Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2720911 **Date: 10/12/2015**

Subject Name: Tribology

Time:2:30 pm to 5:00 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)**	Explain elasto-hydrodynamic lubrication theory.	**07**
	(b)	Explain the principle of hydrodynamic lubrication	**07**
Q.2	**(a)**	Discuss the physical significance of various terms of Reynolds equation used for the hydrodynamic lubrication.	**07**
	(b)	Derive the equation for volume flow rate in an axial direction of hydrodynamic journal bearing.	**07**
		OR	
	(b)	Derive the equation for temperature rise in hydrodynamic self-contained bearing.	**07**
Q.3	**(a)**	A fixed pad hydrodynamic thrust bearing of length L and width B has a fluid film shape given by relation $h = h_0 e^{-ax}$ where h_0 is minimum fluid-film thickness and a is constant. Determine the height h_m where the pressure distribution is maximum.	**07**
	(b)	Show that in an infinite width tapered pad bearing of length L, the pressure is maximum at a distance of $\frac{nL}{n+1}$ from the leading edge.	**07**
		OR	
Q.3	**(a)**	Derive the expression for the pressure distribution in entry zone of the Rayleigh step bearing.	**07**
	(b)	Derive the expression for the pressure distribution in exit zone of the Rayleigh step bearing.	**07**
Q.4	**(a)**	Explain the power losses in hydrostatic step bearing	**07**
	(b)	Derive the expression for pressure distribution of hydrostatic conical thrust bearing.	**07**
		OR	
Q.4	**(a)**	Explain the following friction measurement methods (1) Inclined plane rig (2) Pin on disk rig	**07**
	(b)	Explain the junction growth theory	**07**
Q.5	**(a)**	Using modified adhesion theory of friction, show that the coefficient of friction due to adhesion is $$f_a = \frac{k}{\left[\alpha\left(1-k^2\right)\right]^{1/2}}$$	
	(b)	Explain Archardôs theory of adhesive wear.	**07**
		OR	
Q.5	**(a)**	Derive the Stribeck equation for basic static capacity of bearing.	**07**
	(b)	What is equivalent dynamic load for bearing under cyclic load?	**07**

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