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B.E./B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2014

Material Science and Engineering

Semester 2

CY 8201 CHEMICAL REACTION DYNAMICS

(Regulation R 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks: 100

PART-A (10 x 2 = 20 Marks)

1. What is a unit cell? Give an example.
2. What are elements of symmetry?
3. What is a composite reaction? What are its types?
4. What is the difference between order and molecularity?
5. What is Freundlich isotherm?
6. What is the use of BET theory?
7. What are epitactic and topotactic reactions?
8. Why are solid state reactions difficult?
9. What is the principle of MBE?
10. What is Czochralski process?

Part - B (5 x 16 = 80 Marks)

11. (i) Explain the Born-Haber cycle. How lattice energy is determined? 8
(ii) Give an account on stoichiometric and non-stoichiometric defects. 8
 12. (a) (i) What is a chain reaction? Explain its features and mechanism. 6
(ii) What is activation energy? Derive the Arrhenius equation and explain the effect of temperature on the reaction rate. 10
- OR**
- (b)(i) What are the factors that determine the reaction rates in solution? 6
(ii) Derive an expression for the effect of ionic strength on ionic reactions. 10

13. (a) (i) Explain the mechanism of unimolecular and bimolecular surface reactions briefly. 6

(ii) Explain the Langmuir Hinshelwood mechanism briefly. 10

OR

(b)(i) What is adsorption? What are its types? Detail on the various applications of adsorption? 6

(ii) What is the principle of chromatography? Explain the analytical method with neat sketches. 10

14. (a) (i) Explain the process of solidification by nucleation and growth. 6

(ii) Explain the various factors that influence the reactivity of solids with suitable examples. 10

OR

(b)(i) What is Kirkendall effect? Explain with a suitable example. 6

(ii) Explain the experimental procedure followed for an effective solid state reaction. 10

15. (a) Discuss the principle, construction and procedure of the hydrothermal, CVD and intercalation preparative methods. 16

OR

(b) Explain the principle, working and the preparative methods of temperature gradient and electrochemical methods. 16