Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

MDPC202

2nd Semester Back Examination 2016-17

Bearings & Lubrication

BRANCH(S): MACHINE DESIGN, MECH. SYSTEM DESIGN

Time: 3 Hours

Max Marks: 70

Q.CODE: Z353

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** (2 x 10)

a) What are the prominent theories of friction?

b) Differentiate between fluidity and viscosity.

c) What is meant by a lightly loaded bearing? What parameters decides whether a bearing is lightly or moderately or heavily loaded?

d) Discuss in detail the surface energy and flash temperature theory.

e) Explain wear of ceramic materials

f) Briefly explain the working principle of hydrostatic thrust bearing with figures.

g) Which is the ideal location for the inlet hole in a hydrodynamic journal bearing?

h) What is a self-lubricating bearing and how does it function?

i) Explain the possible causes of bearing failure, and remedies.

j) Explain the mechanism of Pressure development in an oil film.

Q2 a) Define absolute and kinematic viscosity. Also define viscosity index. Discuss the effect of temperature on absolute viscosity of the lubricating Oil. (5)

b) State the different functions of the lubricants. Explain grease as lubricant in Detail. (5)

Q3 a) State the different theories of friction. Explain any one of them which is most widely accepted with neat sketch. (5)

b) Explain the diagnostic maintenance of tribological components and Considerations in IC engines and automobile parts. (5)

Q4	a)	Derive Reynold's equation for 3-D hydrodynamic lubrication. Also state the assumptions made in this derivation.	(8)
	b)	Explain oil whip and whirl.	(2)
Q5	a)	Derive Petroff's equation for lightly loaded bearing.	(4)
	b)	The following data refers to a 360^0 hydrodynamic bearing: Journal diameter = 40 mm, Bearing length = 20 mm, Radial load = 6.5 kN, Journal speed = 1500 r.p.m., Radial clearance = 0.0, mm Oil viscosity = 25 cP. Find the minimum oil film thickness, friction coefficient, oil flow and power lost in churning.	(6)
Q6	a)	State and explain general requirements of good bearing materials.	(3)
	b)	The following data refers to a hydrostatic thrust bearing: Thrust load = 500 kN, Shaft speed = 720 r.p.m., Recess diameter = 300 mm, Shaft diameter = 500 mm, Film thickness = 0.15 mm, Viscosity of lubricant = 29.3 cP, Calculate the supply pressure, flow requirement in lit/min and power loss in pumping.	(7)
Q7	a)	Explain the EHD (elasto hydrodynamic) lubrication in detail. State the different examples of it.	(6)
	b)	Why additives are added in lubricants? Give the names of few additives and their functions. Classify the lubricants.	(4)
Q8		**Write short notes on any two**	(5 x 2)
	a)	Selection of bearing	
	b)	Significance of Stricbeck curve in lubrication	
	c)	Mechanism Of Wear	
	d)	Advanced material's use in tribology application.	