MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

X SEMESTER B.TECH. (AERONAUTICAL/AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2022

SUBJECT: ENGINE TRIBOLOGY [AAE - 4082]

REVISED CREDIT SYSTEM

(17/11/2022)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

Q No	Question	Marks	CO attained	BT level
1A	Define the term 'tribology'. Explain the significance of it from automotive industry point of view with few examples.	**3**	**1**	**1,2**
1B	State the 4 classical laws of friction, and also state which are valid even today.	**3**	**1**	**1,2**
1C	Elucidate the friction theory which involves, welding, shearing and ploughing in metals with a schematic sketch.	**4**	**1**	**1,2**
2A	Define the term wear and state its classifications.	**3**	**1**	**1,2**
2B	Differentiate between Adhesive Wear and Corrosive wear stating at least 3 differences.	**3**	**1**	**1,2**
2C	With a neat sketch explain any two experiments to test erosive wear.	**4**	**1**	**1,2**
3A	Explicate the term *Rehbinder* effect with respect to wear of ceramics.	**3**	**1**	**1,2**
3B	What is the tem Viscosity Index? Explain how VI is calculated using the necessary plot.	**3**	**2**	**1,2**
3C	Briefly explain any 4 properties a good lubricant should retain.	**4**	**2**	**1,2**

4A	Explain the working of a Couette-Hatschek viscometer with a neat sketch	**3**	**2**	**1,2**
4B	With a schematic sketch, explain the working principle of Elastohydrodynamic lubrication.	**3**	**3**	**1,2**
4C	State the assumptions used and derive the Petroff's equation for a lightly loaded bearing.	**4**	**4**	**1,2**
5A	State any 6 assumptions used in the derivation of Reynolds' equation.	**3**	**3**	**1,2**
5B	What features do materials like Nylon, Phenolic should contain so as to be used as sliding contact bearings.	**3**	**4**	**1,2**
5C	A hydrostatic circular thrust bearing has the following data: Shaft dia=300mm, Dia of pocket=200mm, Shaft speed = l00 rpm, Pressure at the pocket = 500 kN/m^2, Film thickness = 0.07 mm, Viscosity of lubricant= 0.05 Pa.S. Determine: i) Load carrying capacity, ii) Oil flow rate and iii) Power loss due to friction	**4**	**4**	**3**