

5 <sup>th</sup> Semester	RAU5D002	Tribology	L-T-P 3-0-0	3 CREDITS
-----------------------------	----------	-----------	----------------	--------------

**MODULE-I (8HOURS)****Introduction**

Overview of the tribology concept, history and basic concept of friction wear. Lubricant and lubrication, Types of bearings, properties and testing of lubricants.

**Basic equations:** Generalized Reynolds equation, Flow and Shear Stress, Energy equation, Equation of state.

**MODULE-II (8HOURS)****Hydro dynamic lubrication:**

Mechanism of pressure development and load carrying capacity, Plane-slider bearing, Idealized slider bearing with a pivoted shoe, Step bearing, Idealized journal bearing, infinitely long journal bearing, Petroffs equation for a lightly loaded bearing, narrow bearing.

**MODULE-III (8 HOURS)**

**Oil flow and thermal equilibrium:** Heat balance of lubricants

**Hydrostatic Bearing:** Principles, Component of hydrostatic lubrication, Hydrostatic circular thrust bearing, calculation of pressure, load carrying capacity, flow rate, power loss in bearing due to friction.

**MODULE-IV (8 HOURS)**

Concept of gas lubricated bearing, Concept of Elastohydrodynamic lubrication, Design and selection of antifriction bearing

**MODULE-V (8 HOURS)****Friction and wear of metals:**

Theories of friction, surface contaminants, Effect of sliding speed on friction, types of wear and their mechanisms: adhesive wear, abrasive wear, wear due to surface fatigue, wear due to chemical reactions, wear of bearings, wear of metallic and non-metallic bearing materials, Wear resistant materials.

**Books:**

- [1] Introduction to Tribology of Bearing, B.C. Mujumdar, S. Chand & Co  
[2] Fundamentals of Tribology, Basu S K., Sengupta A N., Ahuja B. B., PHI 2006

- [3] Basic Lubrication theory, A. Cameron, John Wiley & sons
- [4] Lubrication Fundamentals, D.M.Pirro and A.A.Wessol, CRC Press
- [5] Theory and Practice of Lubrication for Engineers, Fuller, D., New York company 1998
- [6] Principles and Applications of Tribology, Moore, Pergamon press 1998
- [7] Tribology in Industries, Srivastava S., S Chand and Company limited, Delhi 2002
- [8] Lubrication of bearings – Theoretical Principles and Design, Redzimoskay E I., Oxford press company 2000

**Digital Learning Resources:**

***NPTEL MOOCs:***

Course Name: Tribology  
Course Link: <https://nptel.ac.in/courses/112/102/112102014/>  
Course Instructor: Dr. Harish Hirani, IIT Delhi