

CBCS SCHEME

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18MDE23

Second Semester M.Tech. Degree Examination, June/July 2019 Tribology and Bearing Design

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define wear and explain any three wear mechanisms with neat sketch. (10 Marks)
b. Derive Hagen-Poiseuille law, also state the assumptions made to derive this law. (10 Marks)

OR

- 2 a. Derive Petroff's equation for frictional force and coefficient of friction. (10 Marks)
b. A full journal bearing has the following specifications. Shaft diameter is 46mm, bearing length 66mm, radial clearance to radius ratio = 0.0015, speed of journal is 2800rpm, radial load is 820N. Viscosity of oil at the operating temperature is 8.4cp. Considering the bearing as lightly landed bearing determine: i) Frictional torque on journal ii) Coefficient of friction iii) Power loss from bearing. (10 Marks)

Module-2

- 3 Derive the Reynold's equations in two dimensions, also state the assumptions. (20 Marks)

OR

- 4 a. Derive an expression for the load carrying capacity of a plane slider bearing with fixed shoe. (10 Marks)
b. The details of a slider bearing with pivoted shoe are as given below, Runner diameter = 125mm, Weight of runner = 20N, Mean diameter of shoe = 90mm, Number of shoes = 3. Approximate number of shoe = (40 × 40)mm, $\mu = 0.018$ cp, Speed of runner = 5000rpm. Determine the minimum film thickness and coefficient of friction. Assume $m = 1$. (10 Marks)

Module-3

- 5 a. State the assumptions and derive an expression for the load carrying capacity of hydrostatic step bearing. (10 Marks)
b. The following data requires to hydrostatic thrust bearing, load = 460kN, outside diameter = 400mm, recess diameter = 250mm, oil film thickness = 0.15mm, speed = 2800rpm, $\mu = 0.033$ pa.sec. Find: i) Inlet pressure ii) Energy lost in pumping iii) Power loss due to viscous friction iv) Total energy loss v) Coefficient of friction. (10 Marks)

OR

- 6 a. Explain different regimes in EHL contacts. (10 Marks)
b. With a neat sketch, explain any two main systems hydrostatic lubrication. (10 Marks)

Module-4

- 7 a. List out disadvantages and application of antifriction bearings. (10 Marks)
b. Write a note on:
i) Fretting phenomenon
ii) Static and dynamic load capacity in antifriction bearing. (10 Marks)

OR

- 8 a. Explain gas lubricated bearing. Mention their application. (10 Marks)
- b. Explain antifriction bearing. Mention their advantages. (10 Marks)

Module-5

- 9 a. Write a note on different equations used in magnetic bearing. (10 Marks)
- b. List advantages, disadvantages, application sin magnetic bearing. (10 Marks)

OR

- 10 a. Explain with sketch, working of active magnetic bearing. (10 Marks)
- b. Explain advantages of magnetic bearing mention their industrial application. (10 Marks)

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