[5154]-37

B.E. (Mechanical)
TRIBOLOGY
(2008 Pattern) (Elective - I) (402044D) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:

  1) *Answer any 3 questions from section I and 3 questions from section II.*
  2) *Answers to the two sections should be written in separate answer books.*
  3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State and explain applications and importance of tribology in industries. **[8]**

  b) Explain the use of following additives- **[8]**

  i)   Anti-wear additives.

  ii)   Anti-foam additives.

  iii) Anti-friction additives.

  iv)   Anti-scuff additives.

OR

Q2) a) Discuss the effect of pressure on lubricating oil and also explain why excessive amount of E.P. additives is harmful for material. **[8]**

  b) Explain the following terms related to used motor oil- **[8]**
  i)   Re-refining

  ii)   Reconditioning

  iii) Reprocessing

Q3) a) Using the Bowden and Tabor's theory of simple adhesion prove that coefficient friction due to adhesion is- **[8]**

$$f_a = \frac{kS_{sy}}{S_{yc}} \text{ and } f_a = 0.1667 \text{ for } k = 0.5$$

P.T.O.

b) Show that the volume of abrasive wear per unit sliding distance with conical abrasive particles is given by- **[8]**

$$Q = \left[\frac{2k_w \cot\alpha}{\pi} \right] \frac{W}{P} \text{ with usual notations}$$

OR

Q4) a) Discuss the effect of following on coefficient of friction between two surfaces-

    i) Surface finish   ii) Sliding velocity   **[8]**

    b) Classify and explain different friction tests with their application. **[8]**

Q5) Derive equation for pressure distribution and load carrying capacity for short bearing.Draw the pressure distribution curve for longitudinal and transverse direction. **[18]**

OR

Q6) a) State assumptions and derive two dimensional Reynolds equation. **[12]**

    b) Differentiate between long journal bearing and short journal bearing.**[6]**

SECTION - II

Q7) Derive relation for load carrying capacity in terms of supply pressure for thrust bearing. State and explain different types of energy losses in hydrostatic bearing. **[18]**

OR

Q8) a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h1, if both the surfaces are separated by a lubricant of viscosity 'μ'. Derive the expression for the time 't' taken to reduce the film thickness from h1 to h2. **[12]**

    b) A circular plate of 120 mm is approaching to a plane at velocity of 0.1 m/s, at the instant maximum pressure is 5 MPa, if two plates are separated by lubricating oil of viscosity 0.025 Pa-s then calculate: **[6]**

        i) The maximum pressure

        ii) The load carrying capacity

Q9) a) Explain the phenomenon of Elastohydrodynamic lubrication. **[4]**

b) Write a short note on: lubrication in Rolling, Drawing and Extrusion with neat sketch. **[12]**

<div align="center">OR</div>

Q10)a) Write short note on-

  i)   Labyrinth seal   ii)   Metallic Gasket   **[8]**

b) What is self lubricating bearing? Discuss the property of any two materials which are used for making self lubricating bearing. **[8]**

Q11)a) What are the different parameters of coating, explain in brief. **[4]**

b) What are the different methods for manufacturing surface layers? **[6]**

c) Explain electroplating and also write its advantages and limitations. **[6]**

<div align="center">OR</div>

Q12)a) Define the term 'Superficial layers', discuss the development of concept and structure of superficial layers. **[10]**

b) Discuss the importance of "Surface Engineering" in Tribology. **[6]**

<div align="center">ৡৡৡৡ</div>