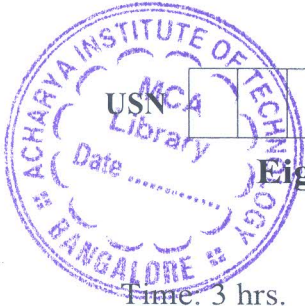# CBCS SCHEME

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18ME822

Eighth Semester B.E. Degree Examination, June/July 2024
Tribology

Time: 3 hrs.

Max. Marks: 100

Note : 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of Design Data Handbook is permitted.*

Module-1

1   a. List and explain different types of Lubrication. **(10 Marks)**
    b. Explain any five desirable properties of an oil. **(10 Marks)**

OR

2   a. Derive an expression for rate of flow through parallel stationary plates. State the assumptions made in deriving the equation. **(10 Marks)**
    b. With a neat sketch, explain any two viscosity measuring instruments. **(10 Marks)**

Module-2

3   a. Define Friction. List and explain Friction theories. **(10 Marks)**
    b. What are the different methods of measuring frictional force? Explain any one. **(10 Marks)**

OR

4   a. Explain the following types of wear with simple sketch :   i) Adhesive wear
       ii) Abrasive wear   iii) Erosive wear   iv) Corrosive wear. **(12 Marks)**
    b. Briefly explain Wear of Ceramic materials. **(08 Marks)**

Module-3

5   a. Derive an expression for Frictional Force and Co-efficient of friction for lightly loaded Journal bearing stating the assumptions. **(10 Marks)**
    b. A lightly loaded Journal bearing has the following data :
       Bearing length = 75mm   ;   Journal diameter = 60mm   ;
       Diametrical clearance ratio = 0.001   ;   Speed = 18000 rpm   ;   Radial load = 200N   ;
       Oil used is SAE30 at a operating temperature of 65ºC. Calculate the power loss in the
       Bearing , Torque , Co-efficient of friction. **(10 Marks)**

OR

6   a. Explain with a neat sketch, mechanism of pressure development in an oil film. **(10 Marks)**
    b. An idealized Full Journal bearing has the following specifications :
       Diameter of the Journal = 50mm ;   Length of the Journal = 62.5mm ;
       Speed of the Journal = 1200 rpm ;   Radial clearance = 0.025mm   ;
       Average viscosity = 11 CP   ;   Altitude = 0.8.   Determine
       i)   Check whether the bearing is lightly loaded or heavy loaded.
       ii)   Load carrying capacity of the bearing.
       iii)   Total Frictional resistance.
       iv)   Co-efficient of friction and power loss. **(10 Marks)**

Module-4

7   a.   Derive an expression for load carrying capacity of Idealized plane slider bearing.   (10 Marks)
    b.   A rectangular plane slider bearing has the following specification :
         Bearing length in the direction of motion = 90mm ;   Bearing width = 75mm ;
         Load = 17850N ;   Slider velocity = 2.5m/sec ;   Inclination = - 0.00035 radians ;
         Mean oil viscosity = 45 CP ;   Minimum oil film thickness = 0.02mm.
         Find, Load carrying capacity , Frictional force , Power loss in the bearing ,
         Co-efficient of friction.   (10 Marks)

OR

8   a.   Derive an equation for load carrying capacity of Hydrostatic lubrication.   (10 Marks)
    b.   A hydrostatic step bearing has the following characteristics :
         Diameter of the shaft = 152mm ;   Diameter of the pocket = 102mm ;
         Vertical thrust on the bearing = 45,000N ;   External pressure is zero ;   Shaft speed = 900 rpm
         Assume that viscosity of the lubricant under the operating condition is 24.15 CP and the
         desirable oil film thickness is 0.127mm.   Find
         i)   Inlet or supply pressure   ii)   Quantity of oil flow   iii)   Power loss in the bearing
         iv)   Frictional force   v)   Co-efficient of friction   vi)   Torque on the shaft.   (10 Marks)

Module-5

9   a.   Explain any ten properties of bearing materials.   (10 Marks)
    b.   Briefly discuss the common bearing materials that are used in practice.   (10 Marks)

OR

10   a.   What is Surface Engineering? Write a brief history of Surface Engineering.   (10 Marks)
     b.   Briefly explain different techniques to achieve Surface modification.   (10 Marks)

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