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10ME831

Eighth Semester B.E. Degree Examination, Feb./Mar. 2022
Tribology

Time: 3 hrs.

Max. Marks:100

Note:1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Design data handbook is permitted.

PART – A

- 1 a. Explain with neat sketches i) Flowers viscometer ii) Saybolt viscometer. (10 Marks)
b. Stating the assumption, derive the Hagen – Poiseuille relations. (10 Marks)
- 2 State the assumptions made in the derivation of Reynold's equation. Hence derive the Reynold's equation in 2D. (20 Marks)
- 3 a. Determine the load carrying capacity, frictional force, coefficient of friction and power loss due to friction for an ideal full journal bearing having following specifications :
Diameter of journal = 50mm , Length of the bearing = 65mm , Speed of journal = 1200 rpm
Radial clearance is 0.025mm , Average viscosity is 1.6×10^{-6} reyn. Attitude is 0.8. (12 Marks)
b. What do you understand by the term "Considering the influence of end leakage"? Discuss the same. (08 Marks)
- 4 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 $B = 0.0508$ m , $L = 0.0625$ m , $U = 5.58$ m/sec , $W = 8006.4$ N , $\eta = 0.03$ N-S/m². Determine
i) Minimum film thickness ii) Power loss , Angle of inclination corresponds to minimum coefficient of friction. (10 Marks)

PART – B

- 5 a. Briefly explain the thermal equilibrium of Journal Bearing. (08 Marks)
b. The main bearing for a stationary slow speed steam engine has the following data. Journal diameter is 200mm , maximum load on the piston is 80KN , Engine speed is 200 rpm , $\phi = 0.0009$. Determine heat generated and heat dissipated. Given operating temperature as 65°C and ambient temperature as 25°C , Attitude = 0.8 and absolute viscosity is 60×10^{-3} pa.sec. (12 Marks)
- 6 a. Derive an expression for the load carrying capacity of hydrostatic step bearings. (10 Marks)
b. A hydrostatic circular thrust bearing has the following data, shaft diameter = 300mm , Diameter of pocket = 200mm , Shaft speed = 100 rpm , Pressure at the pocket = 500kN/m² Film thickness = 0.07mm , Viscosity of lubricant = 0.05 pas. Determine i) Load carrying capacity ii) Oil flow rate iii) Power loss due to friction. (10 Marks)
- 7 a. What are the requirements of a good bearing materials? Discuss in brief. (10 Marks)
b. Briefly explain the advantages and disadvantages of bearing materials. (10 Marks)
- 8 a. Briefly explain the wear of Ceramic materials. (10 Marks)
b. Explain briefly : i) Scuffing ii) Pitting iii) Abrasion. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.