

# C. U. SHAH UNIVERSITY

## Summer Examination-2017

Subject Name : Industrial Tribology

Subject Code : 4TE07ITR1

Branch : B.Tech (Mechanical)

Semester : 7

Date : 31/03/2017

Time :02:30 To 5:30

Marks :70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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Q-1

**Attempt the following questions:**

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- a) What is bearing characteristic number?
- b) What is flash point?
- c) What do you understand by SAE 80W-90 oil?
- d) Draw the diagram – viscosity vs. pressure.
- e) Write down the equation used for measurement of viscosity by Saybolt Universal Viscometer.
- f) What is Bielby layer of surface?
- g) What is square bearing?
- h) Give the name of any two types of additives used in lubrications.
- i) Write down any two advantages of Gas lubricated Bearings.
- j) Draw the working diagram of Stick-Slip friction.
- k) Write any two lubricants used in forging process.
- l) What is anti friction bearing?
- m) Write down Petroff's equation.
- n) Define average roughness? Write down its unit.



**Attempt any four questions from Q-2 to Q-8**

- Q-2**            **Attempt all questions**
- a) Explain geometrical properties of surface with neat sketch.            **07**
  - b) Explain the importance of tribology in mechanical/automobile engineering field.            **07**
- Q-3**            **Attempt all questions**
- a) List the different theories of friction. Explain Bowden and Tabor's theory of simple adhesion in details.            **07**
  - b) State and explain Coulomb's law of dry friction by stating its limitations.            **07**
- Q-4**            **Attempt all questions**
- a) Explain the factors affecting on wear rate.            **07**
  - b) What is wear? List & explain different types of wear. How would you reduce or eliminate wear from industrial machinery at the design stage.            **07**
- Q-5**            **Attempt all questions**
- a) Write various theories of lubrications            **07**
  - b) Explain in detail recycling of used oil, process of recycling and method of disposal of used oil.            **07**
- Q-6**            **Attempt all questions**
- a) Explain hydrodynamic bearing with diagram. Write application, advantages and limitation of hydrodynamic bearing.            **07**
  - b) Derive the Reynold's equation in two dimensional flows for hydrodynamic lubrication.            **07**
- Q-7**            **Attempt all questions**
- a) Explain in detail - properties and parameters of coatings.            **07**
  - b) Explain following terms with respect to Hydrodynamic journal bearing            **07**
    - 1. Long bearing
    - 2. Eccentricity
    - 3. Minimum film thickness
    - 4. Attitude
    - 5. Critical pressure
- Q-8**            **Attempt all questions**
- a) Explain the working of hydrostatic bearings with neat sketch. State their advantages, limitations and applications.            **07**
  - b) What is hydrostatic step bearing? Derive equation for load carrying capacity of hydrostatic step bearing.            **07**

