AU – 2554

Third Semester B. Tech. Polymer (Plastic) Tech. (CGS) Examination

APPLIED PHYSICAL CHEMISTRY

Paper – 3 PP 02

(USC – 11096)

P. Pages : 4

Time : Three Hours] [Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of Civil branch and separate answer book must be used for Section A and B in pharmacy and Cosmetic Tech.
(2) Answer **Three** questions from Section A and **Three** questions from Section B.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Diagrams and chemical equations should be given wherever necessary.
(6) Illustrate your answer wherever necessary with the help of neat sketches.
(7) Use pen of Blue / Black ink / refill only for writing book.

SECTION A

1. (a) State the principle of ultracentrifugation method. 5

(b) What do you mean by extrinsically conducting polymer. 4

(c) Give the classification of polymer with suitable example. 4

OR

2. (a) Explain viscosity measurement method for determining the molecular weight of macromolecules. 5

(b) Give various industrial applications of macromolecules. 4

(c) Define the terms :—

(i) Relative viscosity

(ii) Osmosis. 4

3. (a) Derive an expression for EMF of concentration cell with transference. 5

(b) Define the terms :—

(i) Cell constant

(ii) Transport number. 4

(c) Define and explain Nernst equations. 4

OR

4. (a) Explain the determination of dissociation constant. 5

(b) Explain Debye – Huckel's theory of strong electrolyte. 4

(c) Define the terms :—

(i) Specific conductance

(ii) Equivalnet conductance. 4

5. (a) Give an expression for collision theory of unimolecular reactions. How does the order vary with concentration of reacting molecule ? 6

(b) Define chemical equilibrium, Kp, Kc and Kx. 4

(c) Give in brief about Hit and Trial method to determine the rate laws. 4

OR

6. (a) In a certain reaction, time t varies arithmetically while the concentration varies geometrically.

Time	0	t	2t	3t
Conc.	a	αa	$\alpha^2 a$	$\alpha^3 a$

Show that reaction is I^{st} order. 6

(b) Why does reaction rate increases with temperature ? 4

(c) Show that $T_{1/2} \alpha a$; for second order reaction. 4

SECTION B

7. (a) Explain two component system with diagram. 4

(b) What is Catalytic poisoning ? Explain with suitable example. 4

(c) Explain the idea of acid – base catalysis. 5

OR

8. (a) Define :—

(i) Degree of freedom

(ii) Catalytic activator 4

(b) Derive Gibbs phase rule. 5

(c) Distinguish between homogeneous and heterogeneous catalyst. 4

9. (a) Discuss thermodynamic temperature scale. 4

(b) State and explain the thermodynamic criteria for the spontaneous process taking place in an isolated system at constant temperature and at constant pressure. 4

(c) Calcualte the entropy increase in evaporation of one mole of water at 100^0C. Latent heat of vaporization of water at 100^0C is 540 call/g. 6

OR

10. (a) Derive an expression for the efficiency of Carnot's engine working between two temperature T_1 and T_2. 4

(b) Give any two statements of second law of thermodynamics. 4

(c) Explain the terms :—

(i) Entropy

(ii) Free energy 6

11. (a) What is rigid rotator ? Explain moment of inertia of rigid diatomic molecule. 4

(b) Discuss differential scanning calorimetric analysis technique for polymers. 5

(c) Define :—

(i) Quantum efficiency

(ii) Photosenstization. 4

OR

12. (a) Give the statement of Beer's law, and show that : $I = I_0 e^{-act}$,
Where a = molar absorption coefficient
t = thickness of medium. 4

(b) Give the applications of IR and NMR spectroscopy. 4

(c) A sample of HI (g) was irradiated by light of wave length 253.7 nm. When 307 J of energy was found to decompose 1.30×10^{-3} moles of HI. Calculate quantum yield ($h = 6.626 \times 10^{-34}$ Js). 5