



Tribology (1040 / 1053)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any five** questions.
5. Neat diagrams must be drawn wherever needed.
6. Figures to the right indicate full marks.
7. Assume suitable data if necessary.

1. a) Explain various friction theories with example. 10
b) Explain the effect of different environmental factors on viscosity of lubricants. 10
2. a) Write the solution to the Reynold's equation for infinitely long journal bearing. 10
b) The following data is given for a 360° hydrodynamic bearing. 10
Radial load = 3.2 KN
Journal diameter = 50 mm
Bearing length = 50 mm
Journal Speed = 1490 rpm.
Radial Clearance = 50 microns.
Viscosity of lubricant = 25 CP.
Density of lubricant = 860kg/m^3
Specific heat of lubricant = $1.76\text{kJ/kg}^\circ\text{C}$
assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing calculate :
 - i) The minimum oil film thickness.
 - ii) The coefficient of friction.
 - iii) The power lost in friction.
 - iv) The total flow rate of lubricant in ℓ/m .
 - v) The side leakage.
 - vi) The temperature rise.

3. a) What is Hydrodynamic thrust bearing? Explain different types of it. 10
 b) Write the three dimensional Reynold's equation. State the meaning of each term in it. 10
4. a) Explain the pressure distribution in Hydrostatic step bearing and derive its formula. 10
 b) Explain the thermal considerations in hydrostatic step bearing. 10
5. a) Compare oil lubricated & Gas lubricated bearing. 10
 b) Explain Aerostatic step bearing? Give its design analysis. 10
6. Write short notes on : 20
 i) Types of wear.
 ii) Materials for bearing.
 iii) Types of lubricants.
 iv) Friction measurement.
- 7 a) Explain different modes of lubrications. 10
 b) Compare infinitely short & long hydrodynamic journal bearing. 10
8. a) Explain with neat sketch. Mechanism of pressure development in hydrodynamic lubrication. 10
 b) Flow of viscous fluid through rectangular slot. 10
