

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Aeronautical Engineering

Subject Code 130103

Subject Name Analyses of Mechanism and Machine Elements

Sr.No	Course content
	Analysis of Mechanism
1.	Introduction to mechanism & machine : link, kinematic pair, degrees of freedom, classification of kinematic pairs, inversions of four bar chain, slide crank mechanism & double slider crank mechanism.
2.	Velocity and Acceleration analysis . Velocity analysis: Absolute & relative motion, vectors, motion of a link, Velocity analysis of four-link mechanism & slider crank mechanism, angular velocity of links, velocity of rubbing, I- centre method, Kennedy's theorem, and centrode. Acceleration analysis: Acceleration, Acceleration analysis of four-link mechanism & slider crank mechanism, coriolis acceleration component, crank & slotted lever mechanism.
3.	Force Analysis . Static force analysis: Introduction to static force analysis, superposition, principle of virtual work, Dynamic force analysis: D'Alembert's principle, dynamic analysis of slider crank chain, velocity & acceleration of piston, engine force analysis, inertia of connecting rod.
	Analysis of Machine elements
4.	Introduction to Simple Stresses : Definition, classification, general procedure, physical & mechanical properties of materials, stress strain diagram, Tensile stress & strain, compressive stress & strain, shear stress & strain, crushing & bearing stress, factor of safety, linear & lateral strain, Poisson's ratio, volumetric strain, impact stress.
5.	Torsional and Bending stresses : Torsional shear stress, shafts subjected to torsion, shafts in series & parallel, bending stress in straight beams. Maximum principal stress theory, Maximum shear stress theory, Maximum strain energy theory, Maximum distortion energy theory.

6.	<p>Riveted and Welded joints .</p> <p>Riveted joints: Methods of riveting, types of rivet heads, types of riveted joints, terminology, and strength of a riveted joint, efficiency of a riveted joint, riveted joints for structural use.</p> <p>Welded joints: Advantages & disadvantages of welded joints over riveted joints, welding processes, types of welded joints, strength of transverse fillet welded joint, strength of parallel fillet welded joint, strength of butt joint, stresses on welded joints, axially loaded unsymmetrical welded section, eccentrically loaded welded joints.</p>
7.	<p>Pressure vessels:</p> <p>Classification, stresses in thin shell cylinders due to internal pressure, Hoop stress, longitudinal stress, change in dimension, thick cylindrical shell subjected to internal pressure, compound cylindrical shell.</p>
8.	<p>Shafts :</p> <p>Types of shafts, material of shafts, ASME codes for shaft design, stresses in shaft, design of shafts subjected to twisting moment only, design of shafts subjected to bending moment only, design of shafts subjected to combined twisting & bending, design of shafts subjected to axial load in addition to combined twisting & bending. Combined twisting & bending, design of shaft on the basis of rigidity.</p>

Reference Books:

1. Theory of Machines by S.S.Ratan
2. Theory of Machines and mechanisms by P.L.Ballaney
3. Machine design by R.K.Jain
4. Design of machine elements by V.B. Bhandar
5. Design of Machine elements by R S Khurmi.