

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH. (TRIBOLOGY AND MAINTENANCE) END SEMESTER EXAMINATIONS, APRIL 2019

SUBJECT: ADVANCES IN TRIBOLOGY [MME 5277] REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Explain the multi-scale modelling and solution procedure with regard to hydrodynamic lubrication.	03
1B. 1C.	List the important factors in the lubrication of human joints Discuss adhesion friction in plastics with sketches	03 04
2A. 2B.	Examine the relationship between friction and adhesion. With a neat sketch explain the 'ratchet mechanism' involving adhesion and	03
2C.	surface roughness. Discuss the atomic origins of deformation	04 03
3A. 3B	Elaborate on a simple model for sliding wear Explain the 'Zisman method' for obtaining the contact angle from surface	02
50.	energy measurements	04
3C.	Discuss the Van der Waals forces with regard to macroscopic objects and how the Hamaker constant can be determined	04
4A.	Discuss the phenomenon of abrasive wear and how this type of wear is modelled.	03
4B.	Distinguish between the Frenkel-Kontorova and Tomlinson model in the modelling of stomic friction	04
4C.	Explain Admontons's law with neat sketches	04 03
5A. 5B. 5C.	Discuss the modelling methods in lubrication Explain the Hartfree frock method. Give some of its applications Interpret the molecular dynamics techniques and discuss their drawbacks	04 03 03