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## GIET UNIVERSITY, GUNUPUR – 765022

B. Tech. (Third Semester - Regular) Examinations, December – 2022

### 21BMEPC23003 - Material Science

(Mechanical Engineering)

Time: 3 hrs

Maximum: 70 Marks

#### Answer ALL questions

(The figures in the right hand margin indicate marks)

#### PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. What are point defects?	CO1	PO1
b. Define the terms 'ferrite' and 'austenite' in iron carbon alloy system.	CO2	PO2
c. What is Critical Cooling Rate (CCR)?	CO3	PO1
d. State theory of refraction.	CO4	PO1
e. Write some application of optical fibers.	CO4	PO1

#### PART – B

(15 x 4 = 60 Marks)

Answer ALL questions

	Marks	CO #	Blooms Level
2. a. Explain the following (i) Edge distortion (ii) Screw Distortion (iii) Stacking faults (iv) Twin boundary	8	CO1	K2
b. Copper has FCC structure and its atomic radius is 1.273 Å, find the lattice parameter and the density of copper. (i) Atomic weight of copper = 63.5gm (ii) Avogadro's number = $6.023 \times 10^{26}$ atoms/Kilomole.	7	CO1	K3
(OR)			
c. Draw the following plane and direction in FCC structure. i. (2 1 2) (-2 1 0) (1 ½ 1) ii. [1 2 1] [1 -2 1] [1 ½ 1]	8	CO1	K2
d. Classify bonding in solids and explain briefly	7	CO1	K1
3.a. Explain Phase transformation with a suitable example.	8	CO2	K2
b. What is allotropy? Explain briefly with cooling curve for iron-allotropy.	7	CO2	K1
(OR)			
c. Draw the Iron-Cementite (Fe-Fe <sub>3</sub> C) diagram & label the phase fields. Discuss in brief different reactions that take place in this system	8	CO2	K2
d. Define non-equilibrium cooling. What is the impact of this cooling?	7	CO2	K1
4.a. What is yield point phenomenon? Describe it with a neat sketch of load-elongation curve of low carbon steel.	8	CO3	K2
b. What is meant by Normalizing? List the objectives of normalizing.	7	CO3	K1
(OR)			
c. Explain recovery, recrystallization and grain growth with proper diagram.	8	CO3	K1

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|---|---|-----|----|
| d. Define hardenability. Explain Jominy End-Quench Test.                                | 7 | CO3 | K2 |
| 5.a. Write the working principle of Ruby Laser with proper diagram.                     | 8 | CO4 | K1 |
| b. Explain fibre optic communication system with a block digram.                        | 7 | CO4 | K2 |
| (OR)  |   |     |    |
| c. Write short notes on:  | 8 | CO4 | K1 |
| i. Metal matrix composites  |   |     |    |
| ii. Fibre reinforced plastic  |   |     |    |
| d. Cite several reasons why fibre glass reinforced composites are utilized extensively. | 7 | CO4 | K1 |

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