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17ME742

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 Tribology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Briefly explain history of Tribology. (06 Marks)
- b. Discuss the effect of pressure and temperature on viscosity. (08 Marks)
- c. Write a note on selection of lubricants. (06 Marks)

OR

- 2 a. State and prove Hasen-Poiseuille Law. (10 Marks)
- b. With a neat sketch, explain saybolt viscometer. (10 Marks)

Module-2

- 3 a. Define the term friction. Explain the measurement of friction by tilted plane method. (10 Marks)
- b. Explain Bowden and Tabor's adhesion theory of friction. (10 Marks)

OR

- 4 a. Define wear; briefly explain different types of wear. (10 Marks)
- b. Explain the Delamination theory of wear. (10 Marks)

Module-3

- 5 a. Derive the Petroff's equations for a lightly loaded journal bearing. Also state the assumptions made. (10 Marks)
- b. A full journal bearing have the following specifications, shaft diameter 45mm, bearing length 65mm, radial clearance ratio is 0.0015, speed 2800rpm, radial load 800N, viscosity of the lubricant 8.27×10^{-3} PaS. The bearing is lightly loaded, determine :
 - i) Friction torque at the shaft
 - ii) Co-efficient of friction
 - iii) Power loss. (10 Marks)

OR

- 6 Derive the Reynold's equation in two dimension. Also state the assumption made. (20 Marks)

Module-4

- 7 a. Derive an expression for the load carrying capacity of a plane slider bearing with fixed shoe. (10 Marks)
- b. Slider bearing with pivoted shoe has the following specifications, $B = 0.0508$ mts, $L = 0.0625$ mts, $U = 5.58$ mts/sec, $W = 8006.4$ N, $\eta = 0.03$ N-s/m². Determine :
 - i) Minimum film thickness
 - ii) Power loss
 - iii) angle of inclination corresponds to minimum co-efficient of frictions. (10 Marks)



OR

- 8 a. Derive the expression for load carrying capacity and rate of flow of oil through a hydrostatic step bearing. (10 Marks)
- b. A hydrostatic circular thrust bearing has the following data. Shaft diameter = 300mm, diameter of pocket = 200mm, shaft speed = 100rpm, Pressure at the pocket = 500kN/m², film thickness = 0.07mm, viscosity of lubricant = 0.05Pas. Determine :
- Load carrying capacity
 - Oil flow rate
 - Power Loss due to friction. (10 Marks)

Module-5

- 9 a. Briefly discuss any ten desirable properties of a good bearing materials. (10 Marks)
- b. Briefly discuss the common bearing materials that are used in practice. (10 Marks)

OR

- 10 a. Briefly explain the various mode by which surface properties can be enhanced. (10 Marks)
- b. Briefly explain different techniques to achieve surface modifications. (10 Marks)
