B.Tech. Third Semester (Chem. / Poly / Food / Pulp / Oil / Petro) (Old)

Applied Physical Chemistry : 3 SCECT 2

P. Pages : 2 **AW - 3551**

Time : Three Hours * 0 2 9 4 * Max. Marks : 80

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

SECTION - A

1. a) How pH of solution is determined. **4**

b) Explain activity and activity coefficient. How it is determined. **6**

c) Write short notes on. **4**
i) Specific conductance. ii) Molecular conductance.

OR

2. a) Explain Debye-Huckel's theory of strong electrolytes. **5**

b) How transport number is determined by moving boundary method. **5**

c) The EMF of following concentration cell is 0.02V at 300K. Calculate the transport number of Cu^{2+} and SO_4^{2-} ions. **4**

$Pb|PbSO_4|CuSO_4 : CuSO_4|PbSO_4|Pb$

$(a_1 = 0.02)$ $(a_2 = 0.006)$

3. a) Explain various laws of photochemistry. **4**

b) Differentiate between Electronic rotational spectra and vibrational spectra. **4**

c) What is quantum efficiency. How it is experimentally determined. **5**

OR

4. a) Explain photochemical kinetics with suitable example. **4**

b) Give the applications of IR-Spectroscopy. **4**

c) What are the reasons for low quantum yield. **5**

5. a) Explain osmatic pressure method for determination of molecular weight of Macromolecules. **5**

b) How macromolecules are classified. **4**

c) Give brief account of **4**
i) Number Average molecular weight. ii) Weight average molecular weight.

OR

6. a) Explain light scattering method. **5**

b) Define the following. **4**
i) Turbidity. ii) High polymers.

c) State the principle of sedimentation method. **4**

SECTION - B

7. a) Explain Joule-Thomson effect. 5

b) What is entropy? Give its physical significance. 5

c) Define. 4

i) Flame temperature. ii) Explosion temperature.

OR

8. a) Derive Sackur-Tetrode equation. 5

b) State and explain third law of thermodynamics. 5

c) Define. 4

i) Free Energy. ii) Entropy.

9. a) How order of reaction is determined by Equi Fractional change method. 4

b) Derive an integrated rate equation for second order reaction. 4

c) The rate constant of a second order reaction is $6.70 \times 10^{-5}\ dm^3\ mol^{-1}\ s^{-1}$ at 25°C and $1.64 \times 10^{-4}\ dm^3\ mol^{-1}\ s^{-1}$ at 35°C. Calculate energy of activation. $\left(R = 8.314\ JK^{-1}\ mol^{-1}\right)$. 5

OR

10. a) What is energy of activation? How it is determine by using Arrhenius equation. 4

b) Show that $K_p = K_c (RT)^{\Delta n}$. 5

c) From the following data for the decomposition of NH_4NO_3 in aqueous solution, show that the reaction is first order. 4

Time (Min)	10	15	20	25	∞
Volume of N_2 (C.C)	6.25	9.0	11.40	13.65	35.05

11. a) How surface area is determined by BET method. 5

b) What is integral heat of adsorption. 4

c) Explain. 4

i) Autocatalysis. ii) Catalytic activator.

OR

12. a) Explain Langmuir's isotherm. 5

b) Differentiate between homogenous catalysis and heterogeneous catalysis. 4

c) State some important characteristics of catalyst. 4

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