Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 710905N **Date: 24-06-2014**

Subject Name: Tribology

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)** Derive from basic principles 2-D Reynoldôs equation taking usual notation. **10**

(b) Differentiate Good surface and Bad surface. **04**

Q.2 **(a)** How one can measure the amount of friction between two surfaces in contact? **07**

(b) State assumption made, Prove Archadôs equation of adhesive wear **07**

$$Q = k \times (W \div 3P_0)$$

where P_0 yield pressure

And comment about magnitude of factor ôkô

OR

(b) Discuss factors affecting the wear rate between the rubbing surfaces **07**

Q.3 **(a)** Explain ñTribology is an interdisciplinary scienceò **07**

(b) Define the following terms: **07**

1. Tribo surfaces
2. Tribo system
3. Tribology
4. Antifriction Bearing
5. Seat of pressure
6. Converging Fluid Film
7. Diverging Fluid Film

OR

Q.3 **(a)** Explain working principle of Optical Profilometer with neat sketch. **07**

(b) Define the following terms: **07**

1. Waviness
2. Surface roughness
3. Sampling length
4. Bearing area curve
5. Contact area
6. Real area of contact
7. CLA & RMS

Q.4 **(a)** Explain squeeze- film lubrication. **07**
Give practical situation where hydrostatic squeeze- film lubrication can be observed.

(b) Classify the lubricants and explain the important properties of the lubricants. **07**

OR

Q.4 **(a)** Explain the EHD (Elasto hydrodynamic lubrication) in detail and state its Practical examples. **07**

(b) Discuss the lubrication problems arise at certain extreme environmental conditions such as pressure, temperature and vacuum and along with their solution. **07**

Q.5 **(a)** Discuss different regimes of lubrication with the help of Stribeckôs curve **07**

(b) The following data refers to hydrostatic thrust bearing : **07**

Total thrust load = 500 kN , shaft diameter = 500 mm
Viscosity of the lubricant = 29.3 cP , recess diameter =300 mm
Shaft speed =720 r.p.m. , film thickness = 0.15 mm
Calculate :

1. Supply pressure
2. Flow requirement in litre/min
3. Power loss in pumping
4. Power loss in friction

OR

Q.5 **(a)** The following data refers to short-journal bearing : **07**

Journal diameter = 50 mm
Length of bearing = 25 mm
Viscosity of lubricating oil = 50 MPa- s
Speed of journal = 1440 r.p.m.
Eccentricity ratio = 0.5
(r_j/C) ratio = 1000
Calculate:

1. Load carrying capacity
2. Attitude
3. Power lost in Friction

(b) Explain the following term with reference to hydrodynamic journal bearings: **07**

1. Design variable 2. Performance variable 3. Sommerfeld number

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