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Eighth Semester B.E. Degree Examination, July/August 2022 Tribology

Time: 3 hrs.

Max. Marks: 100

*Note:1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Data hand book is permitted.*

Module-1

- 1 a. Define Tribology. Briefly explain the practical applications of Tribology. (10 Marks)
b. Define Viscosity. State and explain Newton's law of viscosity, with neat sketch. (10 Marks)

OR

- 2 a. Define lubrication. Briefly explain the properties of lubricant oils. (10 Marks)
b. Explain the effect of temperature and pressure on viscosity. (10 Marks)

Module-2

- 3 a. Define friction. List the different types of friction. (05 Marks)
b. Briefly explain any one friction measuring technique. (05 Marks)
c. With neat sketch, explain Bowden and Tabor's theory of friction. (10 Marks)

OR

- 4 a. Define wear. List the different types of wear. Briefly explain any two. (10 Marks)
b. List various wear testing methods. With neat sketch, explain Abrasive wear testing method. (10 Marks)

Module-3

- 5 a. Derive Petroff's equation for lightly loaded journal bearing. Also state the assumptions. (10 Marks)
b. A full journal bearing has following specifications:
Journal diameter = 45 mm, Length = 65 mm, Speed = 2800 rpm,
Radial clearance ratio = 0.0015, Radial load = 800 N,
Average viscosity of oil = 8.274×10^{-3} Pa.Sec.
Calculate : (i) Frictional torque at the shaft.
(ii) Co-efficient of friction.
(iii) Power loss in bearing. (10 Marks)

OR

- 6 State the assumption and derive Reynold's equation in 2D with usual notations. (20 Marks)

Module-4

- 7 Derive an expression for pressure and load carrying capacity in a plane slider bearing with a fixed shoe. Also state the assumptions. (20 Marks)



OR

- 8 a. Derive an expression for rate of oil flow in an Hydrostatic step bearing. (10 Marks)
- b. A hydrostatic circular thrust bearing has the following data: Shaft dia = 300 mm, dia of pocket = 200 mm, Shaft speed = 100 rpm, Pressure at the pocket = 500 kN/m², Film thickness = 0.07 mm, Viscosity of lubricant = 0.05 Pa.sec.
Determine :
 - (i) Load carrying capacity
 - (ii) Oil flow rate
 - (iii) Powerloss due to friction. (10 Marks)

Module-5

- 9 a. List commonly used bearing materials. (05 Marks)
- b. Briefly explain the properties of bearing materials. (05 Marks)
- c. What are the advantages and disadvantages of bearing materials? (10 Marks)

OR

- 10 a. List different surface coating techniques. Explain any two. (10 Marks)
- b. Write a short note on :
 - (i) Scope of surface engineering.
 - (ii) Surface hardening. (10 Marks)

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