

REFERENCE BOOKS :

1. **Modern Control Systems**, Richard.C.Dorf and Robert.H.Bishop, Addison Wesley, 1999
2. **System dynamics & control**, Eronini-Umez, Thomson Asia pte Ltd. singapore, 2002.
3. **Feedback Control System**, Schaum's series. 2001.

ELECTIVE-IV (GROUP - D)**TRIBOLOGY**

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|---------------------|------------------|-------------------|--------------|
| Subject Code | : 10ME831 | IA Marks | : 25 |
| Hours/Week | : 04 | Exam Hours | : 03 |
| Total Hours | : 52 | Exam Marks | : 100 |

PART – A**UNIT - 1**

Introduction To Tribology: Properties of oils and equation of flow: Viscosity, Newton's Law of viscosity, Hagen-Poiseuille Law, Flow between parallel stationary planes, viscosity measuring apparatus. Lubrication principles, classification of lubricants.

06 Hours

UNIT - 2

Hydrodynamic Lubrication: Friction forces and power loss in lightly loaded bearing, Petroff's law, Tower's experiments, mechanism of pressure development in an oil film, Reynold's investigation and Reynold's equation in 2D.

06 Hours

UNIT - 3

Idealized Journal Bearing: Introduction to idealized journal bearing, load carrying capacity, condition for equilibrium, Sommerfeld's numbers and significance of it; Partial bearings, end leakages in journal bearing, numerical problems.

07 Hours

UNIT - 4

Slider / Pad Bearing With A Fixed And Pivoted Shoe: Pressure distribution, Load carrying capacity, coefficient of friction, frictional resistance in a pivoted shoe bearing, numerical examples.

07 Hours

PART – B

UNIT - 5

Oil Flow And Thermal Equilibrium Of Journal Bearing: Oil flow through bearings, self-contained journal bearings, bearings lubricated under pressure, thermal equilibrium of journal bearings.

06 Hours

UNIT - 6

Hydrostatic Lubrication: Introduction to hydrostatic lubrication, hydrostatic step bearings, load carrying capacity and oil flow through the hydrostatic step bearing.

06 Hours

UNIT - 7

Bearing Materials: Commonly used bearings materials, properties of typical bearing materials. Advantages and disadvantages of bearing materials.

07 Hours

UNIT - 8

Behavior Of Tribological Components: Selection, friction, Wear of ceramic materials, wear measurements, effects of speed, temperature and pressure. Tribological measures, Material selection, improved design, surface engineering

07 Hours

TEXT BOOKS:

1. **Fundamentals of Tribology** , Basu S K., Sengupta A N., Ahuja B. B., , PHI 2006
2. **Introduction to Tribology Bearings**, Mujumdar B. C., S. Chand company pvt. Ltd 2008.

REFERENC BOOKS:

1. **Theory and Practice of Lubrication for Engineers**, Fuller, D., New York company 1998
2. **Principles and Applications of Tribology**, Moore, Pergamon press 1998
3. **Tribology in Industries**, Srivastava S., S Chand and Company limited, Delhi 2002
4. **Lubrication of bearings – Theoretical Principles and Design**, Redzimonvskay E I., Oxford press company 2000

FRACTURE MECHANICS

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|---------------------|------------------|-------------------|--------------|
| Subject Code | : 10ME832 | IA Marks | : 25 |
| Hours/Week | : 04 | Exam Hours | : 03 |
| Total Hours | : 52 | Exam Marks | : 100 |

PART – A**UNIT - 1**

Fracture Mechanics Principles: Introduction, Mechanisms of Fracture, a crack in structure, the Griffith's criterion, modern design – strengths, stiffness and toughness. Stress intensity approach

06 Hours**UNIT - 2**

Stress Analysis For Members With Cracks: Linear elastic fracture mechanics, Crack tip stress and deformations, Relation between stress intensity factor and fracture toughness, Stress intensity based solutions. Crack tip plastic zone estimation, Plane stress and plane strain concepts. The Dugdale approach, the thickness effect.

07 Hours**UNIT - 3**

Elastic – Plastic Fracture Mechanics: Introduction, Elasto-plastic factor criteria, crack resistance curve, J-integral, Crack opening displacement, crack tip opening displacement. Importance of R-curve in fracture mechanics, experimental determination of J-integral, COD and CTOD.

07 Hours