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Total No. of Questions : 10] **SEAT No. :**

P4541 **[Total No. of Pages : 3**

[4959] - 1060-A

B.E. (Mechanical S/W) (Semester - II)

TRIBOLOGY (Elective - II(d))

(2012 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :-

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables and electronic pocket calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain the benefits of recycling of used oils. **[6]**

b) Explain the factor affecting the wear. **[4]**

OR

Q2) a) Discuss the effect of following on coefficient of friction between two surfaces- **[4]**

i) Surface finish,

ii) Sliding velocity

b) Explain the use of following additives- **[6]**

i) Anti-wear additives.

ii) Anti-friction additives.

Q3) a) Draw and explain the classification of wear measuring machines along with sketches of at least three types. **[6]**

b) Using diagram show the pressure distribution along the axis and circumference in infinitely narrow/short hydrodynamic journal bearing. **[4]**

OR

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Q4) Following data is given for hydrodynamic full journal bearing **[10]**

Radial load of	=	10kN
Journal speed	=	1440 r.p.m.
Viscosity of lubricating oil	=	30 m Pa s
Unit bearing pressure	=	1000 k Pa
Clearance ratio (r/c)	=	800

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Use given data in Table No.- I and calculate:

i) The dimension of bearing,

ii) The coefficient of friction,

iii) The power lost in friction,

iv) Total oil flow in little / minutes

Table No. 1 – Dimensionless performance parameters for hydrodynamic full journal bearing **[10]**

(l/d)	(h_o/c)	S	(r/c)*f	(Q/r.c.n_s.l)
1	0.9	1.33	26.4	3.37
	0.8	0.631	12.8	3.59
	0.6	0.264	5.79	3.99
	0.4	0.121	3.22	4.33
	0.2	0.0446	1.70	4.62
	0.1	0.0188	1.05	4.74
	0.03	0.00474	0.514	4.82

Q5) Following data is given for a hydrostatic thrust bearing **[18]**

Thrust load	=	450 kN
Shaft speed	=	750 r.p.m.
Shaft diameter	=	400 mm
Recess diameter	=	250 mm
Viscosity of lubricant	=	30 cP
Specific Gravity of lubricant	=	0.86
Specific heat of lubricant	=	2 kJ/kg°C

Draw a neat sketch showing the effect of film thickness on energy losses.

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Calculate:

i) The optimum oil film thickness for minimum power loss,

ii) The total power loss,

iii) The temperature rise, assuming the total power loss in bearing is converted into frictional heat.

OR

Q6) a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h1, if both the surfaces are separated by a lubricant of viscosity 'μ'. Derive the expression for the time 't' taken to reduce the film thickness from h1 to h2. **[12]**

b) State and explain different types of energy losses in hydrostatic bearing. **[6]**

Q7) Using modified Reynold's equation for elastohydrodynamic lubrication, derive Ertel-Grubin equation as- $\frac{h_o}{R}=1.19\left(\frac{ELR}{W}\right)^{1/11}\left(\frac{\mu_o U\alpha}{R}\right)^{8/11}$ **[16]**

OR

Q8) a) Explain the phenomenon of Elastohydrodynamic lubrication. **[6]**

b) Explain requirements of Gas lubrication and its merits, demerits and application. **[10]**

Q9) a) Explain electroplating and also write its advantages and limitations. **[6]**

b) Write short note on: lubrication in Rolling and Extrusion with neat sketch. **[10]**

OR

Q10) a) Define the term 'Superficial layers', discuss the development of concept and structure of superficial layers. **[10]**

b) What are the different parameters of coating, explain in brief. **[6]**

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