ME6T2   **DESIGN OF MACHINE MEMBERS - II**   **Credits: 4**

Lecture:- 4 periods/week   **Internal assessment: 30marks**
Practice: -1 periods/week   **Semester end examination: 70 marks**

Objectives:

1. Design various types of shafts when they subjected to different types of loading
2. Evaluate sizes of keys and couplings
3. Analyze the mechanical power drives by considering the stresses and interrelationships among the elements.
4. Implement basic principles for design of power screws

Learning outcomes:

At the end of course the students will be able to:

1. Evaluate the sizes of shafts under different load applications.
2. Estimate the sizes of suitable keys and couplings for transmission elements.
3. Design the bearings under various environmental and service conditions.
4. Apply the design concepts to evaluate the strength of the gear
5. Analyze power screws to ensure safe operation

Pre-Requisites:

Design of Machine Members-1, Dynamics of Machinery

UNIT - I
SHAFTS:
Design of solid and hollow shafts for strength – For Bending, Torsion, Combined bending and torsion and combined bending, torsion and axial loads

UNIT - II
KEYS & COUPLINGS:
Types of Keys, Design of square and flat keys, Rigid couplings – Muff, split muff and flange couplings, Flexible coupling- Modified Flange coupling

UNIT - III
BEARINGS AND LUBRICATION:
 Lubrication, Types of lubrications, types of lubricants, properties of lubricants, types of Bearings, Bearing materials, Journal bearing design (using Mckee's equation and Raymond and Boyd charts & tables)

UNIT - IV
BALL AND ROLLER BEARINGS:
Static load, Dynamic load, Equivalent radial load, selection of ball and roller bearings

UNIT – V
BELT DRIVES:
Flat and V-belts, Belt constructions, Geometrical relationships, Analysis of belt tensions, condition for maximum power, Selection of V-belts – Selection of Pulleys.

UNIT – VI
POWER SCREWS:
Types - Mechanics of power screws, efficiency, Design of Screw Jack.

UNIT - VII
SPUR GEARS :
Classification of gears, Terminology of spur gear, standard systems of Gear Tooth, Force analysis, Gear tooth failures, Selection of material, Beam Strength of gear teeth, lubrication, Lewis Equation.

UNIT - VIII
HELICAL GEARS:
Terminology of helical gears, virtual number of teeth, Tooth proportions, force analysis, Beam Strength of helical gears, effective load on gear tooth, wear strength of helical gears, Lewis Equation.

Learning resources

Text books:

1. Design of Machine Elements, (3^{ed} Edition), by V. B. Bhandari, Tata McGraw Hill Publishers, New Delhi, 2010.
2. A Textbook of Machine Design (SI Units), (12th Edition Dr. P. C. Sharma, Dr. D. K. Aggarwal, , S. K. Kataria & Sons, New Delhi.

Reference books:

1. Design of Machine Elements, by C. S. Sharma, Kamlesh Purohit, , Prentice Hall of India Private Limited (PHI), New Delhi, 2009.
2. Machine Design an Integrated Approach, (Second Edition) , Robert L. Norton, Pearson Publishers, New Delhi, 2002.

3. Mechanical Engineering Design, (6th Edition), Joseph Shigley, Charles Mischke, , Tata McGraw Hill Publishers, New Delhi, 2003.
4. Design of Machine Elements, (Second Edition), by P. Kannaiah, Scitech Publications India Private Limited, Chennai, 2009.

DATA BOOKS TO BE ALLOWED IN EXAMINATION:

1. Design Data (Data Book for Engineers), P.S.G. College of Technology, Revised Edition, Coimbatore, 2004.
2. Design Data Hand Book, (First Edition), by S. Md. Jalaluddin, , , Anuradha Publications, Chennai, 2009.