

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIIth SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 171905****Date: 29/05/2012****Subject Name: Industrial 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) State the different theories of friction. Explain any one of them which is most widely accepted with neat sketch. **07**

(b) Define absolute and kinematic viscosity. Also define viscosity index. Discuss the effect of temperature on absolute viscosity of the lubricating oil. **07**

Q.2 (a) Explain the air/gas bearing in detail. **07**

(b) State the different functions of the lubricants. Explain grease as lubricant in detail. **07**

OR

(b) Why additives are added in lubricants? Give the names of few additives and their functions. **07**

Classify the lubricants.

Q.3 (a) Explain the EHD (elasto hydrodynamic) lubrication in detail. State the different examples of it. **07**

(b) Explain the wear of metals and non-metals. **07**

OR

Q.3 (a) Explain the diagnostic maintenance of tribological components and considerations in IC engines and automobile parts. **07**

(b) Explain the following (any ONE) : **07**

1. Measurement of wear

2. Recycling of used oils

Q.4 (a) Derive Reynold's equation for 3-D hydrodynamic lubrication. Also state the assumptions made in this derivation. **07**

(b) Explain oil whip and whirl. **07**

OR

Q.4 (a) Derive Petroff's equation for lightly loaded bearing. **07**

(b) The following data refers to a 360° hydrodynamic bearing: **07**

Journal diameter = 40 mm

Bearing length = 20 mm

Radial load = 6.5 kN

Journal speed = 1500 r.p.m.

Radial clearance = 0.007 mm

Oil viscosity = 25 cP

Find the minimum oil film thickness, friction coefficient, oil flow and power lost in churning.

l/d	h_0/c	S	$CFV = f(r/c)$	$FV = Q / rcnl$
1/2	0.4	0.319	8.10	4.85
	0.6	0.779	17	4.29
	0.8	2.03	40.9	3.72

Q.5 (a) State and explain general requirements of good bearing materials. **07**

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

Thrust load = 500 kN
Recess diameter = 300 mm
Film thickness = 0.15 mm

Shaft speed = 720 r.p.m.
Shaft diameter = 500 mm
Viscosity of lubricant = 29.3 cP

Calculate the supply pressure, flow requirement in lit/min and power loss in pumping.

OR

- Q.5** (a) Write short note on the following (any ONE) : **07**
1. Selection of bearing.
 2. Lubrication systems.
- (b) Explain the optimum design of hydrostatic step bearing. **07**

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