Code: 9D15106a

M.Tech I Semester Supplementary Examinations February/March 2018

TRIBOLOGY

(Machine Design)

(For students admitted in 2012, 2013, 2014, 2015 & 2016 only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 Write explanatory notes on:
(a) Wear of ceramic materials.
(b) Wear measurements.
(c) Advanced material's use in tribology application.

2 (a) What properties are expected of bearing materials? List them.
(b) What is cubic mean load? Explain in detail the procedure involved in preloading of bearings.
(c) Write a detailed note on condition monitoring using shock pulse method.

3 (a) Briefly describe the mechanism of pressure build-up in a hydrodynamic bearing with relevant figures.
(b) Derive the Reynold's equation for 3D hydrodynamic lubrication. Also state the assumptions made in this derivation.

4 (a) Explain the working principle of hydrostatic thrust bearing with figures.
(b) A hydrostatic circular thrust bearing has the following data:
Shaft diameter = 300 mm, Diameter 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 PaS.
Determine: (i) Load carrying capacity. (ii) Oil flow rate. (iii) Power loss due to friction.

5 Derive the equations for static load bearing capacity of a rolling element bearing. A ball bearing is operating on work cycle of 3 hours consisting of:
(i) A radial load of 3 kN at 1440 r.p.m for one quarter cycle.
(ii) A radial load of 5 kN at 720 r.p.m for half cycle.
(iii) A radial load of 2.5 kN at 1440 r.p.m for the remaining cycle.
The expected life of the bearing is 10000 hours. Calculate the load carrying capacity of the bearing.

6 (a) What is the role of additive lubrication? What are the additives used in lubricating oils?
(b) How rolling bearings are lubricated with grease? Discuss the factors on which the relubrication interval of a roller bearing depends.

7 (a) Discuss the procedure involved in the selection of mechanical seals.
(b) What are the applications of throttling bushes?

8 Explain the following:
(a) Failure analysis of plain bearings.
(b) Wear analysis using ferrography.

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