MEPC2001 MECHANICS OF SOLID (3-0-0)

Module–I(08Hours)

Stress and Strain: Definition of stress, stress tensor - normal and shearing stresses in axially loaded members. Normal and shearing strains - stress-strain relationship - Generalized Hooke's Law - Poisson's ratio - relationship between material properties of isotropic materials - stress-strain diagram for uniaxial loading for ductile and brittle materials,strain gauges and rosettes, testing of materials with universal testing machine.Composite bars in tension and compression, temperature stresses.

Module–II(06Hours)

Two Dimensional State of Stress and Strain:Principalstresses,principalstrainsandprincipalaxes,calculationofprincipalstressesfromprincipalstrains, Mohr's Circle, Stressesinthincylinderandthinsphericalshellsunderinternalpressure.

Module –III(08 Hours)

Shear Force and Bending Moment Diagram: For simple beams, support reactions for staticallydeterminant beams, relationship between bending moment and shear force, shear force and bendingmomentdiagrams.

Pure bending: Theory of initially straight beams, distribution of normal and shear stress, beams of twomaterials.Deflectionof beamsbyintegrationmethodandareamomentmethod.

Module – IV(04Hours)

Torsionofsolidcircularshafts,twistingmoment,strengthofsolidandhollowcircularshaftsand strength ofshaftsincombinedbendingandtwisting, Closed coiled helical springs.

Module – V(04Hours)

Bucklingofcolumns: Euler'stheoryofinitiallystraightcolumnswithvariousendconditions,Slenderness Ratio, Eccentricloadingofcolumns.Columnswithinitialcurvature.

Course Outcomes

Upon completion of the course, students will be able to:

CO1	Gain a fundamental understanding of the concepts of stress and strain by analysis ofsolids and structures.
CO2	Study engineering properties of materials, force-deformation, stress-strainrelationship & learn fundamental principles of equilibrium, compatibility, and force deformation relationship in linear solids and structures.
CO3	Analyze determinate and indeterminate axial members, torsional members, andbeams, and determine axial forces, torque, shear forces, and bending moments.
CO4	Learn the fundamental concepts of flexibility method,and stiffness method as applied to problems involving statically determinate andindeterminate axial and torsional members, and beams.
CO5	Analyze and design thin, thick cylinders and springs and buckling in columns.

TextBooks:

1. Strengthofmaterials,G. H. Ryder,McMillanIndiaLtd.
2. ElementsofStrengthofMaterials,S. P.Timoshenko, D.H.Young, East WestPress Pvt.Ltd.

ReferenceBooks:

1. Introductionto solidmechanics,H.Shames, Prentice HallIndia, NewDelhi
2. Engineeringmechanics of solid, E.P. Popov,Prentice Hall India, New Delhi
3. Mechanics of materials by Beer and Johnston, Tata McGraw Hill.