



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.D.T., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF CIVIL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester
20CE3T01	STRENGTH OF MATERIALS	III	CIVIL	06	2021-22	25-10-2021
COURSE OUTCOMES						
1	Understand the basic materials behavior under the influence of different external loading conditions and the support conditions. (K2)					
2	Know bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions. (K3)					
3	Assess stresses across section of the thin and thick cylinders. (K2)					
4	Calculate stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions. (K3)					
5	Find Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections. (K3)					
UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	Understand the basic materials behavior under the influence of different external loading conditions and the support	1.1	Simple Stresses, Strains Introduction, Elasticity and plasticity – Types of stresses and strains	T1,R1	1	Chalk & Talk, PPT, Tutorial
		1.2	Hooke's law – stress – strain diagram for mild steel	T1,R1	1	
		1.3	Working stress – Factor of safety	T1,R1	1	
		1.4	Lateral strain, Poisson's ratio volumetric strain – Elastic moduli and the relationship between them and problems	T1,R1	1	
		1.5		T1,R2	1	



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	conditions. (K2)	1.6	Strain Energy – Resilience	T1,R2	1	
		1.7	– Gradual, sudden impact loadings – simple applications and problems	T1,R1	1	
		1.8	Shear Force and Bending Moment: Definition of beam	T1,R1	1	
		1.9	Types of beams – Concept of shear force and bending moment	T2,R1	1	
		1.10	S.F and B.M diagrams for cantilever, simply supported problems	T2,R1	1	
		1.11	S.F and B.M diagrams for overhanging beams	T2,R1	1	
		1.12	S.F and B.M diagrams point loads and uniformly distributed loads.	T2,R1	1	
				Total	12	
II	Know bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions. (K3)	2.1	Flexural Stresses: Theory of simple bending	T2,R1	1	Chalk & Talk, PPT, Tutorial
		2.2	Assumptions	T2,R1	1	
		2.3	Derivation of bending equation: $M/I = f/y = E/R$, Neutral axis	T2,R2	1	
		2.4	Determination bending stresses modulus of rectangular and circular sections (Solid and Hollow),	T2,R1	1	
		2.5	I, T, Angle and Channel sections	T2,R2	1	
		2.6	I, T, Angle and Channel sections	T2,R1	1	
		2.7	Problems on different sections	T1,R1	1	
		2.8	Design of simple beam sections.	T1,R1	1	
		2.9	Shear Stresses , Derivation of formula	T1,R1	1	
		2.10	Shear stress distribution across various beam sections like	T1,R1	1	



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			rectangular, circular,			
		2.11	, triangular, I, T angle sections, built up beams, shear center.	T1,R1	1	
		2.12	Problems on different sections	T1,R1	1	
				Total		12
III	Assess stresses across section of the thin and thick cylinders. (K2)	3.1	Deflection Of Beams, Bending into a circular arc	T2,R1	1	Chalk & Talk, PPT, Tutorial
		3.2	slope, deflection and radius of curvature, Differential equation for the elastic line of a beam	T2,R1	1	
		3.3	Double integration and Macaulay's methods	T1,R2	1	
		3.4	Determination of slope and deflection for cantilever point loads	T2,R2	1	
		3.5	Determination of slope and deflection for simply supported of point loads	T1,R2	1	
		3.6	Determination of slope and deflection for cantilever udl	T2,R1	1	
		3.7	Determination of slope and deflection for simply supported udl	T1,R2	1	
		3.8	Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains	T1,R1	1	
		3.9	Changes in diameter, and volume of thin cylinders. problems	T1,R1	1	
		3.10	Thick Cylinders: Introduction Lame's theory for thick cylinders	T1,R1	1	
		3.11	Derivation of Lame's formulae - distribution of hoop and radial stresses across thickness - design of thick cylinders	T1,R1	1	
		3.12	Compound cylinders. Problems on thin and thick cylinders	T1,R1	1	



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				Total		12
IV	Calculate stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions. (K3)	4.1	Torsion of Circular Shafts and springs, Theory of pure torsion – Derivation of Torsion equation	T2,R1	1	Chalk & Talk, PPT, Tutorial
		4.2	Assumptions– Torsional moment of resistance – Polar section modulus	T2,R1	1	
		4.3	Power transmitted by shafts – Combined bending and torsion and end thrust, problems	T1,R2	1	
		4.4	Springs, Introduction – Types of springs	T2,R1	1	
		4.5	deflection of close and open coiled helical springs under axial pull and axial couple	T1,R2	1	
		4.6	springs in series and parallel and problems	T2,R1	1	
		4.7	Columns And Struts, Types of columns –Euler’s theorem for long columns- assumptions	T1,R1	1	
		4.8	derivation of Euler’s critical load formulae for various end conditions – Equivalent length of a column	T1,R1	1	
		4.9	Slenderness ratio – Euler’s critical stress – Limitations of Euler’s theory.	T1,R1	1	
		4.10	Problems	T1,R1	1	
		4.11	Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.	T1,R1	1	
		4.12	Problems on different loadings	T1,R1	1	
				Total		12
V	Find Principal stresses	5.1	Principal Stresses and Strains, Introduction – Stresses on an inclined section of a bar under	T2,R1	1	Chalk & Talk,



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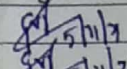
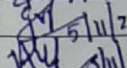
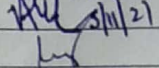

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developed in a member when it is subjected to stresses along different axes and design the sections. (K3)		axial loading			PPT, Tutorial
	5.2	compound stresses	T2,R1	1	
	5.3	Normal and tangential stresses on an inclined plane for biaxial stresses	T2,R1	1	
	5.4	Problems	T1,R2	1	
	5.5	Two perpendicular normal stresses accompanied by a state of simple shear	T1,R1	1	
	5.6	Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.	T2,R1	1	
	5.7	Theories Of Failures, Introduction	T2,R1	1	
	5.8	Types of Theories Of Failures,	T1,R2	1	
	5.9	Maximum Principal stress theory	T1,R2	1	
	5.10	Maximum Principal strain theory – Maximum shear stress theory	T1,R2	1	
	5.11	Maximum strain energy theory – Maximum shear strain energy theory.	T1,R2	1	
	5.12	Problems on different theories	T1,R2	1	
Total				12	
CUMULATIVE PROPOSED PERIODS				60	
Text Books:					
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION				
1	R.K Bansal , Strength of Materials, 6 th Edition, Lakshmi Publications, 2018.				
2	B.C Punmia, Jain and Jain, 2 nd Edition, Mechanics of Materials, 2017.				
3	R. Subramanian, Strength of Materials, 3 rd Editio, Oxford Publications, 2016.				
Reference Books:					
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION				
1	R. K. Rajput, Strength of Materials, 7 th Edition, S. Chand & Co, New Delhi, 2018.				
2	R. Subramanian, Strength of Materials, 3 rd Edition, Oxford Publications, 2016.				
Web Details					
1	https://www.youtube.com/watch?v=IpMZNpWjsk4				



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	Name	Signature with Date
i. Faculty	G.VENKATA RAMANA	 5/11/21
ii. Course Coordinator	G.VENKATA RAMANA	 5/11/21
iii. Module Coordinator	A.VENKATA KRISHNA	 5/11/21
iv. Programme Coordinator	G V L N MURTHY	


Principal