Paper / Subject Code: 35007 / Elective : I - Tribology

ME mech | sem II | CBCS | FH2019 17/05/2019

Time : 3Hrs Marks : 80

N.B.: (1) Attempt any four questions.
(2) Assumption made should be clearly stated.
(3) Use of Design Data Book is permitted.

1. A. State generalized three dimensional Reynolds equation. Explain significance of each term of equation. State assumptions made in derivation of two dimensional Reynolds equation 10
   B. Derive an equation for estimating the frictional power loss in a hydrostatic step bearing. 10

2. A. Write short note on the followings: 10
      i. Hydrodynamic Bearing material.
      ii. Explain meaning and significance of Tribology
   B. A bearing is subjected to 4 kN radial load under minor shocks at 700 RPM. Select an appropriate type of rolling contact bearing if the expected life is 10,000 hours. 10

3. A. Explain various measuring tools used in nanotribology 10
   B Following data is given for a hydrostatic thrust bearing 10
   Shaft speed = 100 rpm, Supply pressure = 50 bar, Specific heat of lubricant = 2 KJ/Kg°C, Shaft diameter = 500 mm, Recess diameter = 300 mm, Viscosity of lubricant = 35 mPa-s, Specific gravity of lubricant = 0.86. Calculate load carrying capacity, optimum oil film thickness, total power loss, flow rate of lubricant and temp. rise. Assume total power loss is converted into frictional heat.

4. A. Define wear and state different types of wear. Describe Tribo-chemical wear and its estimation. 10
   B. Describe essential characteristics of beating materials used for sliding contact bearings. List the materials and explain their applications. 10

5. A. The radial load on 360^0 hydro dynamically lubricated self contained bearing is 15 KN. Assuming journal length by diameter ratio as one and suitable fit between bearing and journal, design bearing for average clearance. 10
   B. Explain in detail classification of lubricants. Also discuss role played by additives in enhancing properties of lubricants 10

6. Write short note on **(any four)** 20
      i. Viscosity Index
      ii. Thermal correction factor in EHL
      iii. Semisolid lubricants
      iv. Stribeck curve
      v. Foil gas lubricated bearing

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