

# CBCS SCHEME

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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  $8.27 \times 10^{-3}$ 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/m<sup>2</sup>. Determine :  
i) Minimum film thickness ii) Power loss 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 =  $500\text{kN/m}^2$ , 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)

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