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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Chemical Engineering **Duration: 3 hrs.**
Course Code: 19CY3DCMCA **Max Marks: 100**
Course: Materials Chemistry and Applications **Date: 19.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Explain the origin of van der Waals forces in molecular crystals. How does the bonding due to van der Waals forces differ from the ionic bonding?	**05**
	b)	What is the conditions for LCAO? Discuss the formation of bonding and anti-bonding molecular orbitals on the basis of LCAO principle.	**05**
	c)	Obtain limiting radius ratio for coordination number 3.	**05**
	d)	What is hydrogen bonding? Discuss Inter- and Intra-molecular hydrogen bonding with a suitable example.	**05**

UNIT - II

2	a)	Explain the difference between edge and screw dislocations.	**05**
	b)	What are point defects? Justify that generally the metal deficiency defect arises due to absence of a cation, not due to the presence of extra anion.	**06**
	c)	The Miller indices of a plane in a simple cubic crystal are (2 0 1). Obtain the coordinates of the plane.	**05**
	d)	List out the differences between X ray diffraction and neutron diffraction.	**04**

UNIT - III

3	a)	Elaborate on enzyme catalysis with an example.	**04**
	b)	Discuss the mechanism of a metal ion catalyzed reaction.	**05**
	c)	What are organometallic complexes? How are they useful in catalysis?	**05**
	d)	Explain the reactant and the product selectivity of zeolite catalysts with relevant examples.	**06**

OR

4	a)	Which properties of zeolites make them suitable for catalytic applications? Discuss.	**06**

	b)	Discuss the mechanism of acid catalyzed ester hydrolysis reaction.	**05**
	c)	Discuss the role of catalysts in the steam reforming process.	**04**
	d)	List out any five differences between homogenous and heterogeneous catalysis.	**05**

UNIT - IV

5	a)	Discuss the salient features of Fe-C phase diagram.	**06**
	b)	Elaborate on the applications of lead alloys.	**04**
	c)	What are ferrous alloys? Explain the properties and applications of the steel. What are the roles of various alloying elements used in steel.	**06**
	d)	What is condensed phase rule? When is it applied?	**04**

OR

6	a)	State Gibbs phase rule. Explain (i) Eutectic mixture (ii) Eutectic point	**06**
	b)	Explain the isothermal transformation (TTT) curves. What are their significances?	**05**
	c)	With the help of a neat diagram, discuss binary phase diagram for Cu-Zn system.	**06**
	d)	Discuss the composition and applications of solder alloy.	**03**

UNIT - V

7	a)	What are ceramic insulators? Explain.	**04**
	b)	Explain thick film lubrication.	**05**
	c)	What are general properties of glasses? Elaborate on manufacturing, composition and applications of soda glass.	**07**
	d)	Discuss the classification of lubricants.	**04**

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