

MINOR (CP)

**MACHINE DYNAMICS AND DESIGN (4-0-0) PME7G001**

[Only specified design data book as mentioned in the syllabus is permitted during examination]

**Module – I : (10 Lectures)**

**1. Kinematic fundamental:** Basic Kinematic concepts and definitions, Degrees of freedom, Elementary Mechanism : Link, joint, Kinematic Pair, Classification of kinematic pairs, Kinematic chain and mechanism, **Grübler's** criterion, Inversion of mechanism, Inversions of Four bar linkage, Single slider crank mechanism and Double slider crank mechanism.

**2. Mechanism Trains :** Gear Terminology and definitions, fundamental law of gearing, Spur, bevel, helical, worm gears. Analysis of mechanism Trains: Simple Train, Compound train, Reverted train, Epicyclic train and their applications.

**Module – II : (10 Lectures)**

**3. Friction Effects:** Friction between pivot and collars, single, multi-plate and cone clutches, friction circle, friction axis. Classification of brakes, Analysis of internal expanding shoe brake, Absorption and transmission dynamometers, Rope brake dynamometer, Belt transmission dynamometer, Belt drives, Initial tension, Effect of centrifugal tension on power transmission, Maximum power transmission capacity, Belt creep and slip.

**4. Mechanism for Control:** Turning moment diagram, Turning moment diagrams for different types of engines, Fluctuation of energy and fluctuation of speed, Dynamic Theory of Flywheel. Governors - Watt, Porter, Proell, Hartnell, Wilson-Hartnell Governor, Performance parameters: Sensitiveness, Stability, Hunting, Isochronism. Introduction to Gyroscopes, Gyroscopic forces and Couple.

**Module – III : (6 Lectures)**

**5. Mechanical Engineering Design:** Introduction to design procedure, Stages in design, Code and Standardization, Interchangeability, Preferred numbers, Fits and Tolerances, Design requirements – properties of materials, Material selection, Use of Data books.

**6. Fundamentals of Machine Design:** Types of load, Modes of failure, factor of safety concepts, concept and mitigation of stress concentration, Fatigue failure and curve, endurance limit and factors affecting it, Notch sensitivity.

**Module – IV : (10 Lectures)**

**7. Machine Element Design:** Design of Joints: Rivets and welds based on different types of loading, Boiler joints, Socket and Spigot cotter joint and knuckle joint.

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

**Text Books**

1. Kinematics and Dynamics of Machinery by R L Norton, Tata MacGraw Hill
2. Theory of Machines and Mechanisms by John J. Uicker Jr., Gordon R. Pennock and Joseph E. Shigley, Oxford University Press
3. Theory of Machines by S.S.Rattan, Tata MacGraw Hill
4. Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill
5. Mechanical Engineering Design, J.E.Shigley, C.R.Mischke, R.G.Budynas and K.J.Nisbett, TMH

**Reference Books**

1. Theory of Machines by Thomas Bevan, CBS Publications
2. Mechanism and Machine Theory by J.S.Rao and R.V.Dukipatti, New Age International.
3. Theory of Mechanisms and Machines by A. Ghosh & A. K. Mallick, East West Press.  
Machine Design, P.C.Sharma and D.K.Agrawal, S.K.Kataria& Sons
4. Machine Design, Robert L. Norton, Pearson Education Asia.
5. Design of Machine Elements by C. S. Sharma and K. Purohit, PHI

**DESIGN DATA HAND BOOKS:**

1. P.S.G. Design Data Hand Book, PSG College of Tech Coimbatore
2. Design Data Hand Book, K. Lingaiah, McGraw Hill, 2nd Ed. 2003.
3. Design Hand Book by S.M.Jalaluddin ; Anuradha Agencies Publications
- 4 .Design Data Hand Book by K.Mahadevan and B.Reddy,CBS Publisher.