Registration No:

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

M.TECH 2ND SEMESTER REGULAR EXAMINATIONS, MAY 2018

BEARING AND LUBRICATION

Branch: MD, Subject Code:MMDPE2051

Time: 3 Hours

Max Marks : 70

PART-A   (10 X 2=20 MARKS)

1. Answer the following questions.

a) Why hydrostatic journal bearing is called externally pressurized bearing?   **[CO3]**

b) Define basic static load capacity, basic dynamic load capacity, eccentricity ratio and life of bearing.   **[CO1]**

c) Explain the following terms as applied to journal bearings :
(a)Bearing characteristic number ; and (b) Bearing modulus.   **[CO4]**

d) Explain wear of ceramic materials   **[CO1]**

e) What is a self-lubricating bearing and how does it function?   **[CO4]**

f) Explain the mechanism of Pressure development in an oil film.   **[CO2]**

g) What role do boundary conditions play in a numerical approach of a problem?   **[CO2]**

h) Name some of the Wear resistance material (metallic & non-metallic) for engineering applications.   **[CO1]**

i) How the sliding speed effect on co-efficient of friction?   **[CO1]**

j) What do you mean by surface contaminants? What is their effect on surface contacts?   **[CO1]**

PART-B   (5 X 10=50 MARKS)

Answer any five questions from the following.

2

a) Define absolute and kinematic viscosity. Also define viscosity index. Discuss the effect of temperature on absolute viscosity of the lubricating Oil.   **[CO1]**

b) State the different functions of the lubricants. Explain grease as lubricant in Detail.**[CO1]**

3

a) State the different theories of friction. Explain any one of them which is most widely accepted with neat sketch.   **[CO1]**

b) Explain the diagnostic maintenance of tribological components and Considerations in IC engines and automobile parts.   **[CO2]**

4

a) Derive an expression for load carrying capacity of an infinitely long journal bearing. Use full sommerfeld and half sommerfeld's condition.   **[CO3]**

b) A full journal bearing is having the following specifications:
Journal diameter = 100mm
Length to diameter ratio = 1.0
Radial clearance=0.025mm
Journal speed = 3000rpm
Operating eccentricity ratio = 0.6

Average viscosity of lubricant = 0.02Pa s
Assuming the bearing to be infinitely long and using full sommerfeld & half sommerfeld
boundary conditions find bearing characteristics. **[CO3]**

5
a) Explain the working principle of hydrostatic thrust bearing with figures. **[CO3]**
b) Derive the equation for pressure acting on hydrostatic annular thrust bearing. **[CO3]**

6
a) State and explain different types of lubricant and its applications. What are the properties of a good lubricant? **[CO1]**
b) What are the practical considerations to be made while designing bearings. Discuss such considerations in brief as related to size , clearance and load. **[CO4]**

7.
a) Derive Petroff's equation for lightly loaded bearing. **[CO1]**
b) The following data refers to a 360^0 hydrodynamic bearing: **[CO3]**
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.

8 **Write short notes on**
a) Bearing Materials [5] **[CO1]**
b) Significance of Stricbeck curve in lubrication [5] **[CO2]**

==0==