

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Sixth Semester

Mechanical Engineering

CME397 – Surface Engineering

Regulations - 2021

Duration: 3 Hrs

Maximum: 100 Marks

PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Discuss the role of friction in extreme conditions.	UN	1	2
2.	What is meant by surface topography?	RE	1	2
3.	What factors influence the wear resistance of a material? Name two.	RE	2	2
4.	What is the importance of lubrication in reducing wear?	UN	2	2
5.	What is galvanic corrosion and how does it occur?	UN	3	2
6.	Describe the concept of passivation in corrosion resistance.	RE	3	2
7.	What is the difference between hydrophobic and hydrophilic surfaces?	RE	4	2
8.	How does surface welding contribute to wear resistance in industrial applications?	UN	4	2
9.	What role do alloying elements like nickel and cobalt play in super alloys?	RE	5	2
10.	What are the key characteristics that distinguish biomaterials from other materials?	UN	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a State and explain the classical laws of friction proposed by Amontons and Coulomb. How do these laws relate to real-world applications in engineering?	UN	1	13
	Or			
	b What specific thermal effects are generated during sliding contact between two surfaces, and how do these effects vary with different materials and surface finishes?	UN	1	13
12.	a What is wear, and how is it defined in the context of material degradation? Discuss the different types of wear mechanisms, including adhesive, abrasive, corrosive, and fatigue wear.	RE	2	13
	Or			
	b Analyze the application of theoretical wear models to real world engineering problems and discuss how these models can improve design and maintenance decision.	RE	2	13
13.	a i What role does surface condition (e.g., coatings, roughness) play in preventing or promoting corrosion?	UN	3	6
	ii How is electrochemical corrosion testing conducted, and what are its advantages?	UN	3	7

Or

	b	Explain the electrochemical processes involved in corrosion. What are the roles of anodes, cathodes, and electrolyte solutions in the corrosion process?	UN	3	13
14.	a	i What are PVD techniques its principle, types and their operational differences?	UN	4	7
		ii Explain about the basic principle of laser surface hardening?	UN	4	6
		Or			
	b	i What is Diamond-Like Carbon (DLC) coating, and what are its primary characteristics?	UN	4	6
		ii What are the common methods used for depositing DLC coatings.	UN	4	7
15.	a	What are high friction materials, and what characteristics define them? In what applications are high friction materials preferred, and why?	RE	5	13
		Or			
	b	What are nickel-based alloys, its primary properties and what distinguishes them from other metal alloys?	RE	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	What are some widely used theoretical wear models (e.g., Archard's wear law, Frenchet model)? How do these models mathematically describe the wear process?	AP	2	15
		Or			
	b	What are polymers, and how are they classified? What are the environmental concerns associated with polymer production and disposal?	AP	5	15