DEPARTMENT OF MECHANICAL ENGINEERING

Aligarh Muslim University, Aligarh

Course Title	:	Mechanics of Solids
Course Number	:	MEC2112/AEC2112
Credits	:	4
Course Category	:	DC
Pre-requisites	:	None
Contact Hours	:	4
Type of Course	:	Theory
Course Assessment	:	Course work 15%
		Mid-Sem Examination (1 Hour) 25%
		End-Sem Examination (2 Hour) 60%

Course Objectives
1. To develop fundamentals of elasticity.
2. To get acquainted with principles of equilibrium, engineering properties of materials, deformations in engineering applications.
3. To practice the methodologies in the analysis and design of structural members.

Course Outcomes
1. Ability to evaluate stresses in deformable bodies.
2. Capability to investigate strains and correlate with stresses under various loading conditions.
3. Ability to predict and analyse deformations in beams.
4. Capability to predict buckling in columns and stresses in pressurized vessels.

Course Syllabus

Unit I Force Deformation Relations, Uniaxial Loading, Stress Vector & Stress Tensor, Stress Transformation, Principal Stresses, Octahedral Stresses, Hydrostatic & Deviatoric Stresses, Equilibrium Equations in Cartesian & Polar Coordinates, Plane Stress, Mohr's Circle

Unit II Concept of Strain, Strain-Displacement Relation, Plane Strain Cases, Transformation of Strain Tensor, Strain Measurement, Compatibility Conditions, Generalized Hooke's Law with Thermal Loading, Compound Bars, Torsion of Circular Shafts

Unit III Shear Force & Bending Moment Diagrams, Moment Curvature Relation, Double Integration Method, Slope and Deflection by Moment Area Theorem, Bending and Shear Stresses, Concept of Shear Centre, Strain Energy, Deflection of beams using strain energy, Castigliano's & Maxwell's theorems

Unit IV Introduction to Columns, Elastic Stability: Euler's Buckling theory, Thin cylinders and spherical shells, Cylindrical vessel with hemispherical ends, Wire wound barrels, Thick cylinder, Compound cylinder, Force fits

Books:
1. Crandal, S.H; Dahl, N.C; Lardner, T.J, An Introduction to the Mechanics of Solids, McGraw Hill
2. Hearn, E.J.; Mechanics of Materials – Vol- I & II, Pergamon Press.
3. Hibbeler, R.C. (2012). Mechanical of materials, Prentice Hall

COs	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	2	2	2					1		1	3		2
2	3	3	2	2	2					1		1	3		2
3	3	3	2	2	2					1		1	3		2
4	3	3	2	2	2					1		1	3		2