Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Industrial Tribology	MEM 502	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
II	4	3-1-0	3 Hours

Unit – I

Introduction: Historical background; Viscosity, Viscometry; Effect of temperature on viscosity; Effect of pressure in viscosity; Other physical properties of mineral oils; The generalized Reynolds equation; Flow and shear stress; The energy equation; The equation of state; Mechanism of pressure development. **(04 Hours)**

Unit – II

Surface Engineering: Concept and scope of surface engineering; Mathematical modeling and manufacturing of surface layers; Three dimensional structures of surface; Superficial layer and its parameters.

(08 Hours)

Unit – III

Contact Mechanism: Types of Contact, Conformal and no conformal: Hertizian stresses and elastic deformation. **(07 Hours)**

Unit – IV

Friction: Theory of friction-sliding and rolling friction; Friction properties of metallic and non metallic materials; Friction in extreme conditions.

(08 Hours)

Unit – V

Wear: Mechanism of wear; Wear resistant materials; Mechanism and types of corrosion; Measurement and testing of frictionW;ear and corrosion; Prevention of wear and corrosion. **(08 Hours)**

Unit – VI

Lubrication and Tribo-performance Measurements: Purpose of lubricants and their characteristics; Different types of lubricant sand their constitutive relations; Lubricants standards; Lubrication regimes; Hydrodynamic lubrication; Reynold's equation; Thermal, inertia and turbulent effects; Elasto, plasto and magneto hydrodynamic lubrication, hydrostatic, gas lubrication; Classification of fluid film bearings; Design of fluid film bearings; Design of air bearing and gas bearing.

Surface topography measurements; Eelectron microscope; Laser method; Instrumentation; International standards; Bearing performance indicators and their measurements; Bearings vibration measurement; Need; Failure mechanism and causes; Economics of condition monitoring; Condition monitoring methods; Vibration monitoring; Oil analysis; Noise and acoustic emission. **(10 Hours)**

Recommended Books:

1. Principles of Tribology; J. Halling, McMillan 1984.
2. Friction, Wear, Lubrication: A text book in Tribology; Kenneth Ludema,CRC press,1996.
3. Surface Engineering of Metals: Tadausz Burakowski, 1998
4. Surface Engineering for corrosion and wear resistance: Davis J. Woodhead publisher; 2001.
5. Tribology and Condition Monitoring; G. Santhanakrishnan; Tata Mc Graw Hill, 1993.
6. Tribology for Scientists and Engineers; Pradeep L Menezes, Edited by Michael Nosonovsky, Edited by Sudeep P Ingole, Springer-Verlag New York Inc., 07 January 2014
7. Applied Tribology; Michael M. Khonsari , E. Richard Booser; 2nd edition, April 2008.
8. Fundamentals of Fluid Film Lubrication; Bernard J. Hamrock; McGraw Hill, 1994.