

GBCS SCHEME



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15ME742

Seventh Semester B.E. Degree Examination, Aug./Sept.2020 Tribology

Time: 3 hrs.

Max. Marks: 80

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of design data hand book is permitted.**

Module-1

- 1 a. Define the following:
(i) Newtonian fluid
(ii) Viscosity
(iii) Fluidity
(iv) Viscosity index (08 Marks)
- b. Explain the working of "Ostwald Viscometer" with a neat sketch. (08 Marks)

OR

- 2 a. Explain with sketches, the regimes of lubrication. (12 Marks)
b. List the characteristics of a good lubricant. (04 Marks)

Module-2

- 3 a. Explain the following with neat sketch:
(i) Inclined plane Rig
(ii) Pin-on-disk Rig (08 Marks)
- b. Write short notes on Friction of Polymers and ceramic materials. (08 Marks)

OR

- 4 a. Define Wear. Classify the Wear. Explain briefly Chemical Wear. (08 Marks)
b. Explain the Delamination theory of Wear. (08 Marks)

Module-3

- 5 a. Derive the Petroff's equation and expression for coefficient of friction in lightly loaded bearing. (08 Marks)
- b. A full journal bearing of an air compressor has the following specifications:
Journal diameter = 63 mm
Bearing length = 50 mm
Diametral clearance = 0.1 mm
Radial load on journal = G30N
Viscosity of lubricant = 3 cp
Coefficient of friction of bearing = 0.0427
Consider the bearing as lightly loaded bearing. Determine speed of journal and power loss in bearing. (08 Marks)

OR

- 6 Derive an expression for Reynolds equation in two dimensions. (16 Marks)



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Module-4

- 7 Derive an expression for pressure distribution for plane slider bearing with a fixed shoe. (16 Marks)

OR

- 8 a. Derive an expression for load carrying capacity of hydrostatic bearing. (08 Marks)
b. Following data refers to hydrostatic thrust bearing:
Shaft speed = 720 rpm
Shaft dia = 500 mm
Recess dia = 350 mm
Viscosity of an oil = 30 cp
Minimum film thickness = 0.15 mm
Supplying pressure = 5 MPa
Determine: (i) Load capacity (ii) Flow requirement
(iii) Pumping power loss (iv) Frictional power loss (08 Marks)

Module-5

- 9 a. List the properties of bearing materials. Explain conformability and embedability with respect to bearing materials. (08 Marks)
b. Explain any four commonly used bearing materials. (08 Marks)

OR

- 10 a. What do you mean by surface engineering? List the processes used to improve the surface characteristics. (08 Marks)
b. Discuss thermal hardening with respect to surface modification. List the advantages and disadvantages of thermal hardening. (08 Marks)

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