

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MECHANICAL ENGINEERING**  
**B. E. SEMESTER: VII**

Subject Name: **Industrial Tribology (Department Elective -I)**  
Subject Code: **171905**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	2	0	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	<b>Introduction:</b>  Tribology in design, tribology in industry Viscosity, flow of fluids, viscosity and its variation -absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers,	<b>02</b>
	<b>1.1</b> Tribological considerations Nature of surfaces and their contact; Physic-mechanical properties of surface layer, Geometrical properties of surfaces, methods of studying surfaces; Study of contact of smoothly and rough surfaces	<b>04</b>
2.	<b>Friction and wear:</b>  Role of friction and laws of static friction, causes of friction, theories of friction, Laws of rolling friction; Friction of metals and non-metals; Friction measurements.	<b>03</b>
	<b>2.1</b> Definition of wear, mechanism of wear, types and measurement of wear, friction affecting wear, Theories of wear; Wear of metals and non-metals.	<b>03</b>
3.	<b>Hydrostatic lubrication:</b>  Principle of hydrostatic lubrication, General requirements of bearing materials, types of bearing materials., Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications,	<b>03</b>
	<b>3.1</b> Hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing, optimum design of hydrostatic step bearing	<b>03</b>
4.	<b>Hydrodynamic theory of lubrication:</b>	<b>04</b>

	Principle of hydrodynamic lubrication, Various theories of lubrication, petroffs equation, Reynold's equation in two dimensions -Effects of side leakage - Reynolds equation in three dimensions,	
	<b>4.1</b> Friction in sliding bearing, hydro dynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl, anti -friction bearing, hydrodynamic thrust bearing	<b>04</b>
<b>5.</b>	<b>Air/gas lubricated bearing:</b>  Advantages and disadvantages application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect	<b>05</b>
<b>6.</b>	<b>Lubrication and lubricants:</b>  Introduction, dry friction; Boundary lubrication; classic hydrodynamics, hydrostatic and elasto hydrodynamic lubrication, Functions of lubricants, Types of lubricants and their industrial uses; SAE classification, recycling , disposal of oils, properties of liquid and grease lubricants; lubricant additives , general properties and selection.	<b>06</b>
<b>7.</b>	<b>6.1</b> Special Topics: Selection of bearing and lubricant; bearing maintenance, diagnostic maintenance of Tribological components and considerations in IC engines and automobile parts, roller chains and wire rope, lubrication systems; Filters and filtration	<b>08</b>

### **Term Work:**

The term work shall be based on the topics mentioned above.

### **Practical / Oral:**

The candidate shall be examined on the basis of term-work.

### **Text Books:**

1. Fundamentals of Tribology, Basu, SenGupta and Ahuja/PHI
2. Tribology in Industry : Sushil Kumar Srivatsava, S. Chand &Co.
3. Tribology H.G.Phakatkar and R.R.Ghorpade Nirali Publications

### **Reference Books:**

1. Tribology – B.C. Majumdar, Tata McGraw Hill Co Ltd.
2. Standard Hand Book of Lubrication Engg., O'Conner and Royle, McGraw Hills C
- 3 Introduction to Tribology, Halling , Wykeham Publications Ltd.
4. Lubrication, Raymono O. Gunther; Bailey Bros & Swinfan Ltd.
5. Bearing Systems, Principles and Practice, PT Barwill
6. Tribology Hand Book, Michel Ncole