USN

Seventh Semester B.E. Degree Examination, Dec- 2018 / Jan 2019

Tribology

Time: 3hrs.   Max. Marks: 80

Note: 1.Answer any FIVE full questions, choosing one full question from each module.

2. Use of Tribology handbook is permitted

MODULE – I

1 **a.** Distinguish between (i) Dynamic and Kinematic viscosity (ii) Fluidity and viscosity (iii) Newtonian and Non Newtonian fluid **(08 Marks)**

  b. Explain with neat sketch construction and working of Saybolt and Ostwald viscometers. **(08 Marks)**

OR

2 **a.** Define the following
     (i) Tribology (ii) Lubrication (iii) Viscosity (iv) Newtonian fluid **(08 Marks)**

  b. Explain with neat sketch construction and working of Saybolt and falling sphere viscometers. **(08 Marks)**

MODULE – II

3 **a.** Define wear and explain type of wear with sketches **(08 Marks)**

  b. Explain in brief friction measuring methods. **(08 Marks)**

OR

4 **a.** Define friction. State laws for friction. **(08 Marks)**

  b. Explain with neat sketch abrasive wear tester. **(08 Marks)**

MODULE – III

5 Derive petroff's equation. State the assumptions made. **(16 Marks)**

OR

6 Stating the assumptions made in deriving Reynolds, derive the Reynolds equation in two dimensions. **(16 Marks)**

MODULE – IV

7 **a.** Derive an expression for oil flow rate in a hydrostatic bearing. **(08 Marks)**

  b. A pivoted shoe of a slider bearing has square shape. The load acting on the bearing is 13.34kN, velocity of the moving member is 5.08m/s. lubricating oil is SAE 40. The expected mean temperature of oil film is 90^0 C. permissible minimum oil film thickness is $1.905*10^{-5}$m. Find
       i)Required dimensions of the shoe
       ii)Coefficient of friction in the bearing under given operating condition
       iii)Power loss

  Assume that inclination of surface corresponds to maximum load carrying capacity. Neglect effect of end flow of oil **(08 Marks)**

OR

8   **a.** Derive the expression for rate of flow of oil and load carrying capacity for on hydrostatic step bearing. **(08 Marks)**

     b. The following data refers to the hydrostatic thrust bearing.
W = 460KN, outside dia = 400mm, pocket dia = 250mm, oil film thickness = 0.15m, speed = 2800rpm, viscosity = 0.033 pa-s. Determine Inlet pressure, Energy lost in pumping, Power loss due to friction, Total energy lost, and Coefficient of friction. **(08 Marks)**

MODULE – V

9   **a.** Discuss any six desirable properties of bearing materials. **(08 Marks)**

     b. Explain the properties and applications of commonly used bearing materials. **(08 Marks)**

OR

10   **a.** Explain Electroless and Electro plating wit neat sketches. **(08 Marks)**

     b. Define Surface Engineering. Explain Ion Implantation method. **(08 Marks)**

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