

MAY 2014

P/ID 40126/PCHF

Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is Glass transition temperature?
2. In a particular sample of polymer, 100 molecules have molecular weight 1000 each, 300 molecules have molecular weight 10^4 each and 300 molecules have molecular weight 10^5 each. Calculate the number average molecular weight.
3. Define the term intrinsic viscosity.
4. What is enzyme catalysis?
5. What is the effect of temperature on enzyme catalysed reactions?
6. What is reversible reaction? Give one example.
7. What is kinetic chain length?
8. Why conventional techniques are not applicable to study fast reactions?

9. State the Heisenberg's uncertainty principle.
10. What is meant by Hamiltonian operator.

PART B — (4 × 20 = 80 marks)

Answer ALL questions.

All questions carry equal marks.

11. (a) (i) Describe the kinetics and mechanism of cationic polymerization.
- (ii) Explain different methods used for the fabrication of plastic material.

Or

- (b) (i) How will you determine the molecular weight by light scattering method?
- (ii) Discuss the role of gel permeation chromatography for the separation of high polymers.
12. (a) (i) Derive BET adsorption isotherm. Show that under certain conditions it reduces to Langmuir isotherm.
- (ii) Explain heterogeneous catalysis with a specific examples.

Or

- (b) (i) Derive Michaelis menten equation.
- (ii) Deduce Langmuir adsorption isotherm equation.

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13. (a) (i) Discuss the kinetics of parallel reactions with examples.
- (ii) Describe the temperature and pressure jump methods to study fast reactions.

Or

- (b) (i) Explain the characteristics of chain reactions.
- (ii) Derive the rate expression by applying steady-state treatment to the reaction between H_2 and Br_2 .
14. (a) (i) Explain quantum mechanical treatment of simple harmonic oscillator.
- (ii) Write schrodinger wave equation for hydrogen atom. Transform it into spherical polar coordinates and Separate the variables.

Or

- (b) (i) Write the expression for energy of a particle in one dimensional box. Explain the quantization of energy and existence of zero point energy.
- (ii) Describe the postulates of quantum mechanics.