

CBCS SCHEME

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17ME742

Seventh Semester B.E. Degree Examination, July/August 2021

Tribology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is Tribology? Explain the Industrial importance of Tribology. (08 Marks)
b. Explain with neat sketches the working of Ostwald's viscometer and Saybolts universal viscometer. (12 Marks)
- 2 a. Discuss major properties of an ideal lubricant. (10 Marks)
b. Explain with sketches the regimes of lubrication. (10 Marks)
- 3 a. Define friction. What are different types of friction? Explain any two types of friction. (10 Marks)
b. Explain Bowden and Tabor's Adhesion theory of friction. (10 Marks)
- 4 a. Define wear. Briefly explain the classification of wear. (10 Marks)
b. List out various wear testing methods and wear standards. (10 Marks)
- 5 State the assumptions and derive Reynolds 2D equation. (20 Marks)
- 6 a. Derive the Petroff's equation for frictional force, Torque and Coefficient of friction in lightly loaded bearing. (10 Marks)
b. A full journal bearing of an air compressor which is lightly loaded has the following specifications. Journal diameter 6.25cm, bearing length 5cm, radial clearance 5×10^{-3} cm, radial load 915 N, Viscosity 0.2896 Pa-sec, coefficient of friction 0.042. Determine (i) Speed of the Journal (ii) Power loss. (10 Marks)
- 7 Derive an expression for pressure distribution for plane slider bearing with a fixed shoe. Also state the assumptions. (20 Marks)
- 8 a. Derive an expression for discharge, pressure distribution and load carrying capacity of hydrostatic bearing. (12 Marks)
b. A hydrostatic step bearing has the following data:
Diameter of shaft : 150 mm Diameter of pocket : 100 mm
Vertical thrust on bearing = 60×10^3 N External pressure = Zero
Shaft speed = 1500 rpm Viscosity of lubricant = 30 cP
Describe oil film thickness = 0.0125 cm
Determine : (i) Rate of flow of oil (ii) Power loss due to friction (iii) Coefficient of friction. (08 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.

- 9 a. List the properties of bearing materials. Explain any 3 properties briefly with respect to bearing materials. (10 Marks)
- b. Explain any four commonly used bearing materials. (10 Marks)
- 10 a. Explain in brief any five common surface hardening processes. (10 Marks)
- b. Explain with a neat sketch physical vapour deposition in surface coating. (10 Marks)
