Dcc. 2005

PHM-1.2.3

PHARMACEUTICAL CHEM-II
(Physical Chemistry)

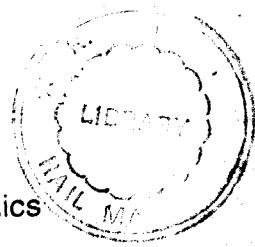### (B.Pharmacy, 2nd Semester, 2123)
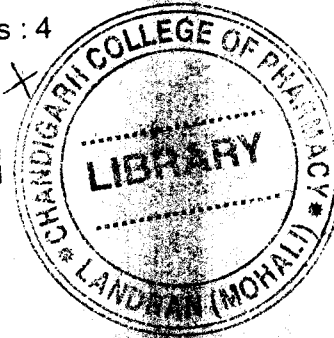
Time : 3 Hours

Maximum Marks : 80

Note :– This paper consists of Three Sections. Section A is compulsory. Attempt any *Four* questions from Section B and any *Three* questions from Section C.

Section–A   Marks : 2 Each

1.   Write short notes on :

   (a)   Quantum Yield

   (b)   Lambert-Beer Law

   (c)   Phase Diagram

   (d)   Second Law of Thermodynamics

   (e)   Homogeneous Catalysis

(f) Parachor

(g) Solvent Extraction

(h) BET theory of multilayer adsorption

(i) Chemisorption and Physisorption

(j) Applications of adsorption

(k) Specific Conductance

(l) Distribution Law

(m) Reverse Osmosis

(n) Henry's Law

(o) Temperature coefficient of a reaction

Section–B   Marks : 5 Each

2. (a) Identify the reaction order from each of the following expressions :

   (i) $k = 5.6 \times 10^{-4}$ mol dm^{-3} s^{-1}

   (ii) $k = 4.5 \times 10^{-3}$ dm^{-3} mol^{-1} s^{-1}

   (iii) $k = 3.2 \times 10^{-3}$ s^{-1}

   (iv) $k = 1.6 \times 10^{-2}$ dm^{6} mol^{-2} s^{-2}

   (v) $k = 4.0 \times 10^{-6}$ atm^{-1} s^{-1}

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(b) In the fermentation of sugar in an enzymation solution that is initially 0.12 M, the cone of sugar is reduced to 0.06 M in 10 hours and 0.03 M in 20 hours. What is the order of the reaction and what is the rate constant ?

3. (a) Explain how the absolute entropy of a substance is determined with the help of the third law of thermodynamics.

(b) Show that :

$$\Delta s = \frac{q_{rev}}{T}.$$

4. What is optical activity ? How is it related to refractive index and structure of a compound ?

5. What is meant by excluded volume ? Show that excluded volume, designated as b, is four times the actual volume of the gas molecule.

6. State and explain Einstein Law of photochemical equivalence. What are the reasons for low and high quantum yields ?

Section–C Marks : 10 Each

7. (a) Show that exp (ikx) is an eigen function of the operator d/dx. Also show that exp (kx^2) is not an eigen function of d/dx.
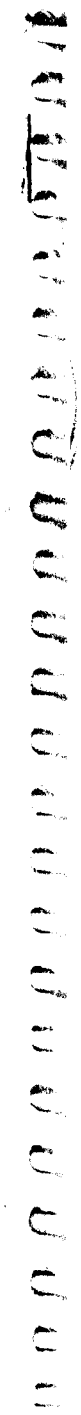
(b) Verify that the wave function $\psi(x) = x\,e^{-ax^2}$ is an eigen function of the operator $d^2/dx^2 - 4\,a^2 x^2$. What is the corresponding eigenvalue ?

8. What are the main consequences of light absorption ? Describe and discuss the Jablonski diagram for depicting various photophysical processes. What are radiative and non-radiative transitions ? 2,6,2

9. Define the terms surface tension and surface energy. Show that surface tension is equal to surface energy numerically as well as dimensionally. Derive an expression for the determination of surface tension by the capillary rise method. 2,4,4

10. (a) State and explain the zeroth law of thermodynamics. What is the significance of this law ? 1,2

(b) What is meant by acid-base catalysis ? Discuss the kinetics of an acid-base catalyzed reaction. 7

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