CBCS Scheme

USN | | | | | | | | | | |

16MDE41

Fourth Semester M.Tech. Degree Examination, June/July 2018

Tribology and Bearing Design

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the following terms:
i) Tribology
ii) Wear
iii) Viscosity
iv) Newton's law of viscosity **(08 Marks)**

b. Derive an expression for discharge through capillary tube with suitable assumptions. **(08 Marks)**

OR

2 a. Explain with neat sketches of any two types of viscometer. **(08 Marks)**

b. A journal bearing has the following specifications:
Shaft diameter = 60 mm
Bearing length = 80 mm
Radial load = 1 kN
Clearance (c) = 0.1 mm
Oil used SAE at 60°C, coefficient of friction 0.042. Determine:
i) Speed of the journal
ii) Power loss **(08 Marks)**

Module-2

3 Derive the expression for Reynolds equation in 2-dimensions and state the assumptions mode. **(16 Marks)**

OR

4 a. Derive an expression for the load carrying capacity of pivoted shoe slider bearing. **(08 Marks)**

b. A rectangular plain slider bearing with fixed shoe with no end leakage has the following data:
Bearing length = 90 mm
Width of shoe = 90 mm
Load on bearing = 7800 N
Slider velocity = 25 cm/sec
Inclination (α) = –0.0035 radians
Viscosity of oil η = 40 cp
Determine: i) Minimum film thickness
ii) Power loss
iii) Coefficient of friction **(08 Marks)**

Module-3

5 a. What is the principle of hydrostatic bearing? Explain hydrodynamic lubrication system with neat sketches. **(08 Marks)**

b. A hydrostatic step bearing has the following data:
Diameter of the shaft = 150 mm
Diameter of the pocket = 100 mm
Vertical thrust on bearing = 60×10^3 N
External pressure = Atmospheric pressure
Shaft speed = 1500 rpm
Viscosity of lubricant = 30 cp, desirable oil film thickness = 0.0125 cm. Determine:
i) Rate of flow
ii) Power loss due to friction
iii) Coefficient of friction **(08 Marks)**

OR

6 a. A circular hydrostatic thrust bearing has the following data:
Shaft dia = 300 mm
Dia of pocket = 200 mm
Shaft speed = 100 rpm
Pressure at the pocket = 500 kN/m^2
Film thickness = 0.07 mm
Viscosity of lubricant = 0.05 Pa.S
Determine:
i) Load carrying capacity
ii) Oil flow rate
iii) Power loss **(08 Marks)**

b. Derive an equation for film thickness of a line contact bearing (Grubin type solution). **(08 Marks)**

Module-4

7 a. List the advantages of antifriction bearing and explain selection and nominal life of antifriction bearing. **(08 Marks)**

b. Explain Fretting phenomenon and its stages of porous bearing. **(08 Marks)**

OR

8 a. Explain the following terms:
i) Bearing mounting
ii) Porous bearing **(08 Marks)**

b. Explain static and dynamic load bearing capacity and also explain gas lubricated bearing. **(08 Marks)**

Module-5

9 a. Explain the following term:
i) Magnetic bearing
ii) Electrical analogy **(08 Marks)**

b. Explain active magnetic bearing with neat labeled diagram. **(08 Marks)**

OR

10 a. Explain magneto-hydrodynamic bearing. **(08 Marks)**

b. What are the advantages and disadvantages of magnetic bearing? **(08 Marks)**

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