

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Third Semester

Mechanical Engineering

ME3392 - Engineering Materials and Metallurgy

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.	State Gibbs rule.	L1	1	2
2.	Define substitutional and interstitial solid solutions.	L1	1	2
3.	Mention the purpose of heat treatment.	L1	2	2
4.	Compare carburizing and nitriding.	L2	2	2
5.	What is precipitation strengthening?	L1	3	2
6.	Define maraging steel.	L1	3	2
7.	Define fiber-reinforced polymer (FRP).	L1	4	2
8.	What is a shape memory alloy?	L1	4	2
9.	Distinguish between elasticity and plasticity.	L2	5	2
10.	List the different types of impact tests.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Describe the constitution of alloys and different types of solid solutions with examples.	L2	1	16
	Or			
	b List and discuss the various types of phase reactions (eutectic, eutectoid, peritectic, and peritectoid) with diagrams and examples.	L2	1	16
12.	a Discuss the process of hardening and tempering of steel with reference to the isothermal transformation diagram.	L2	2	16
	Or			
	b Elaborate the significance of austempering and martempering in	L2	2	16

heat treatment with a neat diagram.

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| 13. | a | Discuss the effect of alloying elements on the properties of steel. | L2 | 3 | 16 |
| | | Or | | | |
| | b | Write the composition, properties, and applications of the following copper alloys: | L2 | 3 | 16 |
| | | i. Brass | | | |
| | | ii. Bronze | | | |
| | | iii. Cupronickel | | | |
| 14. | a | Write the properties and applications of the following engineering polymers: | L2 | 4 | 16 |
| | | i. PVC | | | |
| | | ii. PMMA | | | |
| | | iii. ABS | | | |
| | | Or | | | |
| | b | Write the properties and applications of the following engineering ceramics: | L2 | 4 | 16 |
| | | i. Al_2O_3 | | | |
| | | ii. SiC | | | |
| | | iii. Si_3N_4 | | | |
| 15. | a | With a neat sketch explain the mechanism of plastic deformation of metals by slip and twinning. | L2 | 5 | 16 |
| | | Or | | | |
| | b | Describe the Brinell hardness test to determine the hardness of a metal in detail. | L2 | 5 | 16 |