Time: 3 Hours **Marks: 75**

Q. 1 Attempt all multiple-choice questions (MCQ) **20M**

1 Prerequisite for intermolecular hydrogen bonding is
a Hydrogen attached to large highly electronegative atom
b Hydrogen attached to small highly electronegative atom
c Hydrogen attached to small highly electropositive atom
d Hydrogen attached to large highly electropositive atom

2 Which one of the following is applicable to non-steady state diffusion?
a dc/dt=0
b dt/dc= constant
c dc/dt ≠0
d dc/dx= constant

3 Raoult's law is related to which of the following term
a Mole Fraction
b Normality
c Molarity
d Molality

4 Vapor pressure increases with _____
a Decrease in temperature
b Increase in strength of intermolecular forces
c Decrease in surface area
d Increase in temperature

5 The maximum temperature at which two phase region exists is called
a Upper consolute temperature
b Lower consolute temperature
c Phase inversion temperature
d Kraft Point

6 Which of the following property is applicable to glassy state
a Long range order
b Random packing
c Lower entropy
d Low free energy

7 Amorphous form of a substance has
a High solubility & High stability
b Low solubility & High stability
c High solubility & Low stability
d Low solubility & Low stability

8 The geometric isomers can be identified by _____
a Dipole moment
b Dielectric constant
c Optical rotation
d Refractive index

9 Lower pK_a value indicates_____
a Weak acid
b Strong acid
c Strong base
d Weak base

10 Optical Rotation is a _____property.
a Colligative
b Extensive
c Constitutive
d Additive

11 Surfactants with HLB range of _____are appropriate choice to be used in reducing the lather of hair shampoo.
a 0-3
b 13-16
c 10-13
d 7-10

12 When the surface of water gets _____with the surfactant monomers, these surfactant monomers orient themselves into a micelle.
a Zero
b Saturated
c Unsaturated
d Constant

13 The spreading of liquids can be analysed by considering_____
a cohesive and adhesive forces operating between the molecules
b adhesive forces operating between the molecules
c cohesive forces operating between the molecules
d repulsive forces operating between the molecules

14 As the temperature increases, physical adsorption_____
a Increases
b Remains constant
c Decreases
d First increases then decreases

15 Majority of times, Protein binding_____metabolism of drugs
a Decreases
b Does not affect
c Increases
d Stops

16 Chelation of cupric ions with glycine results in _____
a Shift from acidic pH to alkaline pH
b Shift from alkaline pH to acidic pH
c No change in pH
d Increase in solubility

17 _____protein is abundant in human blood.
a Globulin
b Alpha acid Glycoprotein
c Albumin
d Cysteine

18 For a solution to be injected intravenously, the following criteria is essential.
a buffer with definite pH and hypertonicity
b buffer with definite pH and isotonicity
c buffer with definite pH of solution
d buffer with definite pH and hypotonicity

19 Buffer capacity can be defined as the ratio of increment of strong base or strong acid to the_____
a Small change in osmotic pressure
b Small change in pH
c Small change in temperature
d Small change in buffer concentration

20 The value 14 on pH scale indicates _____nature of a given solution.
a Strongly alkaline
b Neutral
c Strongly acidic
d Weakly basic

Q 2. Attempt ANY TWO question **(10 MARKS EACH)**

Q.i.a What do you understand by negative deviation from Raoult's law. Calculate the vapour pressure lowering caused by the addition of 100 g of sucrose (mol mass = 342) to 1000 g of water if the vapour pressure of pure water at 25°C is 23.8 mm Hg.

Q.i.b What is Hildebrand solubility parameter? Explain its applications.

Q.ii.a Define optical rotation and explain the design and working of polarimeter.

Q.ii.b. Explain the following terms. Glassy state, Polymorphism, Eutectic mixture, Aerosol, Latent Heat of Evaporation

Q.iii. a. Enlist the various methods used to determine surface tension of a given liquid. Discuss any one method in detail with a suitable diagram

Q.iii. b Discuss micellar solubilisation. If equal volumes of liquid A and water are measured as 60 and 20 drops, respectively, and the densities of A and water are 0.896 and 0.964 g/cm^3, respectively, calculate the surface tension of liquid A

Q 3. Attempt ANY SEVEN questions **(5 MARKS EACH)**

Q.i. Enlist and discuss the factors affecting solubility of gases in water.

Q.ii State Fick's first law of diffusion and discuss applications of diffusion.

Q.iii Define eutectic mixture and explain phase diagram of salol- thymol system.

Q.iv Write a note on the HLB system and its applications. A polyhydric fatty acid ester has saponification number 60 and acid number 460. What will be the HLB value of the surfactant?

Q.v Explain the concept of Drug-Protein binding and give its significance.

Q.vi What is Complex? Discuss any one classification of complexes in detail

Q.vii What parameters are essential for the analysis of complex formation. Discuss any one method to analyse complex formation

Q.viii Explain Sorensen's pH scale and calculate the amount of sodium acetate to be added to 100 mL of a 0.1 mole acetic acid to prepare a buffer of pH 5.20. The pKa of acetic acid is 4.76.

Q.ix Discuss Cryoscopic method used to adjust tonicity of solution. find the normality (or strength) of a hydrochloric acid solution which has a pH of 4.5?
