Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (OLD course)• EXAMINATION – SUMMER 2015

Subject Code: 710905 **Date: 16/05/2015**

Subject Name: TRIBOLOGY

Time: 10:30 am to 1:00 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)**	State the assumptions made in derivation of Reynoldsôs equation for hydrodynamic journal bearings. Derive the Petroffôs equation for hydrodynamicjournal bearings.	**10**
	(b)	What do you mean by friction? What role is played by asperities in friction? Explain in detail	**04**
Q.2	**(a)**	Explain different methods of oil lubrication.	**07**
	(b)	The following data refers to hydrodynamic journal bearing:- Journal diameter = 80 mm, Length of bearing = 40 mm Radial clearance between the journal and bearing = 50 microns Minimum oil film thickness = 15 microns, Speed of journal = 1800 r.p.m. Viscosity of lubricating oil = 30 mPa- s Assuming the narrow approximation (a) plot the pressure distribution in the plane perpendicular to the axis and passing through the midpoint of bearing length (b) find the location and magnitude of maximum pressure.	**07**
		OR	
	(b)	The following data refers to a 360^0 hydrodynamic bearing: Journal diameter = 50 mm Bearing length = 50 mm Radial load = 3.2 kN Journal speed = 1490 r.p.m. Radial clearance = 50 microns, oil viscosity = 25 cP Density of lubricant= 860 kg/m^3, specific heat of lubricant=1.76 kJ/kg^{0}C Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Find the minimum oil film thickness, friction coefficient, oil flow, temperature rise ,side leakage and power lost in churning. USE TABLE NO: 1 [PTO]	**07**
Q.3	**(a)**	List and explain the factors affecting selection of lubricants.	**07**
	(b)	What is additive? Explain the different types of additives used to improve the properties of lubricating oils.	**07**
		OR	
Q.3	**(a)**	Explain the concept of Elasto hydrodynamic lubrication between two contacting bodies.	**07**
	(b)	Explain regimes of lubrication.	**07**
Q.4	**(a)**	Derive the load carrying capacity equation for hydrostatic thrust bearing with a circular step.	**07**

	(b)	Explain working principle of Optical Profilometer with neat sketch.	**07**
		OR	
Q.4	**(a)**	Discuss the optimum design of hydrostatic step bearing for minimizing fluid flow rate.	**07**
	(b)	Explain working principle of Glossmeter with neat sketch.	**07**
Q.5	**(a)**	Explain the concept of wear particle analysis ferrography.	**07**
	(b)	What is the tribology? Suggest the various tribological solutions for overcoming friction and wear.	**07**
		OR	
Q.5	**(a)**	Explain the different methods used to reduce the wear with neat sketches in detail.	**07**
	(b)	List and explain the factors affecting wear rate. Also explain the coating for wear resistance.	**07**

TABLE NO: 1

l/d	ho/c	ὺ	S	(r/c)f	$Q/(rcn_s l)$	Qs/Q	Pmax/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

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