SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Accredited by National Board of Accreditation, AICTE, New Delhi,Accredited by
NAAC with "A" Grade – 3.32 CGPA,Recognized under 2(f) & 12(B) of UGC Act 1956,
Approved by AICTE, New Delhi,Permanent Affiliation to JNTUK, Kakinada
Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)
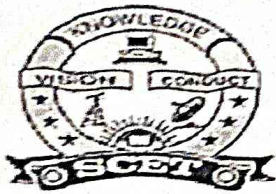
DEPARTMENT MECHANICAL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20ME3T01	MECHANICS OF SOLIODS	III	MECHANICAL ENGINEERING	06	2021-22	25 -10-2021

COURSE OUTCOMES

1	Calculate stresses and strains in structural members subjected to various types of loadings.[K3]
2	Sketch the Shear force and Bending moment diagrams of beams subject to combination Of loads.[K3]
3	Determine and Sketch the stress distribution in section of the beam subjected to Bending and Shear loads.[K3]
4	Determine the Shear stresses and Modulus of rigidity, Slope and Deflection in shafts.[K3]
5	Evaluate 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]	1.1.1	Introduction, Stress, Strain,	T1	1	Chalk & Talk PPT Videos (Active Learning Activity)
		1.1.2	Types of Stresses	T2		
		1.1.3	Elasticity and Elastic Limit	T1		
		1.1.4	Hooke's Law and Elastic Moduli	T2, T1	1	
		1.1.5	Modulus of Elasticity	T1		
		1.1.6	Factor of Safety	T1,T2	1	
		1.1.7	Constitutive Relationship between Stress and Strain	T1		
			Elastic Constants			
		1.2.1	Introduction, Longitudinal Strain	T1	1	
		1.2.2	Lateral Strain, Poisson's Ratio	T1		
		1.2.3	Volumetric Strain, Volumetric Strain of a Cylindrical Rod	T1,T2	1	
		1.2.4	Sphere and Rectangular block Bulk Modulus	T1	1	

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		1.2.5	Expression for Young's Modulus in Terms of Bulk Modulus	T1	1	
			Principal Stresses and Strains			
		1.3.1	Introduction, Principal Planes and Principal Stresses	T1,T2	1	
		1.3.2	Methods of Determining Stresses on Oblique Section	T1	1	
		1.3.3	Analytical Method for Determining Stresses on Oblique Section	T1,T2	1	
		1.3.4	Graphical Method for Determining Stresses on Oblique Section	T1,T2	1	
		1.3.5	Mohr's Circle.	T1,T2	1	
		CBS	Elastic constant for different Engineering Materials	T1,T2	1	
				Total	**16**	
			Shear Force and Bending Moment			
II	Sketch the Shear force and Bending moment diagrams of beams subject to combination of loads.[K3]	2.1	Introduction, Types of Beams	T1	1	
		2.2	Types of Loads	T1, T2	1	
		2.3	Sign Conventions for Shear Force and Bending Moment	T1	1	
		2.4	Shear Force and Bending Moment Diagrams for a Cantilever	T1, T2	1	
		2.5	simply supported	T1	1	Chalk & Talk PPT
		2.6	over hanging beams	T1	1	
		2.7	with different loads and combination of loads	T1, T2	1	
		2.8	Point loads	T1	1	
		2.9	UDL	T1, T2	1	
		2.10	UVL and couple	T1	1	
		2.11	Relation between Load	T1	1	
		2.12	ShearForce and Bending Moment	T1	1	
		CBS	Case study on Failure Analysis of a Bridge	T1, T2	1	
				TOTAL	**13**	
			Flexural Stresses			
III	Determine and Sketch	3.1.1	Introduction, Pure Bending or Simple Bending	T1	1	
		3.1.2	Theory of Simple	T1, R1	1	

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the stress distribution in section of the beam subjected to Bending and Shear loads.[K3]		Bending with Assumptions Made			PPT (Active Learning Activity)
	3.1.3	Expression for Bending Stress,	T1	1	
	3.1.4	Neutral Axis and Moment of resistance	T1, R1	1	
	3.1.5	Bending Stresses in Symmetrical Sections	T1	1	
	3.1.6	Section Modulus	T1,R2	1	
	3.1.7	Section Modulus for Various Shapes of Beam Sections	T2,R1	1	
	3.1.8	and Bending Stress in Unsymmetrical Sections	T1	1	
	3.2	**Shear Stresses** Introduction	T1	1	
	3.2.1	Shear Stress at a Section	T1	1	
	3.2.2	Shear Stress Distribution for Different Sections like Rectangular	T1,R3	1	
	3.2.3	Circular	T1	1	
	3.2.4	Triangular	T1,T2	1	
	3.2.5	I, T and Angle sections	T1	1	
	CBS	Polar Moment Of Inertia and Section Modulus Experimentation	R3	1	
			Total	**14**	

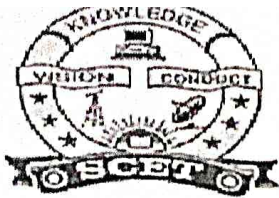|					
		Deflection of Beams			
IV	Determine the Shear stresses and Modulus of rigidity, Slope and Deflection in shafts.[K3]	4.1	Deflection of Beams Introduction	T1, T2	1	PPT, video lecture
		4.2	Deflection and Slope of a Beam Subjected to Uniform Bending Moment	R1,T2	1	
		4.3	Relation between Slope	T2,R1	1	
		4.4	Deflection and Radius of Curvature	T2,R1	1	
		4.5	Deflection of a Simply Supported	T2,R1	1	
		4.6	cantilever Beams Carrying point load	T1,R1	1	
		4.7	and UDL using Macaulay's Method	T1, T2	1	
		4.8	and Moment Area Method	T1, T2	1	
		4.2.	**Torsion** :Introduction	T1, T2,R1	1	
		4.2.1	Derivation of Shear Stress Produced in a Circular Shaft Subjected to Torsion	T2,R1	1	
		4.2.2	Maximum Torque Transmitted by a	T2,R1	1	

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			Circular Solid Shaft		
		4.2.3	and Hollow Circular Shafts, Power Transmitted by Shafts	T2,R3	1
		4.2.4	Expression for Torque in Terms of Polar Moment of Inertia	T2, R1	1
		4.2.5	Polar Modulus	T2, R1	1
		4.2.6	Strength of a Shaft of Varying Sections,	T2,R5	1
		4.2.7	Combined Bending and Torsion	T2	1
				Total	12
			Thin Cylinders and Spheres			
		5.1.1	Introduction, Stresses in a Thin Cylindrical Vessel Subjected to Internal Pressure	T2,R4	1	
		5.1.2	Expression for Circumferential Stress	T2,R3	1	PPT (Active Learning Activity)
		5.1.3	Expression for Longitudinal Stress, Efficiency of a Joint	T2, R1	1	
		5.1.4	Effect of Internal Pressure on the Dimensions of a Thin Cylindrical Shell,	T2, R1	1	
		5.1.5	Wire Winding of Thin Cylinders.	T2,R1	1	
V	Evaluate stresses in thin and thick cylinders.[K4]	5.1.6	Thin Spherical Shells	T2,R2	1	
		5.1.7	Change is Dimensions of a Thin Spherical Shell Due to an Internal Pressure	T2,R1	1	
		5.2	**Thick Cylinders:** Introduction	T2,R3	1	
		5.2.1	Stresses in a Thick Cylindrical Shell	T2,R2	1	
		5.2.2	Stresses in Compound Thick Cylinders	T1,R1	1	
		5.2.3	Initial Difference in Radii at the Junction of a Compound Cylinder for Shrinkage.	T2,R2	1	
		CBS	Case study on Pressure Vessels		1	
				Total	12	
		CUMULATIVE PROPOSED PERIODS			67	

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION

| T1 | Popov E, Solid Mechanics, Prentice Hall India Learning Private Limited, 2nd edition, 2002. |
| T2 | R K Rajput, Strength of Materials, S. Chand Publishing, 6th Edition, 2015. |

Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
R1	R. K Bansal, Strength of Materials, Laxmi Publications, New Delhi, Revised 4th Edition, 2010,
R2	S.S. Rattan, Strength of Materials, Tata Mc-Graw Hill Private Limited, New Delhi, 2nd edition, 2012
R3	Stephen P. Timoshenko, James M. Gere, Mechanics of Materials, , C B S Publishers, (2nd edition) 2011.
R4	Ferdinand P. Beer, E. Russell Johnston Jr. , John T. DeWolf, David F. Mazurek , Mechanics of Materials, 7th Edition, 2014.
R5	R K Rajput, Strength Of Materials, S. CHAND, 1st Edition, 2018
R6	Ramamrutham S, Strength of Materials, Dhanpat Rai Publishing Company (p) Ltd., 18th Edition, 2014.
R7	U. C. Jindal, Strength of Materials, Pearson Education; 1st edition, 2012.

Web Details

| | https://nptel.ac.in/courses/112/107/112107146/ |
| | http://www.nptelvideos.in/2012/11/mechanics-of-solids.html |

SNO	Details	Name	Signature
i.	Faculty	Dr.R.Lalitha Narayana	
ii.	Faculty II (for common Course)	Mr.N.Bulli Raju	
iii.	Faculty III (for common Course)	--	
iv.	Course Coordinator	Dr.R.Lalitha Narayana	
v.	Module Coordinator	Dr. Francis Luther King M	
vi.	Programme Coordinator	Dr. A Gopichand	

Principal