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

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Chemical Engineering **Duration: 3 hrs.**
Course Code: 22CY3ESMCA **Max Marks: 100**
Course: Materials Chemistry and applications

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 band theory of solids. On the basis of band theory discuss the electrical conductivity in metals.	**05**
	b)	What is lattice energy? Derive Born-Lande equation for the calculation of lattice energy.	**06**
	c)	Explain dipole-dipole interactions with an example.	**05**
	d)	What are ionic solids? The ionic solids have high melting points, Justify.	**04**

UNIT - II

2	a)	What are Miller indices? Find the miller indices for the planes that intersect the crystallographic axis at the distances (i) (0.5a, -1b, 2c), and (ii) (1a, 2b, ∞c).	**06**
	b)	Discuss the types of defects in non-stoichiometric crystals.	**05**
	c)	What is neutron diffraction? List out the differences between X-ray and neutron diffraction.	**05**
	d)	Explain briefly the working principle of transmission electron microscopy.	**04**

OR

3	a)	Discuss the construction and working scanning electron microscope.	**06**
	b)	Define Braggs' law and explain the terms involved in it.	**04**
	c)	Elaborate metal excess defects in crystals.	**05**
	d)	What is the distance between the adjacent Miller planes if the first order reflection from X-rays of wavelength 1.54 Å occurs at 27°8'?	**05**

UNIT – III

4	a)	Discuss the mechanism of acid catalysed reaction by taking an appropriate example.	**05**
	b)	What are phase transfer catalysts? Discuss any one application of phase transfer catalysts.	**05**

c) Elaborate the significance of catalytic converter in vehicles. **04**

d) Discuss catalytic poisons and inhibitors with examples. **06**

UNIT – IV

5 a) State Nernst distribution law. Explain any one application. **04**

b) Define critical solution temperature (CST). Explain the principle involved in finding CST of phenol water system. **06**

c) Explain the phase diagram for single component iron system. **06**

d) Explain briefly Isothermal transformation (TTT) curves for eutectoid steel. **04**

OR

6 a) State and explain Gibbs phase rule. Calculate the degrees of freedom for the following decomposition, **06**

$$PCl_5(s) \rightarrow PCl_3(l) + Cl_2(g)$$

b) Give a brief account on application of phase diagram for Iron- iron carbide system. **04**

c) What is steam distillation? Discuss its advantages. **05**

d) State and label the regions of lead-tin phase diagram. **05**

UNIT – V

7 a) Explain the properties and applications of the common ferrous alloys. **06**

b) Discuss the classifications of lubricants with examples. **04**

c) Describe the manufacture of soda glass with the help of a labelled diagram. **05**

d) Elaborate on the composition and applications of borosilicate glass. **05**

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