Roll No.

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. (Full Time) - END SEMESTER EXAMINATIONS, APRIL/MAY 2024

MATERIAL SCIENCE AND ENGINEERING

Semester II Course

(for Sem IV & VI Bridge Course Students)

ML 5202 Reaction Kinetics and Dynamics

(Regulation 2019)

Time: 3 hrs

Max. Marks: 100

CO1 To discuss and explain the basics of solid state chemistry

CO2 To understand and apply the basic principles of chemical reaction kinetics & dynamics

CO3 To explain the theoretical models of molecular collisions, dynamics & microscopic kinetics

CO4 To theoretically derive the rate law equations and solve simple numerical problems

CO5 To describe the experimental methods of preparation of materials in various forms

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART - A (10 x 2 = 20 Marks)

(Answer all Questions)

Q.No	Questions	Marks	CO	BL
1	State the difference between amorphous and crystalline solids.	2	1	1
2	What do you understand by symmetry of elements?	2	1	2
3	Define threshold energy.	2	2	1
4	State the use of Arrhenius equation.	2	2	2
5	What is the principle of TLC?	2	3	1
6	How BET theory is useful?	2	3	2
7	What is Kirkendall effect?	2	4	1
8	Bring the difference between epitactic and topotactic reactions.	2	4	2
9	What are the uses of intercalated compounds?	2	5	1
10	Brief about the use of plasma fusion technique.	2	5	2

PART- B (5 x 13 = 65 Marks)

Q.No	Questions	Marks	CO	BL
11 (a)	(i) What is a chemical bond? What are its types? Explain with examples. (10) (ii) Write a note on intrinsic and extrinsic semiconductors. (3)	13	1	4
	OR			
11 (b)	(i) Draw and label the Born Haber cycle for formation of MX, where M is a metal and X is a halide. (10) (ii) Write a note on Frenkel and Schottky defects. (3)	13	1	4

12 (a)	(i) How do you determine order of a reaction? Explain any two methods in detail. (10) (ii) Write a note on half-life period. (3)	**13**	2	4
	OR			
12 (b)	(i) Illustrate the mechanism of a chain reaction with an example. (10) (ii) Write a note on pseudo first order reaction. (3)	**13**	2	4
13(a)	(i) Derive the Langmuir adsorption isotherm. (10) (ii) Distinguish between physisorption and chemisorption. (3)	**13**	3	4
	OR			
13(b)	(i) Discuss the various types of isotherms with examples. (10) (ii) Distinguish between Langmuir Hinshelwood and Freundlich mechanisms (3)	**13**	3	4
14 (a)	(i) Distinguish between (2 x 5 = 10) • Nucleation and Growth • Direct exchange mechanism and ring mechanism (ii) Brief on Kirkendall effect. (3)	**13**	4	3
	OR			
14 (b)	(i) Distinguish between: (2 x 5 = 10) • Epitactic and Topotactic reactions • Precipitation and Co-precipitation (ii) Brief on Wagner mechanism. (3)	**13**	4	3
15 (a)	(i) Discuss the difference in the working, construction and the procedure followed for: (2 x 5 = 10) • Cathodic deposition and Anodic oxidation • Bridgman and Stockbarger methods (ii) Briefly explain how SC Si chips are made. (3)	**13**	5	3
	OR			
15 (b)	(i) Discuss the difference in the working principle, construction and the procedure followed for: (2 x 5 = 10) • CVD and PVD • Hydrothermal and microwave synthesis (ii) Briefly explain how optical fibers are produced. (3)	**13**	5	3

PART- C (1 x 15 = 15 Marks)3

(Q.No.16 is compulsory)

Q.No	Questions	Marks	CO	BL
16	Neatly draw and account for all the elements of symmetry in a cubic crystal.	**15**	1	6

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