GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

22BCHES24001 – Material Science

(Chemical)

Time: 3 hrs   Maximum: 70 Marks

(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.	Differentiate unit cell and primitive cell.	CO1	K2
b.	What is an isomorphous system?	CO2	K1
c.	What is Critical Cooling Rate (CCR)?	CO3	K1
d.	Write some objectives of Heat treatment?	CO3	K1
e.	Define cermet.	CO4	K1

PART – B   (15 x 4 = 60 Marks)

Answer *ALL* questions

		Marks	CO #	Blooms Level
2. a.	Aluminium has FCC structure and its density is $2700 kg/m^3$. Calculate the unit cell dimension and atomic diameter. (A_w of Al =26.98 g/mol).	8	CO1	K3
b.	Classify bonding in solids and explain briefly.	7	CO1	K2
	(OR)			
c.	Describe and illustrate the edge and screw dislocations. Draw Burgers circuit to show magnitude and direction of Burgers vector on a crystal having edge dislocation.	10	CO1	K2
d.	Calculate the equilibrium number of vacancies per cubic meter for copper at 100° C. The energy for vacancy formation is 0.9 eV/atom; the atomic weight and density for copper are 63.5 g/mol and $8.45 g/cm^3$, respectively. Take Avogadro's number as 6.023×10^{23} atoms/mol. $k=8.62 \times 10^{-5}$ eV/atom.	5	CO1	K3
3. a.	Define non-equilibrium cooling. What is the impact of this cooling?	7	CO2	K1
b.	Explain the effect of cold working and hot working process on metals and write the advantages and disadvantages of both with example of both the processes.	8	CO2	K2
	(OR)			
c.	Draw the Iron-Cementite ($Fe-Fe_3C$) diagram & label the phase fields. Discuss in brief different reactions that take place in this system.	15	CO2	K2
4. a.	What are the types of Heat treatment process, Explain briefly.	8	CO3	K2
b.	Define hardenability. Explain Jominy End-Quench Test.	7	CO3	K2
	(OR)			
c.	What is meant by Normalizing? List the objectives of normalizing.	8	CO3	K2
d.	Explain recovery, recrystallization and grain growth with proper diagram.	7	CO3	K2
5. a.	Explain the working principle of Ruby Laser with proper diagram.	8	CO4	K2

b.	What are Optical fibres? Explain the structure and working principle of optical fibre.	7	CO4 K2

<div align="center">(OR)</div>

c.	Explain the working principle of He-Ne Laser with proper diagram.	8	CO4 K2
d.	What are ceramic materials? Explain briefly different types of ceramics.	7	CO4 K2

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