

Total No. of Questions : 10]

SEAT No. :

P43

[Total No. of Pages : 3

[5871]-543

B.E. (Mechanical)

TRIBOLOGY

(2015 Pattern) (Semester - II) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1)** a) Explain the importance of tribology in design of different machine elements? [6]
b) Enlist desirable properties of lubricants? [4]

OR

- Q2)** a) Enlist the different methods to measure friction and explain pin-on-disc rig. [6]
b) What is the key difference between gasket and oil seal? Explain non-metallic gasket. [4]

- Q3)** a) Derive Archard's equation for volume of adhesive wear. [4]
b) Write short note on : [6]
i) Fretting wear
ii) Solid wear
iii) Liquid erosion

OR

- Q4)** Babbit lined steel back bush bearing is used to support a shaft of diameter 50mm and length of 50 mm. the radial load on the bearing is 3550N. The oil filter restricts a clearance at the bearing as 40 microns. The shaft rotates at 950 rpm. If the oil used has a viscosity of 60 cp at operating temperature. [10]
Calculate :

- a) Coefficient of friction
- b) Minimum oil film thickness
- c) Power loss due to friction
- d) Required oil flow in lit per min
- e) Side leakage in lit per min

P.T.O.

$\frac{L}{d}$	$\frac{h_0}{c}$	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{rcn_s L}$	$\frac{Q_s}{Q}$
1	0.8	0.631	12.8	3.59	0.280
	0.6	0.261	5.79	3.99	0.497
	0.4	0.121	3.22	4.33	0.680
	0.2	0.0446	1.70	4.62	0.842
	0.1	0.0188	1.05	4.74	0.919

Q5) a) Explain working principle of hydrostatic bearing with figure. Compare hydrostatic bearing with hydrodynamic bearing. **[10]**

b) Derive an expression for flow rate of fluid through rectangular slot. State the assumptions made while deriving the equation. **[8]**

OR

Q6) a) What is squeeze film lubrication? State the merits, demerits and applications of squeeze film lubrication. **[8]**

b) The following data is given for hydrostatic thrust bearing **[10]**

Supply pressure = 5MPa,

Shaft speed = 720 rpm

Shaft diameter = 400mm

Recess diameter = 250mm

Film thickness = 0.15mm

Viscosity of lubricant = 30cP

Specific heat of lubricant = 1.76 kJ/kg°C

Specific gravity of lubricant = 0.86

Calculate :

i) Load carrying capacity of bearing

ii) Frictional power loss

iii) Pumping power loss

Temperature rise by assuming the total power loss in bearing is converted into the frictional heat.

Q7) a) Explain the phenomenon of Elasto-hydrodynamic lubrication and state the application where EHD lubrication is observed. [8]

b) Explain Merits, demerits and application of gas bearing. [8]

OR

Q8) a) Explain in brief about the active and passive magnetic bearing. What are its advantages over conventional bearing? [8]

b) What do you understand by gas lubricated bearing? Compare gas lubricated with oil lubricated bearing based on the following points. [8]

i) Viscosity of lubricant

ii) Viscous resistance

iii) Frictional power loss

iv) Operating speed

v) Load carrying capacity

vi) Film thickness and Surface Thickness

Q9) a) Write short notes on : [8]

i) Lubricating system in wire rope

ii) Lubricating system in seals and packaging

b) Write short note on: selection of coatings [8]

OR

Q10) a) State and discuss the lubricant and lubricating methods for gears. [8]

b) How surface engineering processes are specified? [8]

