

Content Product
Detailed syllabus
MECHANICS OF SOLIDS

UNIT I - STRESS AND STRAIN

Stress and strain – Introduction, Stress, Normal stress, Compressive stress, Tensional stress, Shear stress, Strain, Hooke's law, Relationship between stress and strain in one dimensional, Relationship between stress and strain in two dimensional, Relationship between stress and strain in three dimensional, Analysis of bars of varying sections, Analysis of bars of composite sections, Principle of superposition. **Elastic constant** -Modulus of elasticity, Bulk modulus, Relation between young's modulus E and rigidity modulus (C), Relation between young's modulus (E) and bulk modulus (K), Relation between young's modulus (E) and rigidity modulus (C) and bulk modulus (K), Problems. **Stress strain diagram** -Stress strain diagram, Stress strain diagram for mild steel, Stress strain diagram for high strength steel, Stress strain diagram for concrete, Factor of safety, Problems. **Thermal stresses** - Thermal stresses definition, Problems, Thermal stresses in composite bars, Problems. **Thin cylinders and shells** – Introduction, Thin cylindrical shells, Circumferential or hoop stresses, Longitudinal stresses, Maximum shear stress, Efficiency of a joint, Problems, Effect of internal pressure on the dimensions of a thin cylindrical shell, Problems, Thin spherical shells, Problems. **Strain energy** - Strain energy, Strain energy stored in a body when load is applied gradually, Strain energy stored in a body when load is applied suddenly, Strain energy stored in a body when the load is applied with impact, Problems.

UNIT II - SHEAR AND BENDINGS IN BEAMS

Introduction to beams, loads and supports - Introduction to beam, Bending in beams, Types of supports, Types of beam based on support, Types of loads. **Shear force and bending moment** -Shear force, Bending moment, Shear force and bending moment diagram, Relationship between bending moment and shear force. **SFD and BMD for cantilever beam** -SFD and BMD for cantilever beam with point load at the free end, SFD and BMD for cantilever beam with point load at a distance of a from fixed end, SFD and BMD for cantilever beam with uniformly distributed load on whole span, SFD and BMD for cantilever beam subjected to UDL over a part of span from fixed end, SFD and BMD for cantilever beam carrying a uniformly varying load, Problems. **SFD and BMD for simply supported beams** -SFD and BMD for simply supported beam with central point load, SFD and BMD for simply supported beam with eccentric point load, SFD and BMD for simply supported beam with UDL thought the span, SFD and BMD for simply supported beam with carrying uniformly varying load, Problems. **SFD and BMD for overhanging beam** - SFD and BMD for overhanging beam, Problems. **Theory of simple bending** - Bending stress, Theory of simple bending, Pure bending, Moment of resistance, Derivation of bending equation, Bending stress in symmetrical and unsymmetrical section, Section modulus Problems based on bending equation. **Shear stress** - Introduction to shear stress, Shear stress distribution, Shear stress distribution in rectangular section, Shear stress distribution in circular section, Shear stress distribution in I section, Problems on shear stress. **Composite or flitched beam** - Composite or flitched beam, Bending stress in flitched beam, Problems.

UNIT III - DEFLECTION OF BEAMS

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Deflection of beam – Introduction, Beam deflection, Deflection and slope of a beam subjected to uniform bending moment, Relation between slope, deflection and radius of curvature. **Double integration method** -Introduction to Double integration method, Deflection of a simply supported beam carrying a point load at the centre, Deflection of a simply supported beam with an eccentric point load, Deflection of a simply supported beam with an eccentric point load (Case II), Deflection of cantilever with a point load at the free end , Deflection of a cantilever with a point load at a distance 'a' from the fixed end, Deflection of a cantilever with a uniformly distributed load, Deflection of a cantilever with a uniformly distributed load for a distance 'a' from the fixed end, Deflection of a cantilever with a uniformly distributed load for a distance 'a' from the free end, Problems. **Macaulay's method** - Introduction to Macaulay's method, Deflection of a simply supported beam with an eccentric point load, Problems. **Moment area method** - Introduction to moment area method, Derivation for slope and deflection by using moment area method, Slope and deflection of a simply supported beam carrying a point load at the centre by Mohr's theorem, Slope and deflection of a simply supported beam carrying a uniformly distributed load by Mohr's theorem, Problems. **Conjugate beam method** - Introduction to conjugate beam method, Conjugate theorem, Problems.

UNIT IV - TORSION

Shafts - Introduction to shafts, Torsion, Torsion in shafts. **Design of shafts** - Introduction of shaft design, Assumptions for torsional equation, Torsional equation for solid circular shafts, Torsion in hollow circular shaft, Torsional rigidity and modulus of rupture, Power transmission, Problems, Comparison of hollow shaft and solid shaft, Problems. **Composite shafts** - Introduction to composite shafts, Shaft connected in series, Shafts in parallel, Problems, Combined bending and torsion, Problems. **Springs** - Definition of spring, Commonly used spring materials, Classifications of springs. **Closed coiled helical springs** - Closed coiled or tension helical springs, Closed coiled helical springs with axial load, Problems, Closed coiled helical springs with axial twist, Problems. **Open coiled helical springs** -Open coiled or Compression helical springs, Open coiled helical springs with axial load, Open coiled helical springs with axial thrust, Stress in circular wire of open coiled spring, Problem, Terms used in helical springs, Rectangular and square cross section wire springs. **Springs in series and parallel** -Springs in series and parallel, Problems. **Buffer springs** -Introduction to buffer springs, Problem.

UNIT V - COMPLEX STRESSES AND PLANE TRUSSES

Principal plane and stress – Introduction, Principal plane and stresses, A member subjected to a direct stress in one plane, The member is subjected to like direct stresses in two mutually perpendicular directions, Problems. **Mohr's circle** - Mohr's circle, A body subjected to two mutually perpendicular principal tensile stresses of unequal intensities, A body subjected to two mutually perpendicular principal stresses which are unequal and unlike, Problems. **Plane trusses** – Introduction, Components of truss, Classification of truss, Problems. **Analysis of truss** - Analysis of truss, Assumptions made in analysis of truss. Method of joint, Method of section, Comparison between method of joint and sections. **Method of joints** -Steps for analysis of frame by method of joint, Problems. **Method of section** -Steps for analysis of truss by method of section, Problems.