BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: BTECH **SEMESTER : V**
BRANCH: MECHANICAL **SESSION : MO/2024**

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)	State four applications or roles of tribology in daily life.	[2]	1	2
Q.1(b)	A rough surface has a profile given by $z(x) = a\cos\left(\frac{\pi}{a}x\right)$. Find the values of R_a and R_q.	[3]	1	3
Q.2(a)	Differentiate between physiosorbed and chemisorbed layer with illustration.	[2]	1	3
Q.2(b)	Explain skewness and kurtosis along with their formula, range of values and physical significance with a neat sketch.	[3]	1	2
Q.3(a)	Explain the stick-slip phenomenon along with some of its practical implications.	[2]	2	2
Q.3(b)	Considering a hard spherical asperity, find out the expression for the coefficient of friction predicted by the deformation theory of friction.	[3]	2	3
Q.4(a)	A hard conical asperity of semi-angle 70° is slid against a soft metal surface which produces a groove of 2.5 mm width. For a measured coefficient of friction of 0.48 and considering friction due to adhesion and ploughing in additive mode, calculate adhesive component of friction coefficient.	[2]	2	3
Q.4(b)	Consider a micro-scale friction measurement using a hard ball of radius 2.83 mm sliding against a soft and flat surface. The overall friction coefficient is measured as 0.25, and the groove produced during sliding has a width of 1 mm. The interfacial shear strength at the contact is found to be one-tenth of the bulk value. Assuming friction due to multiple mechanisms acting in additive mode, calculate the contribution from different mechanisms towards friction.	[3]	2	4
Q.5(a)	Illustrate with a neat sketch the mechanism of two body and three body abrasion.	[2]	3	2
Q.5(b)	Formulate the expression for non-dimensional wear coefficient K in abrasive wear considering a hard conical asperity.	[3]	3	3

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