

SE503: Advanced Solid Mechanics

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	2	0	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p><u>Introduction:</u></p> <p>State of stress and strain at a point in two and three dimensions, stress and strain invariants, Hooke's law, plane stress and plane strain.</p> <p>Theories of Failure: Maximum principal stress and strain theory, maximum shear stress theory, Total strain energy theory, shear strain energy theory, octahedral shear stress derivation of equation for each and their application to problems.</p>	08
2	<p><u>Theory of elasticity:</u></p> <p>Two dimensional problems in Cartesian & polar co-ordinates, solution by Airy's stress function, stress concentration, problems of torsion, curved elements, membrane analogy method, stress function of circular plates.</p>	08
3	<p><u>Concept of stability:</u></p> <p>Static dynamic and energy criterion of stability, flexibility and stiffness criteria, buckling, post buckling stages, stability of columns, beams, inelastic building, Beams – Column, Stability of frames, methods applied to stability problems.</p> <p>Stability of multistories buildings, water tanks, Dams, Retaining walls, bridges and Chimnies.</p>	10
4	<p><u>Introduction Structural Reliability:</u></p> <p>Basic Statistics Theory of Probability, Probability Distributions (Continuous & Discrete), Random Variables, Implicit Performance Function, Polynomial Response, Surface Method (RSM), Stochastic Response Surface Method (SRS), Stochastic Models of Loads, Code Calibration, Partial Safety Factors, LRFD Format, System Reliability.</p>	16
Total Hrs.		42

Reference books:

1. N. Filonenko Borodich, "*Theory of elasticity*", Peace Publishers Moscow.
2. S. P. Timoshenko and J.N.Goodier, "*Theory of elasticity*", McGraw-Hill book Company.
3. Don O. Brush and B. O. Almorth, "*Buckling of bars, plates and shells*", McGraw-Hill Kogakusha.
4. S. P. Timoshenko and J.M. Gere, "*Theory of elastic stability*".
5. Chajes, "*Principles of structural stability theory*".
6. N.G.R. Iyengar, "*Structural stability of plates and shells*".
7. G.J.Siitses, "*An introduction to elastic stability to structure*".
8. R. S. Lehri, "*Atreangth of Material*".