Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 710905N **Date: 21/02/2012**

Subject Name: Tribology

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** The following data refers to a 360^{O} hydrodynamic journal bearing: **10**

1. Radial load = 12kN
2. (l/d) ratio = 1
3. Bearing Length = 50mm
4. Radial Clearance = 20μ
5. Journal Speed = 1450rpm
6. Eccentricity = 15μ
7. Specific heat of lubricant = 2.10kJ/kg^{o}C
8. Density of lubricant = 860kg/m^{3}

Determine:

(i) The minimum oil film thickness
(ii) The power lost in friction
(iii) Viscosity of lubricant in cP
(iv) The side leakage
(v) The average temperature if make up oil is supplied at 35^{o}C

l/d	h_o/c	ε	S	(r/c)f	$Q/(rcn_s l)$	Q_s/Q	P_{max}/p
1	0.2	0.8	0.0446	1.7	4.62	0.842	3.195
	0.4	0.6	0.121	3.22	4.33	0.68	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066

(b) What is Tribology? What can be the practical applications of Tribology in machine design? Explain siting some practical examples. **04**

Q.2 **(a)** Explain regimes of lubrication. **07**

(b) Derive petroff's equation for hydro journal bearings mentioning different assumptions made. **07**

OR

(b) Explain different physical properties of lubricants in detail. **07**

Q.3 **(a)** Explain the analysis of pivoted shoe bearing **07**

(b) A hydrodynamic plane slider has the following particulars **07**
Length of the slider = 150mm
Width of the slider = 50mm
Maximum oil film thickness = 200microns
Minimum oil film thickness = 100 microns
Viscosity of the lubricant = 60mPa.sec
Sliding velocity = 10m/sec
Calculate the maximum pressure and its locations and the average pressure. What is the load carrying capacity? Use the long bearing approximation.

OR

Q.3 **(a)** A petroff's sleeve bearing consists of a sleeve having a bore diameter of 105.1 mm and length of 105 mm. A shaft having 105 mm diameter supports a load of 4050 N. A shaft runs at 2800 rpm in the sleeve. If the frictional torque on the shaft is 110 N.m find: **07**
(i) The absolute viscosity of lubricant
(ii) The bearing pressure
(iii) The coefficient of friction and
(iv) The power lost in bearing.

(b) Explain the following in respect to surface characteristics: **07**
(i) Wavines
(ii) Bearing area curve
(iii) Real area of contact
(iv) CLA & RMS

Q.4 **(a)** What are the different applications of hydrodynamic sliders in machine tools? **07**

(b) Explain different methods of oil lubrication. **07**

OR

Q.4 **(a)** Explain Holographic Interferometer with neat sketch. **07**

(b) Explain the concept of Elasto hydrodynamic lubrication between two contacting bodies. **07**

Q.5 **(a)** Explain the concept of wear particle analysis ferrography. **07**

(b) Explain the bearing selection procedure of antifriction bearings with a flowchart. **07**

OR

Q.5 **(a)** Explain fiber optic transducer with neat sketch. **07**

(b) Explain the phenomenon of wear and different types of wear in detail. **07**

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