B.Tech. Third Semester (Food, Pulp. & Paper, Oil & Paint, Petro Tech.) (CGS)

11002 : Applied Physical Chemistry - II : 3 CT 02

P. Pages : 2 | AW - 3002

Time : Three Hours | Max. Marks : 80

Notes :
1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Diagrams and chemical equations should be given wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Discuss the reaction, mechanism wherever necessary.
6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) How macromolecules are classified? **4**

b) How molecular weight of polymer is determined by light scattering method? **5**

c) Give the application of doped conducting polymer. **4**

OR

2. a) Derive the formula for weight average molecular weight of macromolecules. **5**

b) Explain with example extrinsically conducting polymers. **4**

c) Define i) Osmosis ii) Intrinsic viscosity **4**

3. a) State the principle of potentiometric titration. Explain the determination of neutralization point of titration between strong acid and strong base. **6**

b) What is the effect of dilution of an electrolytic solution on specific and equivalent conductance? **4**

c) The emf-of concentration cell: $Pb|PbSO_4|CuSO_{4(a\pm=0.022)} \vdots CuSO_{4(a\pm0.0064)}|PbSO_4|Pb$ is 0.0118 V at 298 K. Calculate the transference number of the copper ions. **4**

OR

4. a) How pH of electrolyte is determined? **4**

b) Derive Nernst equation. **6**

c) Define i) Specific and Molar conductivity. **4**

5. a) What is Gibbs free energy? Derive Gibbs Helmholtz equation. **6**

b) Define i) Work function. ii) Chemical potential. **3**

c) One mole of an ideal gas ($C_v = 12.55\ JK^{-1}\ mol^{-1}$) at 300 K is compressed adiabatically and reversibly to one fourth of its original volume. What will be final temperature of the gas? $\left(R = 8.314\ JK^{-1}\ mol^{-1}\right)$ **4**

OR

6. a) Discuss carnot cycle and derive equation for efficiency of heat engine. **6**

b) State the second law of thermodynamics. 3

c) Show that $TV^{(r-1)}$ = constant where $r = \frac{C_p}{C_v}$. 4

SECTION – B

7. a) What is quantum yield? How is it determined experimentally? 6

b) Distinguish between photo – chemical reaction from thermal reaction. 3

c) Give the applications of NMR spectroscopy. 4

OR

8. a) Explain thermal Gravimetric analysis techniques for polymer. 4

b) Explain Beers law of photo chemistry. 6

c) Give the application of IR spectroscopy. 3

9. a) Derive an integrated rate equation of specific rate constant for second order reaction in which reactants have unequal initial concentration. 6

b) Explain the Ostwald's isolation method. 4

c) Half life disintegration of radium is 1570 years. Calculate the rate constant in S^{-1} and also calculate how many years will be taken for disintegration of 70% of radium. 4

OR

10. a) Give the characteristics of zero order reaction. 4

b) Define K_p and K_x, and give their inter – relation. 4

c) Show that 6

i) $t\,½$ = constant: for first order reaction. ii) $t\,½ \; \alpha \frac{1}{a}$; for second order reaction.

11. a) Explain with example what are homogeneous catalyst. 3

b) Explain acid base catalyst. 4

c) Derive an expression for Langmuir isotherm. 6

OR

12. a) How adsorption is classified. 3

b) Explain with example what are Heterogeneous catalyst. 4

c) Give the important characteristics of catalysts. 3

d) How surface are a of fine powder is determined. 3

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