

Code No: 07A80304

R07**Set No. 2**

IV B.Tech II Semester Examinations, April/May 2012

TRIBOLOGY

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Can hybrid hydrostatic and hydrodynamic bearings be developed and used to advantage? [8+8]
(b) Give examples of operating conditions under which the application of hydrostatic bearings would be necessary or highly desirable. [8+8]
2. Suggest steps for prevention of wear in bearings. [16]
3. What range of viscosity covers most oils? Discuss their relative merits and applications. [16]
4. For the infinitely long Rayleigh step bearing find the relationship between the total load supported W , minimum film thickness h_0 and step height h . Assume that $B_1=B_2=B/2$. [16]
5. Describe typical geometries of non-flat hydrostatic bearings. [16]
6. Give the criterion for selection of bearing materials. [16]
7. Explain general dry friction theories in brief. [16]
8. Derive an expression for load carrying capacity of hydrodynamic journal bearing stating the assumptions. [16]

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R07**Set No. 4**

IV B.Tech II Semester Examinations, April/May 2012

TRIBOLOGY

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Give your comments on simplifying assumptions in hydrodynamics.
(b) What are the advantages and disadvantages of hydrodynamic journal bearings? [8+8]
2. With the help of a neat sketch explain the construction and working of falling sphere viscometer. [16]
3. Explain the mechanism of boundary friction. [16]
4. Classify various bearing materials. Discuss their relative features. [16]
5. Derive an equation for the final film thickness in a parallel surface bearing. [16]
6. A 150mm diameter shaft carrying a load of 10kN and rotating at 1000rpm is supported by a 40mm long journal bearing. The bearing is lubricated with SAE 20W/50 of density 900kg/m^3 and specific heat = 1650J/kgK . Assume that the bearing clearance is $100\ \mu\text{m}$ and the inlet oil temperature is 50°C . Using the constant flow method calculate the operating temperature of the bearing. Discuss the results obtained. [16]
7. Describe the construction and working of pressure feed bearings with applications. [16]
8. A rectangular slider bearing with pivoted shoe has the following specification:
Length of shoe = 60mm
Width of shoe = 55mm
Slider speed = 5m/s
Load = 25kN
Absolute viscosity = 0.012Pa s .
Determine:
(a) Minimum film thickness and
(b) Power loss due to viscous friction. Neglect side leakage. [16]

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R07**Set No. 1**

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TRIBOLOGY

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. Lateral stability of a long shaft 15cm in diameter is obtained by means of a 25cm stationary bearing having an internal diameter of 15.025cm. If the space between the bearing and the shaft is filled with a lubricant having a viscosity 49Nsec/m^2 , what power will be required to overcome the viscous resistance when the shaft is rotated at a constant rate of 180rpm? [16]
2. (a) What are the applications of hydrostatic bearings?
(b) Compare advantages and disadvantages of hydrodynamic and hydrostatic bearing. [8+8]
3. (a) What is the main difference between hydrodynamic and hydrostatic lubrication?
(b) Are hydrostatic bearings effective at high sliding speeds? Discuss. [8+8]
4. What other parameters, apart from viscosity, are significant when dealing with lubricants? Explain their role on the effectiveness of the lubricant. [16]
5. (a) What is the advantage of the offset pivot compared to centrally pivoted pads?
(b) The centrally pivoted pad is suitable for load carrying in both directions of rotation, while the off-center pad is unsuitable. The centrally pivoted pad is, however, inferior to the off-center pad in one important aspect. Discuss. [8+8]
6. (a) What are the classic laws of friction?
(b) Explain elastic contact in metals. [8+8]
7. What are the characteristics of castable bearing materials? [16]
8. Give the design aspect of extremely pressurized bearings. [16]

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R07**Set No. 3**

IV B.Tech II Semester Examinations, April/May 2012

TRIBOLOGY

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. Explain basic mechanism of friction with suitable sketches. [16]
2. List advantages and disadvantages of gas-lubricated bearings over oil-lubricated bearings. [16]
3. Explain the working principle and applications of hydrodynamic thrust bearing. [16]
4. Many animal and plant oils and fat make excellent lubricants, yet they are rarely used. Why should this be? [16]
5. Design a journal bearing with the following specifications:
Journal diameter=100mm
Journal speed=3000rpm
Radial load=15kN. [16]
6. An engine bearing of 80mm diameter, 10mm length and clearance to radius ratio of 10^{-3} , lubricated by the oil with viscosity 0.01Pas, is operating under a load of 1.5kN at a speed of 5000rpm. Select the filter pore size to limit wear on this bearing. [16]
7. Explain corrosion resistance bearing materials. [16]
8. Derive an expression for pressure distribution in hydrostatic bearing. [16]
