materials by J.M.Gere7® Edition
2. Strength of materials by S.P Timoshenko
3. Advanced Mechanics Of Materials By Arthur P. Boresi

Reference Book:

Prerequisites :

CE-103 Mechanics of Solids-I**.**

Assessment System for Theory

	Without Project (%)	With Project/Complex Engineering Problems (%)
Quizzes	15	10-15
Assignments	10	5-10
Mid Terms	25	25
Project	-	5-10
End Semester Exam	50	45-50

Assessment System for Lab

Lab Work/ Psychomotor Assessment/ Lab Reports	70%
Lab Project/ Open Ended Lab Report/ Assignment/ Quiz	10%
Final Assessment/ Viva	20%

Teaching Plan

Theory:

Week	Topic Covered	Reading Assignment/ Home Work	CLO No.	Assessment Methodology
1-2	• Introduction to Combined Stresses (normal, shear stresses - practical cases) • Stresses due to Axial Loading and Flexural Loading • Members subject to Normal and Shear stresses • Analysis of curved beams • Beams on elastic foundation	Ref-1, Chap-4 Ref-2, Chap-3&8 Quiz-1	1	**Assignments, Quizzes, MSE, ESE**
2-5	• Stresses on Inclined Planes • Principal Stresses, Principal Planes, and Maximum Shear Stress (Transformation Equations) • Mohr's Circle (for plain stress problems), and measuring of maximum stresses, principal stresses and their plane • Mohr's circle for Maximum shear stress • Mohr's Circle for Plane Strain problems	Ref-1, Chap-7 Ref-2, Chap-2 Ref-3, Chap-2 HW-1 Quiz-2	1	
6	• Strain Gauge and Strain Rosettes • Relationship between Modulus of Elasticity (E) and Modulus of Rigidity (G), elastic constants	Ref-2, Chap-3		
7-8	**Theories of Failure (and their applications)** i. Maximum Stress Theory ii. Tresca Theory (Max Shear Stress Theory) iii. Maximum Strain Theory iv. Maximum Strain Energy Theory v. Von Misses or Misses Yield Theory vi. Mohr-Coulomb Theory	Ref-3, Chap-4 HW-2 Quiz-3	1	
9	**Mid Semester Exam**			
10-11	**Unsymmetrical Bending in practical cases** • Skew loading • ii. Unsymmetrical Cross Section	Ref-1, Chap-6 Ref-3, Chap-7 Quiz-4	1	
12	**Theory of plasticity** • Elementary theory of plasticity • Plastic hinges • Shape factor • Collapse mechanism	Ref-1, Chap-6 Ref-3, Chap-7 HW-3		

13	**Energy Methods** • Energy methods- General area of application and its usefulness	Ref-1, Chap-6 Ref-3, Chap-7 HW-4	1	
14	**Thin and Thick Cylinders** • Circumferential and Longitudinal Stresses in Thin Cylinders • Stresses in Spherical Shells • Stresses in Thick Cylinders	Ref-1, Chap 8 Ref-3, Chap-11 HW 5 Quiz-5	-	
15	**Stability** • Struts and columns • Euler, Rankine and sother formulas for buckling load of columns • Stability analysis of columns under eccentric loading	Ref-1, Chap-6 Ref-3, Chap-7 HW-6	1	
16	**Fatigue** • Fatigue due to cyclic loading • Discontinuities and stress concentration • Corrosion fatigue • Low Cyclic fatigue • Epsilon-N relations	Ref-1, Chap-11 Ref-2, Chap-8 Quiz 6	1	
17-18	**End Semester Exam**			

Practicals:

1	To determine the tensile strength of a steel bar	P3, A3
2	To determine the deflected shape of struts under different end conditions	P4, A3
3	To determine the compressive strength of concrete specimen	P3, A3
4	To determine the Ixx and Iyy of a beam under unsymmetrical bending	P4, A3
5	Verification of the Euler's theory of buckling	P4, A3
6	Bending of symmetrical and unsymmetrical cross-sections	P4, A3
7	Elastic deformation of curved beams	P4, A3
8	Determination of stresses under combined bending and torsion	P4, A3
9	Stresses in thin and thick wall cylinders	P4, A3