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Total Number of Pages: 02

M.TECH
P2PUCC15

2nd Semester Regular Examination- 2016-17

Tribology

BRANCH: PRODUCTION ENGG, PRODUCTION ENGG AND OPERATIONAL MGT

Time: 3 Hours

Max Marks: 100**Q.CODE: Z982**

Answer Question No.1 which is compulsory and any FOUR from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: *Short answer type* (2 x 10)**
- What is the S.I unit of kinematic viscosity?
 - A journal of 120 mm diameter rotates in a bearing at a speed of 1000 rpm. What is the power lost during friction if 8 kN radial load acts on the journal and coefficient of friction is 2.525×10^{-3} ?
 - How the sliding speed effect on co-efficient of friction?
 - What is the difference between air film lubrication and oil lubrication?
 - What are the properties of a sliding contact bearing material?
 - What are the commonly used materials for sliding contact bearings?
 - What is meant by hydrodynamic lubrication?
 - What do you mean by wear? How would you calculate wear rate?
 - Explain the following terms as applied to journal bearings :
(a) Bearing characteristic number ; and (b) Bearing modulus.
 - Why hydrostatic journal bearing is called externally pressurized bearing?
- Q2 a) Derive the generalized Reynolds equation from Navier-Stokes equation along with the continuity equation using certain assumptions for a steady laminar flow between the two parallel planes. (10)**
- b) How would you classify wear? Explain briefly on each type of wear. (10)**
- Q3 a) What do you mean by bearings? Classify different type of bearings and with diagram explain on each type. (10)**
- b) Derive an expression for load carrying capacity of an infinitely long journal bearing. Use full sommerfeld and half sommerfeld's condition. (10)**
- Q4 a) How the hypothesis of Burwell and Strang is differ from hypothesis of Holm to determine the material removal rate? (10)**
- b) The following data is given for 360° hydrodynamic journal bearing. (10)**
- | | |
|---------------------|-------------|
| l/d | 1 |
| n | 1350 r.p.m |
| Journal diameter | 100 mm |
| Diametral clearance | 100 μ m |
| External load | 9 kN |

The value of minimum film thickness variable is 0.3. Find the viscosity of oil that needs to be used.

- Q5 a)** Briefly describe the mechanism of pressure build-up in a hydrodynamic bearing with relevant figures **(10)**
- b)** State and explain different types of lubricant and its applications. What are the properties of a good lubricant? **(10)**
- Q6 a)** Derive an expression to determine wear rate according to hypothesis of Archard. **(10)**
- b)** Briefly describe different types of viscometer and its working principle. **(10)**
- Q7 a) Write short notes on the followings: (5x2)**
- i) Rabinowicz's quantitative law for abrasive wear
 - ii) Solid lubricants and its applications.
- b)** Define viscosity .State and explain the effect of temperature and pressure on viscosity of lubricating oils. **(10)**