

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.	Introduction: 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,	02
	1.1 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	04
2.	Friction and wear: 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.	03
	2.1 Definition of wear, mechanism of wear, types and measurement of wear, friction affecting wear, Theories of wear; Wear of metals and non-metals.	03
3.	Hydrostatic lubrication: 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,	03
	3.1 Hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing, optimum design of hydrostatic step bearing	03
4.	Hydrodynamic theory of lubrication:	04

	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,	
	4.1 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	04
5.	Air/gas lubricated bearing: Advantages and disadvantages application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect	05
6.	Lubrication and lubricants: 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.	06
7.	6.1 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	08

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 Barwll
6. Tribology Hand Book, Michel Ncole