STRENGTH OF MATERIALS

Course Code	19ME3401	**Year**	II	**Semester**	II
Course Category	Program Core	**Branch**	ME	**Course Type**	Theory
Credits	4	**L-T-P**	3-1-0	**Prerequisites**	Engineering Mechanics
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course outcomes: At the end of the course, the student will be able to

CO 1	Calculate stresses, strains and deflections in structural members subjected to various types of loadings.
CO 2	Draws shear force and bending moment diagrams of simple beams subject to combination of loads
CO 3	Determine the principal stresses & Evaluate the stresses in thin cylinders and torsion.
CO 4	Plot the stress distribution in section of the beam subjected to bending and shear loads
CO 5	Calculate deflections of statically determinate beams & Analyze the critical buckling loads of columns

Contribution of Course outcomes towards achievement of programme outcomes & Strength of correlations (High: 3, Medium: 2, Low: 1)

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	**3**	**3**	**2**							**1**		**2**	**3**	**1**
CO 2	**3**	**3**	**2**							**1**		**2**	**3**	**1**
CO 3	**3**	**3**	**2**							**1**		**2**	**3**	**1**
CO 4	**3**	**3**	**2**							**1**		**2**	**3**	**1**
CO 5	**3**	**3**	**2**							**1**		**2**	**3**	**1**

UNIT-I

Simple Stresses and Strains: Types of stresses and strains, Hooke's law, stress- strain diagrams, Axially loaded bars of uniform and varying cross section, Compound bars, Relation between elastic modulii, Thermal stresses.

UNIT-II

Shear Force and Bending Moment Diagrams: Types of beams and loads, Shear force and bending moment diagram for cantilever, simply supported and overhanging beams subjected to Point load, Moments and UDL, Point of contra flexure, Relation between load, shearing force and bending moment.

UNIT-III

Torsion of Circular Shafts: Torsion - Torsion equation - solid and hollow circular shaft - Torsional rigidity - power transmitted by the shafts

Complex stresses: Biaxial state of stress with and without shear- principal stresses - Mohr's circle

Thin cylinders: thin cylinders and spheres subjected to internal pressure.

UNIT-IV

Bending and Shear stresses in beams: Flexural formula, distribution of bending and shear stresses across various cross sections of beams.

UNIT-V

Deflection of Beams: Differential equations of the deflection curve, Slope and deflection using double integration method, Macaulay's method.

Columns: buckling and stability of column, crippling load of columns with pinned ends, fixed-free, fixed –fixed and fixed-pinned effective length of column ,limitations of Euler's formula.

Text Books:

1. Stephen P. Timoshenko, James M. Gere "Mechanics of Materials", 2nd edition, C B S Publishers, 2011.
2. SS Rattan, Strength of materials, 3/e, Tata McGraw-Hill, 2016.

References:

1. Timoshenko,StrengthofMaterialsPart-I&II,3/e,CBSPublishers,2004.
2. Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.
3. F.P. Beer, E.R. Johnston, Jr & John. T. DeWolf, Mechanics of Materials, 7/e, Tata McGraw- Hill, 2016.
4. Adarsh Swaroop, "Mechanics of Materials" 1st edition, New Age International Pvt. Ltd, 2012.