

MMPC3001 DESIGN OF MACHINE ELEMENTS (3-0-0)

Course Objectives :

This course introduces the fundamental principles and systematic procedures involved in the design of machine elements. It emphasizes material selection, stress analysis, fit and tolerance, and safety considerations. Students learn to design various mechanical components like joints, shafts, springs, couplings, and bearings using engineering standards and data handbooks.

Module - I: (06hrs)

Mechanical Engineering design: Introduction to design procedure, Stages in design, Code and Standardization, Interchangeability, Preferred numbers, Fits and Tolerances, Factor of safety concept, Engineering materials: Ferrous, Non-ferrous, design requirements – Properties of Materials, Material selection, Use of Data books.

Module - II: (06 hrs)

Machine Element Design: Design of Joints: Rivets, Welds and threaded fasteners based on different types of loading, Boiler joints, cotter joints and knuckle joints.

Module - III: (06hrs)

Design of Keys, Shaft and Couplings: Classification of keys and pins, Design of keys and pins, Design of shafts: based on strength, torsional rigidity and fluctuating load, ASME code for shaft design, Design of couplings: Rigid coupling, Flexible coupling.

Module - IV: (06hrs)

Design of Mechanical Springs: Types of helical springs, Design of Helical springs, bulking of spring, spring surge, end condition of springs, Design of leaf springs: nipping.

Module - V: (06hrs)

Bearings: Types and selection of ball and roller bearings, Dynamic and static load ratings, Bearing life, Design of sliding contact bearings, Journal bearing, foot step bearing.

Course Outcomes :

After successful completion of this course, students will be able to:

- CO1: Understand the design principles, material selection, and standardization concepts in mechanical design. (Understand)
- CO2: Apply various codes, standards, and data handbooks in designing machine elements under different loading conditions. (Apply)
- CO3: Analyze the strength, rigidity, and performance of machine elements such as riveted joints, shafts, and couplings. (Analyze)
- CO4: Evaluate the suitability of mechanical springs and bearings for specific engineering applications. (Evaluate)
- CO5: Design practical mechanical components like joints, shafts, springs, and bearings ensuring functionality, safety, and reliability. (Create)

TEXTBOOKS:

1. Mechanical Engineering Design, J.E.Shigley, C.R.Mischke, R.G.Budynas and K.J.Nisbett, TMH.
2. Design of Machine Elements, V.B.Bhandari, Tata McGraw Hill

REFERENCEBOOKS:

1. Machine Design, P.Kanaiah, Scietech Publications
2. Fundamentals of Machine Component Design by R.C.Juvinall and K.M.Marshek, JohnWiley & Sons

3. Machine Design, P.C.Sharmaand D.K.Agrawal, S.K.Kataria&Sons
4. Machine Design, Pandyaand Shah, Charotar Book Stall
5. Machine Design, Robert L.Norton, Pearson Education Asia.

DESIGN DATA HANDBOOKS:

1. Design Hand Book by S.M.Jalaluddin; Anuradha Agencies Publications
2. P.S.G.Design Data Hand Book,PSG College of Tech Coimbatore
3. Design Data HandBook, K.Lingaiah, McGrawHill, 2ndEd. 2003.
4. Design Data Hand Book by K.Mahadevanand B.Reddy, CBS Publishers