

# GUJARAT TECHNOLOGICAL UNIVERSITY

Semester: 1

## PDDC- MECHANICAL ENGINEERING

Subject Name    Strength of Material

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Sr.No	Course content
1.	Mechanical properties of materials : Metals - ductility, brittleness, toughness, malleability, behavior of ferrous and non-ferrous metals in tension and compression, shear and bending, standard test pieces, influence of various parameters on test results, true and nominal stress, mode of fracture, characteristic stress-strain curves strain hardening, hardness, different methods of measurement, impact tests, fatigue test, endurance limit, creep of metal, co-relation between different mechanical properties, effect of temperature, testing machine and special features, different types of extensometer and compressometer, measurement of strain by electrical strain gauges.
2.	Shear force and Bending moment : B.M. & S.F. Diagrams in statically determinate beams subjected to concentrated, U.D. and varying loads as well as in-plane moment loading, relation between bending moment, shear force and rate of loading, point of contraflexure.
3.	Torsion : Torsion of solid and hollow circular section shafts, shear stress and strain due to torsion, angle of twist, torsional moment of resistances, power transmitted by a shaft, keys and coupling, combined bending and torsion.
4.	Strain energy: Resilience, strain energy in tension, compression, shears, bending and torsion, Proof resilience, modulus of resilience, Impact loads, resilience in case of compound stresses.
5.	Principal stresses and strains: Compound stresses analysis of principal planes and principal stresses, Mohr circle of stress, principal strains, angle of obliquity of resultant stress, principal stresses in beams, principal stresses in shafts subjected to bending and torsion with and without axial stress.
6.	Slope & deflections: Double integration method, Macaulay's method, moment area method, strain energy method.
7.	Riveted and Welded joints: Riveted and welded joints subjected to eccentric loading.
8.	Fixed and continuous beams: B.M. & S.F. Diagrams for various load conditions, moment distribution method for continuous beams.

## **Reference Books:**

1. Mechanics of Structures Vol. I S. B. Junnarkar & H. J. Shah
2. Mechanics of Materials E. P. Popov
3. Strength of Materials G. H. Ryder
4. Mechanics of Materials Timoshenko & Gere