Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Semester I (Full Time)			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
DTR1C1 **Tribology**	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objective:

- The basic objective of the subject is to deal fundamentals of friction, wear and lubrication.
- The subject is useful in understanding the nature of surfaces of engineering materials.
- The Pre requisites are material science and machine design.

Prerequisite: Material Science , Machine Design

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.

UNIT- II

Friction:

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.

UNIT- III

Wear:

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

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.

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, Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication, Design of hydrodynamically loaded journal bearing, externally pressurized bearing, rolling element bearing, performance analysis of bearing.

Learning Outcomes:

Upon Completing the course, student will be able to

1. Analyze the friction wear and lubrication related problems in different machining process,
2.Explain behavior of ferrous and non ferrous material for different tribological conditions.
3.Find outcomes on related machines.

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

LABORATORY EXPERIMENTS:

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