

COURSE CODE	INDUSTRIAL TRIBOLOGY	L	T	P	C
1152ME109		3	0	0	3

1. Preamble

This course provides knowledge of various engineering surfaces and friction in mechanical systems. It also introduces concepts associated with devices such as design of surfaces lubrication of surfaces, wear and tear.

2. Prerequisite

Engineering Materials and Metallurgy

1151ME117

3. Links to other courses

Project Work

4. Course Educational Objectives

Students undergoing this course are expected to

- Describes the material characteristics and friction problems arising due to the advanced technology
- Explains and provides knowledge on the wear theory and wear measuring instruments.
- Analysis of various types of bearing control methods for solving the problems arising due to them
- Discusses the various lubrication method and testing method
- Description of surface modification methods and marginal lubrication method and its impacts on sustainable development and its control methods

5. Course Outcomes

The students would be benefitted with the following outcomes:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describes the friction characteristics metals, and friction metals energy and their advantages and disadvantages.	K2
CO2	Discusses the various types wear and measurement of wear	K2
CO3	Analysis and classification of various Viscous flow between very close parallel plates measures to solve the problems.	K2
CO4	Distinguishes between hydrodynamic lubrication, Boundary Lubrication and Solid Lubrication Hydrostatic Lubrication.	K2
CO5	Assessment of Materials for fluid film bearings and Materials for marginally lubricated and dry bearings.	K2

(K3 - apply)

6. Correlation of COs with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	L										M	M	L
CO2	M	L										M	M	L
CO3	M	L										M	M	L
CO4	M	L										M	M	L
CO5	M	L										M	M	L

H- High; M-Medium; L-Low

7. Course Content

UNIT I SURFACES AND FRICTION

L – 9

Topography of Engineering surfaces- Contact between surfaces - Sources of sliding Friction – Adhesion ploughing- Friction characteristics of metals - Friction of nonmetals- Friction of ceramic materials and polymers - Rolling friction - Source of rolling friction -Stick slip motion - Measurement of friction.

UNIT II WEAR

L – 9

Types of wear - Simple theory of sliding wear mechanism -Abrasive wear – Materials for adhesive and abrasive wear situations - Corrosive wear - Surface fatigue wear situations - Corrosive wear- Surface fatigue wear – Wear of ceramics and polymers – Wear measurements.

UNIT III FILM LUBRICATION THEORY

L – 9

Fluid film in simple shear - Viscous flow between very close parallel plates - Shear stress variation Reynolds equation for film lubrication - High speed unloaded journal bearings - Loaded journal bearings –The Somerfield diagram.

UNIT IV LUBRICANTS AND LUBRICATION TYPES

L – 9

Types and properties of Lubricants - Testing methods - Hydrodynamic Lubrication - Elasto hydrodynamic lubrication- Boundary Lubrication - Solid Lubrication Hydrostatic Lubrication.

UNIT V SURFACE ENGINEERING AND MATERIALS FOR BEARINGS

L – 9

Surface modifications - Transformation hardening - Surface fusion - Thermo chemical processes – Surface coatings - Plating and anodizing - Materials for rolling element bearings - Materials for fluid film bearings - Materials for marginally lubricated and dry bearings.

TOTAL: 45 periods

8. Text Books

1. Hutchings, I. M., Tribology, Friction and Wear of Engineering Material, Edward Arnold, London, 1992.
2. Williams, J. A., Engineering Tribology, Oxford University Press, 1994.

9. Reference Books

1. Stolarski T. A., Tribology in Machine Design, Industrial Press Inc., 1990.
2. Bowden, E. P., and Tabor. D., Friction and Lubrication, Heinemann Educational Books Ltd., 1974
3. Cameron, A., Basic Lubrication theory, Longman, U.K., 1981
4. Neale, M. J., (Editor), Tribology Handbook, Newnes Butter worth, Heinemann, U.K., 1975
5. Nptel