



SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
23ME3T01	Mechanics of Solids	III	ME	05	2026-27	13-07-2026
COURSE OUTCOMES						
1	Calculate stresses and strains in structural members subjected to various types of loadings.[K3]					
2	Analyze beams and draw correct and complete shear and bending moment diagrams for beams.[K4]					
3	Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, and moments.[K3]					
4	Determine and sketch the stress distribution in section of the beam subjected to Bending and Shear loads.[K3]					
5	Determine the Shear stresses in shafts and slope & deflection in beams.[K3]					
6	Analyze stresses in thin and thick cylinders.[K4]					
UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
SIMPLE STRESSES AND STRAINS						
I	Calculate stresses and strains in structural members subjected to various types of loadings.[K3]	1.1	Elasticity and plasticity	T3, R1	1	Chalk & Talk PPT (Active Learning Activity)
		1.2	Types of Stresses and strains, Hooke's law	T3, R1	1	
		1.3	Stress – Strain diagram for mild steel	T3, R1	1	
		1.4	Working stress – Factor of safety	T3, R1	1	
		1.5	Lateral strain, Poisson's ratio	T3, R1	1	
		1.6	Volumetric strain	T3, R1	1	
		1.7	Bars of varying section	T3, R1	1	
		1.8	Composite bars	T3, R1		
		1.9	Temperature stresses	T3, R1	1	
		1.10	Complex Stresses	T3, R1	1	
		1.11	Stresses on an inclined plane under different uniaxial and biaxial stress conditions	T3, R1	1	
		1.12	Principal planes and principal stresses	T3, R1	1	
		1.13	Mohr's circle	T3, R1	1	



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		1.14	Relation between elastic constants	T3, R1	1	
		1.15	Strain energy – Resilience – Gradual, sudden,	T3, R1	1	
		1.16	Impact and shock loadings.	T3, R1	1	
		CBS	Saint Venant’s principle	T3	1	
Total					17	
SHEAR FORCE AND BENDING MOMENT						
II	Analyze beams and draw correct and complete shear and bending moment diagrams for beams.[K4]	2.1	Definition of beam – Types of beams – Concept of shear force and bending moment	T3,R1	1	Chalk & Talk PPT
		2.2	S.F and B.M diagrams for cantilever - point loads, u.d.l	T3,R1	1	
		2.3	S.F and B.M diagrams for cantilever - uniformly varying loads and combination of these loads	T3,R1	2	
		2.4	Simply supported - point loads, u.d.l	T3,R1	1	
		2.5	Simply supported - uniformly varying loads and combination of these loads	T3,R1	2	
		2.6	Overhanging beams - point loads, u.d.l,	T3,R1	1	
		2.7	Over hanging beams - uniformly varying loads and combination of these loads	T3,R1	2	
		2.8	Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.	T3,R1	1	
		CBS	Fixed and Continuous Beams	T3	1	
TOTAL					12	
FLEXURAL STRESSES						
III	Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and	3.1.1	Theory of simple bending	T3,R1	1	
		3.1.2	Derivation of bending equation	T3,R1	1	
		3.1.3	Determination of bending stresses	T3,R1	1	
		3.1.4	Section modulus of rectangular, circular, I and T sections	T3,R1	1	
		3.1.5	Design of simple beam sections	T3,R1	1	
			SHEAR STRESSES			
		3.2.1	Derivation of formula	T3,R1	1	



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	bending loads, and moments.[K3] Determine and sketch the stress distribution in section of the beam subjected to Bending and Shear loads.[K3]	3.2.2	Shear stress distribution across various beams sections like rectangular	T3,R1	1	Chalk & Talk, PPT (Active Learning Activity)	
		3.2.3	Circular Section	T3,R1	1		
		3.2.4	Triangular Section	T3,R1	1		
		3.2.5	I Section	T3,R1	1		
		3.2.6	T Sections	T3,R1	1		
		CBS	Bending Stress-Walls and Pillars subjected to wind pressure	T3	1		
Total					12		
DEFLECTION OF BEAMS							
IV	Determine the Shear stresses in shafts and slope &deflection in beams.[K3]	4.1	Bending into a circular arc – slope, deflection and radius of curvature	T3,R1	1	Chalk & Talk, PPT	
		4.2	Differential equation for the elastic line of a beam	T3,R1	1		
		4.3	Double integration method	T3,R1	1		
		4.4	Macaulay’s method	T3,R1	1		
		4.5	Determination of slope and deflection for cantilever- point loads, UDL and UVL	T3,R1	1		
		4.6	Determination of slope and deflection for simply supported beams - point loads, UDL and UVL	T3,R1	1		
		4.7	Mohr’s theorem	T3,R1	1		
		4.8	Moment area method	T3,R1	1		
		4.9	Application to simple cases	T3,R1	1		
		TORSION					
		4.2.1	Introduction-Derivation	T3,R1	1		
		4.2.2	Torsion of Circular shafts	T3,R1	1		
		4.2.3	Pure Shear	T3,R1	1		
		4.2.4	Transmission of power by circular shafts	T3,R1	1		
		4.2.5	Shafts in series	T3,R1	1		
		4.2.6	Shafts in parallel.	T3,R1	1		
		CBS	Torsion of a tapering shaft	T3	1		
Total					16		
V	Analyze stresses in	THIN AND THICK CYLINDERS				Chalk & Talk, PPT (Active Learning Activity)	
		5.1.1	Thin seamless cylindrical shells	T3,R1	1		
		5.1.2	Derivation of formula for longitudinal and circumferential stresses	T3,R1	1		
		5.1.3	hoop, longitudinal and volumetric strains	T3,R1	1		



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thin and thick cylinders.[K4]	5.1.4	Changes in dia, and volume of thin cylinders	T3,R1	1
	5.1.5	Thin spherical shells	T3,R1	1
	5.1.6	Wire wound thin cylinders	T3,R1	1
	5.1.7	Lame’s equation	T3,R1	1
	5.1.8	Cylinders subjected to inside & outside pressures	T3,R1	1
	5.1.9	Compound cylinders	T3,R1	1
		COLUMNS	T3,R1	
	5.2.1	Buckling and Stability, Columns with Pinned ends	T3,R1	1
	5.2.2	Columns with other support Conditions	T3,R1	1
	5.2.3	Limitations of Euler’s Formula	T3,R1	1
	5.2.4	Rankine’s Formula	T3,R1	1
	CBS	Struts- Laterally loaded struts	T3	1
Total				14
CUMULATIVE PROPOSED PERIODS				72
Text Books:				
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION			
T1	GH Ryder, Strength of materials, Palgrave Macmillan publishers India Ltd, 1961.			
T2	B.C. Punmia, Strength of materials,10/e, Lakshmi publications Pvt. Ltd, New Delhi, 2018.			
T3	S. Ramamrutham & R. Narayanan Strength of materials, 20/e Dhanpat rai publications Pvt. Ltd, New Delhi, 2020.			
Reference Books:				
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION			
R1	R.K.Bansal, A Text Book of Strength of Materials: Mechanics of Solids, 6 th Edition, Laxmi Publications, 2018.			
R2	Gere & Timoshenko, Mechanics of materials, 2/e, CBS publications, 2004.			
R3	U.C.Jindal, Strength of Materials, 2/e, Pearson Education, 2017.			
R4	Timoshenko, Strength of Materials Part – I& II, 3/e, CBS Publishers, 2004.			
R5	Andrew Pytel and Ferdinand L. Singer, Strength of Materials,4/e, Longman Publications, 1990.			
R6	Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.			



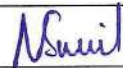
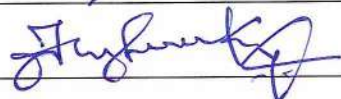
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Web Details	
1	https://onlinecourses.nptel.ac.in/noc19_ce18/preview
2	https://youtube/iY_ypychVNY?si=310htc4ksTQJ8Fv6
3	https://www.youtube.com/watch?v=WEy939Rkd_M&t=2s
4	https://www.classcentral.com/course/swayam-strength-of-materials-iitm-184204
5	https://www.coursera.org/learn/mechanics-1
6	https://www.edx.org/learn/engineering/massachusetts-institute-of-technology-mechanical-behavior-of-materials-part-1-linear-elastic-behavior
7	https://archive.nptel.ac.in/courses/112/107/112107146/

SNO	Details	Name	Signature
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Principal