Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1725006 **Date: 05-12-2014**

Subject Name: Tribology of Machine Elements

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

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

Q-1	(a)	What is tribology and briefly explain different tribological systems?	**07**
	(b)	Briefly explain the different techniQs of surface examination?	**07**
Q-2	(a)	What is surface topography?	**07**
	(b)	Briefly explain the various types of wear and how wear is measured. Give wear resistance material.	**07**
		OR	
	(b)	Explain freeting, corrosion and surface fatigue wear?	**07**
Q-3	(a)	Explain the EHD (elasto hydrodynamic) lubrication in detail. State the different examples of it.	**07**
	(b)	Define absolute viscosity,kinematic viscosity and viscosity index. Discuss the effect of temperature on absolute viscosity of the lubricating oil.	**07**
		OR	
Q-3	(a)	Derive the equation of load carrying capacity of Hydrostatic Step bearing.	**07**
	(b)	Derive Petroffôs equation for lightly loaded bearing.	**07**
Q-4	(a)	Explain the CLA method and RMS method use to analyze surface traces.	**07**
	(b)	State the different functions of the lubricants. Explain grease as lubricant in detail.	**07**
		OR	
Q-4	(a)	State the different theories of friction. Explain any one of them which is most widely accepted with neat sketch.	**07**
	(b)	Briefly explain the design procedure of journal bearing and selection of bearing.	**07**
Q-5	(a)	Derive Reynoldôs equation for 3-D hydrodynamic lubrication.	**07**
	(b)	The load on the journal bearing is 150 KN due to turbine shaft of 300 mm diameter running at 1800 rpm. Determine the following (1) Length of bearing if the allowable bearing pressure is 1.6 N/mm^2 (2) Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60 ^{0}c is 0.02 kg/m-s and the bearing clearance is 0.25 mm	**07**
		OR	
Q-5	(a)	Why additives are added in lubricants? Give the names of few additives and their functions. Classify the lubricants.	**07**
	(b)	A 150 mm diameter shaft supporting a load of 10KN has a speed of 1500 rpm. The shaft runs in a bearing whose length is 1.5 times the shaft diameter. If the diametral clearance of the bearing is 0.15 mm and the absolute viscosity of the oil at the operating temperature is 0.011 kg/m-s, find the power waste in friction.	**07**

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