Spring 2024

ME 315-002: Stress Analysis

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SYLLABUS – Spring 2024: ME315

Textbook: *Advanced Strength and Applied Elasticity* 4th ed., A. Ugural & S. Fenster (Prentice-Hall)
Prerequisites: Math 222, Mech 237, ME 215

Week	Topic	Reading	Problems
1	Introduction: Free body diagrams, axial stress, torsion, bending stress, shear & moment diagrams	Lecture 1 (Canvas)	Canvas
2	Equilibrium, transformation of stresses, principal stresses	1.1 to 1.7 1.8 to 1.10	1, 2 8, 9
3	Mohr's circle for stress Three-dimensional stresses	1.11 1.12 to 1.14	10, 11, 23 36, 47
4	Normal and shearing strains, strain tensor, compatibility, Transformation of strains	2.1 to 2.4 2.5 to 2.7	1, 3, 5 6, 12, 14
5	Stress-strain relations, Strain gages	2.8 to 2.10	25, 28, 29
	Exam No. 1		
6	Strain energy, St. Venant's principle	2.11 to 2.14	39, 41, 46
	Plane stress, Plane Strain Airy Stress Function	3.1 to 3.4 3.5 to 3.7	1a, 3, 4 5, 10, 16
7	Stress and strain in polar coordinates Stress concentration	3.8 to 3.9 3.10 to 3.11	24 36
8	Yielding /Failure Theories Comparison of Theories	4.1 to 4.8 4.9 to 4.12	3, 4, 6a 20
9	**Exam No. 2**		
	Axisymmetrically loaded members Shrink fit, Composite cylinders	8.1 to 8.4 8.5	1, 4, 11, 13 21, 24
10	Rotating disks	8.6 to 8.8	26, 28
11	Energy methods, Castigliano's Theorem Virtual Work, Ritz method	10.1 to 10.4 10.7, 10.8 to 10.11	3, 4, 5 30, 32
	Castigliano's Theorem applications		
12	Indeterminate Structures	Lecture 14 (Canvas)	Assigned in class
13	**Exam No. 3**		
14	Elastic stability of columns	11.1 to 11.6 11.7 to 11.9	2, 3, 5 21
15	**Final Exam**		