INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING)**
SEMESTER	**4**
COURSE TITLE	**MACHINE DESIGN & INDUSTRIAL DRAFTING**
COURSE CODE	**01ME2401**
COURSE CREDITS	**4**

Objective:

1 The course objectives is to impart basic skills for problem oriented depth knowledge and basic skills for analysis of mechanical components and address the underlying concepts and method behind the machine design and industrial drafting

2 The course objectives is to impart basic skills for problem oriented depth knowledge and basic skills for analysis of mechanical components and address the underlying concepts and method behind the machine design and industrial drafting.

Course Outcomes: After completion of this course, student will be able to:

1 Students will be able to understand the stresses in machine elements due to various types of loads.

2 Students will be able to understand different theories of failure and their application to the design of machine elements.

3 Students will be able to design and analyze various joints and fasteners.

4 Students will be able to design and analyze shaft, key, and coupling.

5 Students will be able to design and analyze the lever and column for stresses and deflection.

Pre-requisite of course: Engineering Graphics, Fundamentals of Machine Design.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Principal Stresses** Two-dimensional stress system. Evaluation of stresses in an inclined plane for members subjected to orthogonal stresses, Definition of principal plane, principal stresses, angle of obliquity, and resultant stress, : Evaluation of Principal plane and principal stresses using analytical method, Analysis of Principal stresses and principal planes for two-dimensional stress system, Application of Mohr's circle and ellipse of stress	6

Contents : Unit	Topics	Contact Hours
2	**Design concepts of Mechanical Components** Different theories of Failures and its limitation and application for Different theories, Distortion energy, Maximum Shear stress,, Maximum Principal stress, Coulomb-Mohr Theory, Factor of safety and its different parameters for selection, Selection of theories of failures and Use of theories of failures, Contact stresses, Crushing and Bearing pressure	6
3	**Design of mechanical joints: Temporary joints:** Cotter and Knuckle joints: Design of Cotter and Knuckle Joints, Screw and nut: Different types of thread for Single as well as Multiple threaded screw, screw fastening and its types, Cap and Set screw, concept of uniform strength in bolt, locking devices, Different Terms of Screw thread, Torque calculation for bolt tightening., Design of power screw: Different terms used to describe power screw, Calculation of torque required for lifting and lowering of Load, , Efficiency of threads, Self-locking phenomenon, Co-efficient of friction	10
4	**Design of mechanical joints: Permanent joints** Welded joints: Different types of welded joints and stress relieving methods in weld joints, Strength of butt and fillet joint, , welded joint subjected to bending and torsion, Riveted joints: material selection and criteria for rivet joints and types of its failure, riveted joints efficiency and strength calculation, strengthen method for riveted joints like Caulking and Fullering, longitudinal lap joint, Eccentric loading condition in riveted joint, Eccentric loading in the plane of weld, Circumferential lap joint	10
5	**Design of shaft** Design of solid and hollow circular shaft subjected to torque as well combined loading, Design of shaft based on rigidity and stiffness	10
6	**Design of machine component** Design of key: Saddle, Sunk,, Woodruff, Square, and Flat., Design of coupling: Design and Concept of Couplings, Rigid coupling, Flexible coupling	6
7	**Design of lever** Cranked, Bell crank, Foot, Rocker arm , Type of loading compressive axial loading of columns, Type of loading compressive axial loading of struts	6
8	**Limit, Fit, Tolerance & Surface Roughness:** Clearance, Maximum Metal Condition, Least Metal Condition, Types of Fits with application, Basis of Limit System, BIS system of fits and tolerances, Geometric tolerance, symbols and tolerance modifiers, Different aspects of datum, Parameters of surface texture and qualifications, Relation of surface roughness and various manufacturing processes, Surface Lay Indication, Basic terminology of GD & T, Allowance	8
Total Hours		**62**

Textbook :

1 Design of Machine Elements, V B Bhandari, McGraw Hill, 2020
2 Machine Design: Fundamentals and Applications, P C Gope, PHI Learning, 2020
3 Design of Machine Elements, Sadhu Singh, Khanna Publishers, 2019
4 Strength of Materials, Dr Sadhu Singh, Khanna Publishers , 2016
5 Strength of Materials, S. Ramamrutham & R. Narayanan, Khanna Publishers , 2020

References:

1 Design of Machine Elements, Design of Machine Elements, V B Bhandari, McGraw Hill, 2002
2 Machine Design: An Integrated Approach, Machine Design: An Integrated Approach, R L Norton, Pearson, 2021
3 Shigley's Mechanical Engineering Design, Shigley's Mechanical Engineering Design, Richard Budynas, Keith Nisbett, McGraw Hill, 2020
4 Design of Machine Elements, Design of Machine Elements, C. S. Sharma, Kamlesh Purohit, PHI Learning, 2003
5 Machine Design, Machine Design, Abdul Mubeen, Khanna Publishers, 2020
6 Machine Design - Solved Problems, Machine Design - Solved Problems, S. G. Kulkarni, Tata McGraw Hill Publishing Company, 2019

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	20.00	20.00	20.00	10.00

Supplementary Resources:

1 https://nptel.ac.in/courses/112/105/112105124/
2 https://swayam.gov.in/
3 https://www.coursera.org