DECEMBER 2014 **P/ID 40126/PCHF**

Time : Three hours Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define the term : specific viscosity.

2. A protein sample consist of an equimolar mixture of haemoglobin (M = 15.5 kg mol^{-1}), ribonuclease (M = 13.7 kg mol^{-1}) and myoglobin (M = 17.2 kg mol^{-1}) Calculate the number average weight of the sample.

3. What is the role of inhibitors in polymerization reactions?

4. What is an adsorption isotherm?

5. What is catalysis? Give an example for semiconductor oxide acts as a catalyst.

6. What is opposing reaction? Give an example.

7. Define relaxation time.

8. What are the limitations of Langmuir adsorption theory?

9. What is compton effect?

10. The speed of an electron is 1×10^3 m s^{-1}. Calculate the de Broglie wavelength of the electron.

($h = 6.626 \times 10^{-34}$ kg m^2 s^{-1} and mass of $e^- = 9.1 \times 10^{-31}$ kg)

PART B — ($4 \times 20 = 80$ marks)

Answer ALL questions.

11. (a) (i) Discuss the kinetics of free radical addition polymerization reactions. (10)

(ii) Describe the determination of molecular weight by light scattering method. (10)

Or

(b) (i) Describe the role of Gel permeation chromatography for the separation of polymers. (10)

(ii) Explain the nature of crystallinity and its significance related to polymer structure. (10)

12. (a) (i) Discuss the effect of substrate concentration, pH and temperature on enzyme catalysed reaction. (10)

(ii) Derive BET adsorption isotherm. (10)

Or

(b) (i) Explain the role of inhibitors on enzyme catalysed reaction. (10)

(ii) Derive Michaelis-Menten equation. (10)

13. (a) (i) Derive the rate expression for the reaction between H_2 and Br_2. (10)

(ii) Describe the pressure and temperature jump methods of fast reaction kinetics. (10)

Or

(b) (i) Discuss the kinetics of parallel reactions with an example. (10)

(ii) Discuss the detailed account of the study fast reactions by stopped flow method. (10)

14. (a) (i) Set up and solve the Schrodinger wave equation for the rigid rotor. (10)

(ii) State and discuss Heisenberg's uncertainty principle. (10)

Or

(b) (i) Explain the quantum mechanical treatment of simple harmonic oscillator. (10)

(ii) What is the concept of particle in a three dimensional box? Derive the expression for normalized eigen function and total energy of particle in a three dimensional box. (10)

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