Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 1725006 **Date: 23-06-2014**

Subject Name: Tribology of Machine Elements

Time: 02:30 pm - 05:00 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)**	Define the term 'Tribology'. Discuss the application of it in day to day life.	**07**
	(b)	Explain the various Tribological solutions for overcoming friction and wear.	**07**
Q.2	**(a)**	Enlist the different methods of studying the surface. Describe with neat sketch profilometer.	**07**
	(b)	Briefly explain the selection parameter for bearing design.	**07**
		OR	
	(b)	Explain the term wear. Explain in detail different types of wear experienced in mechanical systems.	**07**
Q.3	**(a)**	Explain the principle of elasto-hydrodynamic lubrication.	**07**
	(b)	Derive the question of load carrying capacity of hydrostatic step bearing.	**07**
		OR	
Q.3	**(a)**	Give the detail comparison of hydrodynamic bearing with hydrostatic bearing.	**07**
	(b)	Derive the question of pressure distribution in case of infinity short hydrodynamic journal bearing. Also state the assumption made.	**07**
Q.4	**(a)**	Derive the Reynold's question in two dimensional using direct method fpr hydrodynamic lubrication.	**07**
	(b)	The following data is given for a hydrostatic thrust bearing: Thrust load=500 kN, Shaft speed=720 rpm, shaft diameter=500 mm, recess diameter=300 mm, film thickness=0.15 mm, viscosity of lubricant=160 SUS, specific gravity=0.86 Calculate (i) supply pressure (ii) flow requirement in liters/min (iii) Power loss in pumping (iv) frictional power loss.	**07**
		OR	
Q.4	**(a)**	Explain the CLA method and RMS method used to analyze surface traces.	**07**
	(b)	Define viscosity and discuss effect of pressure and temperature on viscosity of lubrication oil.	**07**
Q.5	**(a)**	State the desirable properties of lubricants. Also explain briefly the process of recycling of used oil.	**07**
	(b)	Derive the Petrioff's equation for hydrodynamic journal bearing.	**07**
		OR	
Q.5	**(a)**	State laws of friction. Explain how Coulomb's vision of friction explains these laws of friction.	**07**
	(b)	Explain the following terms of lubrication: (i) SUS (ii) Viscosity Index (iii) Fluidity	**07**

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