



# GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ME454C - (Elective III)- Tribology**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

## 1) Solve ant three of the following

- a) Explain different tribological problems in industries. [6]
- b) Explain different types of additives in detail. [6]
- c) The following data is given for a  $360^\circ$  hydrodynamic bearing  
Radial load = 3.2 kN , journal diameter = 50 mm , Bearing length = 50 mm, Journal speed = 1490 rpm, Radial clearance = 50 microns, Viscosity of lubricant = 25 cP, Density of lubricant = 860 kg/m<sup>3</sup> , Specific heat of lubricant = 1.76 kJ/kg°C assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate i) the minimum oil- film thickness ii) the coefficient of friction iii) the power lost in friction. [6]
- d) Write a short note on Squeeze film lubrication. [6]

## 2) Solve ant three of the following

- a) Explain the basic modes of lubrication. [6]
- b) What are the different laws of friction . Explain [6]
- c) A hydro static step bearing has following details  
Shaft diameter = 100 mm , Recess diameter = 60 mm , Film thickness = 0.05 mm , Supply pressure = 5.5 bar , Viscosity of oil = 30 cP , recess depth = 0.5 mm , Find i) the load carrying capacity ii) the oil flow rate required. [6]
- d) Derive Petroff,s equation for hydrodynamic journal bearing. [6]

## 3) Solve ant three of the following

- a) Derive Reynold,s equation for one dimensional flow. [6]
- b) Explain the advantages and limitations of gas lubricated bearing. [6]
- c) A pressure vessel wall is made of two steel plates rolled over each other. A vessel contains a fluid of viscosity 10 cP at 2 MPa pressure. A crack of 20  $\mu$ m is developed between the rolled steel plates. The width of crack is 100 mm . If the length of crack in the direction of possible leakage is 2 m, determine the leakage of fluid from vessel in one day. [6]
- d) Explain mechanism of pressure development in hydrodynamic thrust bearing. [6]

## 4) Solve the following

- a) An oil of viscosity 70 cP and relative density of 0.7 is used for lubrication. Convert the viscosity into SUS. [3]
- b) Give any three applications of gas lubricated bearing. [3]

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