
MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2018

SUBJECT: ENGINE TRIBOLOGY [AAE 4019]

REVISED CREDIT SYSTEM

(02/01/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Explain the origination of sliding friction and relate the influence of sliding friction in the slip-stick phenomenon. **(02)**

1B. Classify different types of lubricants and state few advantages of synthetic oils **(03)**

1C. Describe cone-on-plate viscometer with a diagram. **(05)**

2A. Categorize and explain the progressive stages of bearing damages as an effect of inadequate lubrication. **(02)**

2B. With an illustration, explain the testing methods to identify adhesion wear. **(03)**

2C. Derive the following expressions of hydro-dynamically lubricated Journal bearing **(05)**

I. Bearing Geometry
II. Pressure Distribution

3A. Explain the principle of short-tube viscometers in brief and name some of the short tube viscometers with a schematic diagram. **(02)**

3B. Explain the concepts of the following topics briefly **(03)**

I. Tomlinson Molecular theory
II. Need of Spherical Deformation theory of friction.

3C. A service technician removes water from the fender using a cotton squeegee cloth with a speed of 10 cm/s. He is supplying a tangential force of 30 dynes. The thickness between the cloth and the car body is 0.8mm. If a soap solution (cleaning agent) spills over the car body which is having a viscosity of 0.59 stokes, Compute the force required to maintain the same speed. The viscosity of water is 0.01 Stoke. **(05)**

4A.	Predict the type of wear originated from the inclusions. Explain the importance of bielby layer in brief.	**(02)**
4B.	Categorize the different types of Transmission Electron Microscope and mention their salient features.	**(03)**
4C.	Describe the functioning of surface profilometer with the aid of a diagram.	**(05)**
5A.	Derive the expression for the flow rate capacity characteristics of a hydrostatic bearing.	**(04)**
5B.	Derive the bearing geometry and pressure distribution of a tilted pad bearing.	**(06)**