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17ME742

Seventh Semester B.E. Degree Examination, Feb./Mar. 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 design data handbook is permitted.*

Module-1

1 a. Define the term Tribology. Illustrate briefly the applications of Tribology. **(06 Marks)**
   b. Explain the effect of temperature and pressure on viscosity. **(06 Marks)**
   c. Define Lubrication. Explain briefly the properties of lubricant oils. **(08 Marks)**

OR

2 a. Define Viscosity. State and explain Newton's law of viscosity, with a neat sketch. **(10 Marks)**
   b. Explain with a neat sketch, Mac – Michael viscometer and Flowers viscometer. **(10 Marks)**

Module-2

3 a. Define Wear. With neat sketches, explain types of Wear. **(10 Marks)**
   b. Explain different methods of Measuring Friction. **(10 Marks)**

OR

4 a. Explain briefly friction of metals and non metals. **(06 Marks)**
   b. Write a note on Delamination theory of Wear. **(06 Marks)**
   c. Explain Bowden and Tabor's theory of Friction. **(08 Marks)**

Module-3

5 State the assumptions made in the derivation of Reynold's equation in 2 – D and derive the equation with usual notations. **(20 Marks)**

OR

6 a. Derive an expression for Frictional force, Torque , Co-efficient of friction and power loss in the lightly loaded journal bearing. **(10 Marks)**
   b. A full journal bearing has following specifications : Diameter = 50mm , Length = 65mm , Speed = 1200rpm , Radial clearance = 0.025mm , Average viscosity of oil under operating condition = 1.125×10^{-3} Pa.Sec , Attitude = 0.8. Calculate :
     i) Load Carrying capacity   ii) Co-efficient of friction   iii) Power Loss in bearing. **(10 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 Load Carrying Capacity of a Hydrostatic bearing. **(10 Marks)**
   b. A hydrostatic circular thrust bearing has the following data :
     Shaft diameter = 150mm , Diameter of pocket = 100mm , Shaft Speed = 1500 rpm ,
     Vertical thrust = 60kN , Film thickness = 0.125mm ,
     Viscosity of lubricant = 30×10^{-3} Pa – sec. Determine   i) Oil flow rate
     ii) Power loss due to friction   iii) Co-efficient of friction. **(10 Marks)**

Module-5

9 a. List the commonly used bearing materials and describe any five commonly used bearing materials with respect to their characteristics and advantages. **(10 Marks)**

b. List any ten desirable properties of bearing material. Explain Conformability and Embedability with respect to bearing material. **(10 Marks)**

OR

10 a. What is Surface Engineering? Explain the scope of Surface Engineering. **(06 Marks)**

b. Briefly explain any four Surface Hardening processes. **(08 Marks)**

c. What is the need of Surface Coating? Explain any one Surface Coating Method. **(06 Marks)**

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