Programme	Bachelor of Technology in Mechanical Engineering					Year of Regulation			2018
Department	Mechanical Engineering					Semester			V
Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 321	Tribology	3	0	0	3	50	50	100	200

Course Objectives	To understand basic principles of friction and tribology and able to classify various tribological properties of lubricants and their application.	Course Outcomes	CO1 To understand the properties of lubricant and select proper lubricant for a given application. (Understanding)
	To develop the skills to analyze and design methods to analyse various lubricant properties and use them for the practical application.		CO2 Determine tribological performance parameters of sliding contact in different lubrication regimes. (Applying)
			CO3 Design and select appropriate bearings for a given application. (Applying)
			CO4 Predict the type of wear and volume of wear in metallic and polymer surfaces. (Analyzing)

No.	COs	Mapping with Program Outcomes (POs)											Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	0	0	2	2	2	0	0	0	0	2	3	0	0
2	CO2	3	2	0	0	2	2	2	0	0	0	0	2	3	2	0
3	CO3	3	0	2	0	2	2	2	0	0	0	0	2	2	3	0
4	CO4	2	0	2	2	2	2	2	0	0	0	0	2	2	3	0

SYLLABUS

No.	Contents	Hours	COs
I	**Introduction** Overview of the course, history, Tribology definition, Tribology in design-bearing material, Tribology in industry (Maintenance), and basic concept of friction, wear, and Lubrication.	06	CO1
II	**Lubricants** Lubrication-Definition, types of lubricants, objectives of lubricant, physical properties of lubricants, selection of lubricant, additives, EP lubricants, Recycling of used oil, Oil conservation, oil emulsion, Bearing Terminology-types of sliding contact, rolling contact bearings. Comparison between sliding and rolling contact bearing, Lubrication in rolling, forging, drawing and extrusion, Surface engineering for wear and corrosion resistance-diffusion.	12	CO2
III	**Modes of Lubrication** Hydrodynamic, Hydrostatic, Elasto-hydrodynamic, mixed and boundary lubrication, Reynolds' equation, Applications of hydrodynamic lubrication theory - Journal bearing and Inclined thrust pad bearing, Hydrodynamic lubrication of roughened surfaces, Theories of Externally pressurized lubrication, Squeeze-film lubrication, Elasto-hydrodynamic lubrication and gas (air) lubrication.	12	CO3
IV	**Friction and Wear** Origin of sliding friction, contact between two bodies in relative motion, Types of wear and their mechanisms - Adhesive wear, Abrasive wear, Wear due to surface fatigue and wear due to chemical reactions, wear of metallic materials, Tribology of polymers.	10	CO4
	Total Hours	40	

Essential Readings

1. Stachowaik, G.W., Batchelor, A.W., Engineering Tribology, 3rd Ed., Elsevier, 2010.

2. Majumdar B.C, Introduction to bearings, S. Chand & Co., Wheeler publishing, 1999.

Supplementary Readings

1. Andras Z. Szeri, Fluid film lubrication theory and design, Cambridge University press, 1998.

2. Davis J., —Surface Engineering for Corrosion and Wear Resistance‖, Woodhead Publishing, 2001.

3. Cameron A., —Basic Lubrication Theory‖, Wiley Eastern Ltd.