BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.TECH **SEMESTER : V**
BRANCH: MECHANICAL **SESSION : MO/2025**

SUBJECT: ME367 INDUSTRIAL TRIBOLOGY

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	What is the need for interdisciplinary knowledge in tribology?	[2]	1	2
Q.1(b)	Illustrate the different layers of a surface and elucidate the deformed layer.	[3]	1	2
Q.2(a)	A surface profile is measured at equal intervals over a 10 mm sampling length, and the absolute height values (in μm) from a fixed reference line are recorded as follows:	[2]	1	3

Point	1	2	3	4	5	6	7	8	9	10
Height (μm)	3.5	5	4.2	6.3	5.5	4.8	6	3.9	5.1	4.7

For the given surface, calculate the centerline average roughness and root mean square roughness.

Q.2(b)	Illustrate and explain with neat sketches the following amplitude roughness parameters: Peak to valley height, Peak to mean height, Mean to Valley height and ten point height.	[3]	1	3
Q.3(a)	For a contaminant free surface sliding in vacuum, the simple adhesion theory failed to explain the high coefficient of friction. Explain mathematically giving reasons thereof for such an observation.	[2]	2	3
Q.3(b)	Show mathematically and discuss the role of interface shear stress in controlling adhesive friction.	[3]	2	3
Q.4(a)	Differentiate between the adhesion and deformation components of friction.	[2]	2	3
Q.4(b)	In a dry sliding wear test, a stainless steel ball of 10 mm diameter produces a 2 mm wide groove. The wear mechanism was observed to be both adhesive and ploughing. The coefficient of friction recorded by the sensor was 0.4. The shear strength of the softer material was 300 MPa. Find out the friction forces arising due to adhesion and ploughing component if the applied normal load was 50 N. What is the expected shear strength of the interface and actual contact area?	[3]	2, 3	3
Q.5(a)	State the major forms of wear mechanisms. Give two examples where wear changes from one form to the other.	[2]	2, 3	2
Q.5(b)	Considering a hard conical asperity, find out the relation for the wear coefficient in abrasive wear.	[3]	2	2

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