MEPE4004 TRIBOLOGY (3-0-0)

Course Outcome

1. Understand and apply tribological principles to analyze friction, wear, and lubrication in mechanical systems.
2. Evaluate surface contact characteristics and their influence on tribological performance.
3. Analyze and compare different wear mechanisms to predict material degradation and improve component lifespan.
4. Apply lubrication techniques to minimize friction and enhance system efficiency.
5. Application of Antifriction Bearing.

Module I: Introduction and Surface contact (6 hours)

Introduction to tribology, history of tribology, inter-disciplinary approach, economic benefits. Introduction to surface, surface roughness and its measurement, conformal and non-conformal contact geometry, types, and stresses in non-conformal contact.

Module II: Friction (8 hours)

Causes of friction, adhesion theory, abrasive theory, junction growth theory, laws of rolling friction, friction instability, friction of nonmetallic materials.

Module III: Wear (8 hours)

Introduction, Wear mechanisms, adhesive wear, abrasive wear, corrosive wear, fretting wear, wear analysis, delamination theory of wear, wear debris analysis, wear testing methods.

Module IV: Bearings and Lubrication (8 hours)

Boundary lubrication, basic equations for fluid film lubrication, hydrodynamic journal bearing, liquid lubricants: properties and measurement, additives.

Module V: Antifriction Bearing (6 hours)

Introduction, Study on antifriction bearing, Life of antifriction bearing.

Test Books

1. Ian Hutchings, Philip Shipway, Tribology: Friction and Wear of Engineering Materials, Butterworth-Heinemann Ltd , 2020
2. Kenneth C. Ludema, Oyelayo O. Ajayi, Friction, Wear, Lubrication: A Textbook in Tribology, CRC Press , 2021

Reference Books

1. Bharat Bhushan, Introduction to Tribology, Wiley , 2020
2. A. Cameron, C. M. Mc. Ettles, Basic Lubrication Theory, Ellis Horwood Ltd, Publisher , 2024