

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING) MAKE UP EXAMINATIONS, NOV/DEC 2020

SUBJECT: ENGINE TRIBOLOGY [AAE 4019]

REVISED CREDIT SYSTEM

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Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.

1A.	With relevant graphs explain, how friction of metals is influenced by load and temperature.	(04)
1B.	Explain with a neat sketch how friction is measured using a pin on disk test rig.	(03)
1C.	List the limitations of the Electrostatic and Energy dissipation friction theories.	(03)
2A.	What is <i>Rehbinder effect</i> in wear of ceramics? With the help of a plot explain how sliding speed influences wear of Silicon Nitride.	(04)
2B.	Explain any two testing methods for erosive wear with a neat sketch.	(03)
2C.	State some of the methods/steps engaged in reduction of wear.	(03)
3A.	Explain any 5 thermal properties that should be present in a good lubricant.	(04)
3B.	Explain the phenomenon of boundary (extreme pressure) lubrication with schematic sketches.	(03)
3C.	State the advantages and disadvantages of hydrostatic bearing.	(03)

4A.	A full journal bearing has the following specifications: Journal Diameter = 100 mm , Bearing Length = 80 mm , Radial Clearance = 0.05 mm , Radial load = 1000 N , Absolute viscosity of oil = 0.015 Pa s . Using Petroff's equation find (i) the speed of the journal which corresponds to coefficient of friction = 0.04 and the power loss at this speed.	(04)
4B.	Explain the step wise procedure of selecting a ball bearing from the manufacturer's catalogue.	(03)
4C.	Derive the expression for frictional torque in a hydrostatic bearing with pocket radius r_1 and outer radius r_2 of the bearing.	(03)
5A.	Explain the sputtering process of physical vapour deposition using a schematic sketch.	(04)
5B.	Explain the mechanism of hydrodynamic instability with respect to fluid film bearings.	(03)
5C.	Explain with a neat sketch how a falling sphere viscometer is used to measure the viscosity of a liquid.	(03)