Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME SEMESTER II EXAMINATION – SUMMER 2017

Subject Code: 2720911 **Date: 29/05/2017**

Subject Name: Tribology

Time:02:30 PM to 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)**	Discuss the physical significance of various terms of Reynolds equation used for the hydrodynamic lubrication.	**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**
Q.2	**(a)**	Derive the expression for the pressure distribution in entry zone of the Rayleigh step bearing.	**07**
	(b)	Explain the power losses in hydrostatic step bearing	**07**
		OR	
	(b)	Discuss various methods for measuring the coefficient of friction and explain any two in detail.	**07**
Q.3	**(a)**	Derive the Stribeck equation for basic static capacity of ball bearing.	**07**
	(b)	Explain Archard's theory of adhesive wear.	**07**
		OR	
Q.3	**(a)**	Explain equivalent dynamic load for bearing under cyclic loading.	**07**
	(b)	Explain various types of minor wears.	**07**
Q.4	**(a)**	Discuss various methods for measuring the coefficient of friction and explain any two in detail.	**07**
	(b)	Derive the Stribeck equation for basic static capacity of bearing.	**07**
		OR	
Q.4	**(a)**	Using modified adhesion theory of friction, show that the coefficient of friction due to adhesion is $$f_a = \frac{k}{\left[\alpha\left(1 - k^2\right)\right]^{1/2}}$$	**07**
	(b)	Explain the following friction measurement methods (1) Inclined plane rig (2) Pin on disk rig	**07**
Q.5	**(a)**	Explain performance analysis of gear in terms of (1) fatigue failure mode (2) wear mode and (3) lubrication mode.	**07**
	(b)	Derive the expression for the pressure distribution in aerostatic step bearing.	**07**
		OR	
Q.5	**(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)	Explain various tribological problems faced by industries.	**07**