

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: VI

### Mechatronics Engineering

Subject Name: **Design of Mechanisms – I**

Subject Code: **162001**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	Generalized design procedure, Preferred Numbers, Standardization, Material designation and Selection, Factor of safety, Allowable stresses, Stress Concentration and Remedies	5
2.	Basic Loads and Stresses such as tensile, compressive, bending, shear, bearing, torsion etc., combine and eccentric loading, Principal Stresses and Strains, Theories of elastic failures	8
3.	Design of Operational Joints such as Socket and Spigot Joint of Cotter type, Sleeve and cotter Joint, Knuckle Joint, Turn Buckle	6
4.	<b>Design of Columns:</b> Slenderness Ratio, Euler's Formula, End fixity coefficients, Rankine Formula, Design of Push Rod	4
5.	<b>Design of Springs:</b> Closed Coil Helical Springs, Concentric Springs, Introduction to Leaf Springs	4
6.	Design of Screw Jack, Lead Screw, Toggle Jack	6
7.	Design of Hand and Foot Lever, Lever of Lever Loaded Safety Valve, Rocker Arm, Bell Crank Lever	5
8.	<b>Design of shaft and Key:</b>  Hollow and Solid Shaft Design based on strength and rigidity, Rectangular and Square Key design, Introduction to Splines	6
9.	Design of Thin Cylinders	2
10.	Design of Bolted Joints with several cases	4

**Text Books:**

1. U C Jindal  
Machine Design  
Pearson Education
2. Pandya & Shah  
Machine Design  
Charotar Publishing House

**Reference Books:**

1. Shigley J. E  
Mechanical Engineering Design  
McGraw Hill
2. Robert L. Norton  
Machine Design: An Integrated Approach  
Pearson Education Publication
3. Bhandari V. B.  
Introduction to Machine Design  
Tata McGraw Hill
4. Bernard J. Hamrock, B. O. Jacobson,  
Steven R. Schmid  
Fundamentals of Machine Elements  
McGraw Hill International Edition

**List of Laboratory Exercises:**

1. Assembly drawing
2. Design and Drawing of Various Joints
3. Design and Drawing of Screw Jack, Toggle Jack
4. Design and Drawing of levers and Bolted joints