

**B. Tech.**  
**Year: 2<sup>nd</sup> Semester: 3<sup>rd</sup>**  
**Minor Test (Examination): 2025-26**  
**Material Science & Engineering**

Time: 2 Hrs.

Max Marks: 20

Note: Attempt ALL questions.

Q1.	Attempt any Two parts of the following.	Marks	CO	BL	PO	PI Code
	a) What do you understand by crystal? Explain the various types of crystal system with the help of neat sketch.	4	1	1, 2	1	1.4.1
	b) What do you mean by Hardness? Explain various hardness testing with the help of neat sketch.	4	2	1, 2	1	1.4.1
	c) What do you understand by Phase Diagram? Explain the solid solution type binary phase diagram with neat sketch. Also explain lever rule with suitable example.	4	3	1, 2	1	1.4.1
<b>Q2.</b>	<b>Attempt any Two parts of the following.</b>					
	a) What do you mean by atomic packing factor? Calculate the atomic packing factor for the FCC crystal structure.	3	1	5	1	1.4.1
	b) What do you mean by Miller indices? Sketch (012) and (111) planes within a cubic unit cell.	3	1	4	1	1.4.1
	c) Draw a stress-strain curve for mild steel and explain various points on this diagram.	3	2	1, 2	1	1.4.1
<b>Q3.</b>	<b>Attempt any Two parts of the following.</b>					
	a) Draw a neat sketch of iron-iron carbide diagram and explain the various phases present in it. Also explain the various reaction of it.	3	3	2,3	1	1.4.1
	b) What are the purposes of heat treatment process? Explain the various stages of a heat treatment process.	3	4	2	1	1.4.1
	c) What do you mean by C curve? Explain the important transformation taking place during cooling of eutectoid steel with the help of TTT diagram.	3	4	4	1	1.4.1

**B. Tech**  
**Year: II Semester: III**  
**Odd Semester 2025-2026**  
**Material Science & Engineering**

Time: 3 Hr.

Note: Attempt All questions.

Max Marks: 50

Q1	Attempt any five parts of the following.	Marks	CO	BL	PO	PI Code
a) ✓	Explain simple cubic (SC), body centered cube (BCC) and face centered cube (FCC) with the help of neat sketch.	2	1	1,2	1	1.4.1
b) ✓	What do you mean by ductile and brittle material? Draw stress strain diagram for brittle material.	2	2	1,2	1	1.4.1
c)	Define creep? Explain the different stages of creep with the help of neat sketch.	2	2	1,2	1	1.4.1
d)	What do you mean by solid solution type phase diagram?	2	3	1,2	1	1.4.1
e)	Explain Gibb's phase rule.	2	3	1,2	1	1.4.1
f) ✓	Explain Tempering process.	2	4	1,2	1	1.4.1
g) ✗	Explain any one strengthening mechanism.	2	4	1,2	1	1.4.1
Q2	Attempt any two parts of the following.					
a)	Describe in detail the steps involved in sample preparation for metallographic examination. Why is polishing and etching necessary before observing the microstructure under a microscope?	5	5	1,2	1	1.4.1
b) ✓	What do you mean by Scanning Electron Microscope (SEM)? Explain the principles of image formation in SEM with the help of a neat sketch.	5	5	1,2	1	1.4.1
c) ✓	Differentiate between the optical microscope and Scanning Electron Microscope.	5	5	1,2	1	1.4.1
Q3	Attempt any two parts of the following.					
a) ✓	What do you mean by NDT? Explain magnetic particle inspection with the help of a neat sketch.	5	5	1,2	1	1.4.1
b)	Which NDTs are generally used to detect internal cracks? Explain any one test with the help of a neat sketch.	5	5	1,2	1	1.4.1
c) ✓	What do you understand by corrosion? Also, explain its types with examples.	5	5	1,2	1	1.4.1
Q4.	Attempt any two parts of the following.					
a) ✓	What are the different types of steel? Explain their general properties and applications.	5	6	1,2	1	1.4.1

b)	What are the different types of cast iron? Explain their general properties and applications.	5	6	1,2	1	1.4.1
c)	Write short notes on the following advanced materials: i. Biomaterials ii. Smart materials	5	6	1,2	1	1.4.1
Q5.	Attempt any two parts of the following.					
a)	What are composite materials? Describe their classification, structure, and applications in engineering fields.	5	6	1,2	1	1.4.1
b)	What do you mean by aluminum alloy? Explain the various aluminum alloy and their applications.	5	6	1,2	1	1.4.1
c)	Write short notes on the following advanced materials: i. Optical materials ii. Nanomaterials	5	6	1,2	1	1.4.1

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