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		Levels
After successful completion of the course, the student will be able to		
CO1	Calculate stresses, strains and deflections in structural members subjected to various types of loadings.	L3
CO2	Draws shear force and bending moment diagrams of simple beams subject to combination of loads	L2
CO3	Determine the principal stresses & evaluate the stresses in thin cylinders and torsion.	L3
CO4	Plot the stress distribution in section of the beam subjected to bending and shear loads	L3
CO5	Calculate deflections of statically determinate beams & analyze the critical buckling loads of columns	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1: Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2							1		2	3	1
CO2	3	3	2							1		2	3	1
CO3	3	3	2							1		2	3	1
CO4	3	3	2							1		2	3	1
CO5	3	3	2							1		2	3	1

Syllabus

Unit No.	Contents	Mapped COs
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 moduli, Thermal stresses.	CO1
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.	CO2
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	CO3

	pressure	
IV	**BENDING AND SHEAR STRESSES IN BEAMS:** Flexural formula, distribution of bending and shear stresses across various cross sections of beams.	CO4
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	CO5

Learning Recourse(s)

Text Book(s)

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.

Reference Book(s)

1. Timoshenko, Strength of Materials, Part-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.