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 OF CIVIL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester
23CE3T02	STRENGTH OF MATERIALS	III	CIVIL	05	2024-25	30-07-2024

COURSE OUTCOMES

1	Explain the basic materials behavior under the influence of different external loading Conditions and the support conditions. (K2)
2	Draw the diagrams indicating the variation of the key performance features like axial Forces, bending moment and shear forces in structural members. (K3)
3	Acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams. (K3)
4	Calculate deflections in the beams due to various loading and support conditions. (K3)
5	Compute stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lame's Equation. (K3)

UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	Explain the basic materials behavior under the influence of different external loading Conditions and the support conditions. (K2)	1.1	**Simple Stresses and Strains:** Elasticity and plasticity	T1,R1	1	Chalk & Talk, PPT, Tutorial
		1.2	Types of stresses and strains	T1,R1	1	
		1.3	Hooke's law — Factor of safety, Poisson's ratio	T1,R1	1	
		1.4	problems	T1,R1	1	
		1.5	problems	T1,R2	1	
		1.6	Relationship between Elastic constants	T1,R2	1	
		1.7	problems	T1,R1	1	
		1.8	problems	T1,R1	1	
		1.9	Bars of varying section — stresses in composite bars.	T2,R1	1	
		1.10	problems	T2,R1	1	
		1.11	problems	T2,R1	1	
		1.12	problems	T2,R1	1	

				Total		12
II	Draw the diagrams indicating the variation of the key performance features like axial Forces, bending moment and shear forces in structural members. (K3)	2.1	**Shear Force and Bending Moment:** Definition of beam Types of beams	T2,R1	1	Chalk & Talk, PPT, Tutorial
		2.2	Concept of shear force and bending moment	T2,R1	1	
		2.3	Point of contra flexure	T2,R2	1	
		2.4	Relation between S.F., B.M, and rate of loading at a section of a beam;	T2,R1	1	
		2.5	S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads,	T2,R2	1	
		2.6	S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed loads,	T2,R1	1	
		2.7	S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.	T1,R1	1	
		2.8	Problems	T1,R1	1	
		2.9	Problems	T1,R1	1	
		2.10	Problems	T1,R1	1	
		2.11	Problems	T1,R1	1	
		2.12	Problems	T1,R1	1	
				Total		12
III	Acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the	3.1	**Flexural and Shear Stresses: Flexural Stresses:** Theory of simple bending, Assumptions	T2,R1	1	Chalk & Talk, PPT, Tutorial
		3.2	Derivation of bending equation,	T2,R1	1	
		3.3	Neutral axis, Determination of bending stresses, section modulus of rectangular and circular sections (Solid and	T1,R2	1	

	beams. (K3)		Hollow),			
		3.4	I, T, Angle and Channel sections, Design of simple beams	T2,R2	1	
		3.5	Problems	T1,R2	1	
		3.6	**Shear Stresses:** Derivation of formula — Shear stress distribution across various beam sections like rectangular	T2,R1	1	
		3.7	Problems	T1,R2	1	
		3.8	Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like circular, I, T Angle sections.	T1,R1	1	
		3.9	Problems	T1,R1	1	
		3.10	Problems	T1,R1	1	
		3.11	Torsion – circular shafts only.	T1,R1	1	
		3.12	Problems	T1,R1	1	
				Total		**12**
IV	Calculate deflections in the beams due to various loading and support conditions. (K3)	4.1	Deflection of Beams: Double integration and Macaulay's methods	T2,R1	1	Chalk & Talk, PPT, Tutorial
		4.2	Determination of slope and deflection for cantilever subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.	T2,R1	1	
		4.3	Problems	T1,R2	1	
		4.4	Problems	T2,R1	1	
		4.5	Determination of slope and deflection for simply supported subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.	T1,R2	1	
		4.6	Problems	T2,R1	1	
		4.7	Problems	T1,R1	1	
		4.8	Determination of slope and deflection for overhanging	T1,R1	1	

			beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.			
		4.9	Problems	T1,R1	1	
		4.10	Problems	T1,R1	1	
		4.11	Mohr's theorems — Moment area method — application to simple cases of cantilever.	T1,R1	1	
		4.12	Problems	T1,R1	1	
					Total	12
V	Compute stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lame's Equation. (K3)	5.1	Introduction – Classification of columns – Axially loaded compression members	T2,R1	1	Chalk & Talk, PPT, Tuto
		5.2	Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions	T2,R1	1	
		5.3	Problems	T2,R1	1	
		5.4	Problems	T1,R2	1	
		5.5	Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory	T1,R1	1	
		5.6	Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.	T2,R1	1	
		5.7	Problems	T2,R1	1	
		5.8	**Thin and Thick cylindrical** shells — Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains	T1,R2	1	
		5.9	Problems	T1,R2	1	
		5.10	changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae,	T1,R2	1	

		5.11	distribution of hoop and radial stresses across the thickness, compound cylinders- distribution of stresses	T1,R2	1	
		5.12	Problems	T1,R2	1	
				Total	12	
				CUMULATIVE PROPOSED PERIODS	60	

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2	Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024
3	Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010.

Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rdEdition
2	Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and MudimbyAndal, Cambridge University Press, 2018, 1st Edition

Web Details

1	*https://www.youtube.com/watch?v=IpMZNpWjsk4*

		Name	Signature with Date
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