

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E4 TRIBOLOGY	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The basic objective of the subject is to deal fundamentals of friction, wear and lubrication.
2. The subject is useful in understanding the nature of surfaces of engineering materials.
3. The basic objective of the subject is to learn about types of lubricants.
4. The subject is useful in understanding the various tribological applications.

Pre requisite(s): Material Science, Machine Design I & II.

COURSE CONTENTS

UNIT- I

Fundamentals of Tribology: Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques, statistical description.

UNIT- II

Friction of Surfaces: Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods, friction of non metallic materials.

UNIT- III

Wear Mechanism: Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-IV

Theory of Lubrication: Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring, Additives in lubricants.

UNIT- V

Design for Tribological Elements: An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Basic Equation for fluid film lubrication Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication.

Learning Outcomes:

Upon completing the course, student will be able to:

1. Understand and importance of Tribological phenomenon
2. Optimize the friction and wear rate.
3. Understand the wear mechanism.
4. Determine the application of Lubricants.

BOOKS RECOMMENDED:

- [1] Moore F Desmond ,*Principals and application of Tribology*, Pergamon press,1975
- [2] Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- [3] Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- [4] Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999.

LIST OF PRACTICAL ASSIGNMENTS

1. Performance analysis of Journal Bearings.
2. Experimental analysis of Lubricants.
3. Experimental analysis of Friction on different material.
4. Study of method for Wear Debris analysis.
5. Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.