

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Mechanical Engineering, VIII-Semester

Departmental Elective ME 802(B) Tribology And Maintenance Engineering

Course Objectives

After studying this course, students will be able to learn;

- The basic principles governing the tribology and apply them to reduce friction and wear in mechanical machines and structures.
- About lubrication, lubricants, mechanism of lubrication
- About Nano tribology, Instrumental tests, Bearings, Clutches and Brakes

Chapter 1: Introduction, history of tribology, early scientific studies of - friction, wear and lubrication. Tribo-Surface preparations and characteristics. Surface contacts, Hertz contact stresses, residual stress, surface fatigue, creep, stress relaxation, fracture mechanics, elastic, viscoelastic and plastic behavior of materials. Choice of materials.

Chapter 2: Friction, laws of friction, rolling/sliding friction, theory of adhesion and abrasion, different mechanisms of friction, stick slip characteristics, interface temperature, thermal analysis, Molecular mechanical theory of friction, operating conditions and system parameters, calculations of coefficient of friction, design of friction devices.

Chapter 3: Wear, different types of wear mechanisms, adhesive, abrasive impact, percussion erosion, fretting wear calculations of wear rate, two body/ three body wear, wear prevention, wear of metal cutting and metal forming tools, wear mapping of materials, cavitation, surface fatigue, corrosion, performance levels classifications and specifications of lubricants

Chapter 4: Lubrication, lubricants and additives, composition and properties of lubricants, maintenance of oil and emulsions, industrial hygiene aspects, technical regulations for lubricants. boundary/ mixed and fluid film lubrication, industrial methods of lubrications, SAE, BIS, ASTM, IP, DIN Standards, oil testing's, wear and chemistry of lubricants.

Chapter 5: Nano tribology, Instrumental tests,. Bearings, clutches and brakes, slide units, dynamic seals, Automobile applications, machine tools/ press machines applications. Other applications and case studies.

Evaluation:

Evaluation will be continuous an integral part of the class as well through external assessment.

References:

1. Principles and applications of tribology, Bharat Bhushan, John Wiley & sons, ISBN 0471 594075.
2. Tribology,, - lubrication ,friction and wear, I V Kragelsky and V VALisin, Mir publication, ISBN 1860582885.
3. Applied Tribology,MMKhonsari and E. R. Booser, John Wiley, ISBN 04712830

Tutorial topics:

1. Testing equipments of tribology.
2. Various industrial applications of tribology.
3. NEMS and MEMS applications
4. Solid, liquid and mist/ gas lubricants.
5. Surface coatings.
6. Chemical analysis of materials
7. Various simulations
8. AFM/ FFM , SFA, STM, studies.