**B.TECH/** **CHE /4TH SEM/** **CHEM 2201/2018**

**CHEMISTRY-II**

**(CHEM 2201)**

**Time Allotted : 3 hrs Full Marks : 70**

***Figures out of the right margin indicate full marks.***

***Candidates are required to answer Group A and***

***any 5 (five) from Group B to E, taking at least one from each group.***

***Candidates are required to give answer in their own words as far as practicable.***

**Group – A**

**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) A real gas most closely approaches the behavior of an ideal gas under the conditions of

(a) high pressure and high temperature

(b) high pressure and low temperature

(c) low pressure and high temperature

(d) low pressure and low temperature.

(ii) The unit of ebulioscopic constant is

(a) K kg mol or K (molality) (b) mol kg K or K (molality)

(c) kg mol K or K (molality) (d) K mol kg or K (molality).

(iii) The Freundlich adsorption isotherm can be used to model

(a) multilayer adsorption (b) monolayer adsorption

(c) both (a) & (b) (d) none of the above.

(iv) An unripe mango placed in a concentrated salt solution to prepare pickle, shrivels because

(a) it gains water due to osmosis

(b) it loses water due to reverse osmosis

(c) it gains water due to reverse osmosis

(d) it loses water due to osmosis.

(v) Which compound will not take part in Aldol condensation reaction?

(a) Acetone (b) Propionaldehyde

(c) Acetaldehyde (d) Benzaldehyde.

(vi) Sucrose is composed of

(a) glucose and glucose (b) glucose and fructose

(c) glucose and galactose (d) fructose and galactose.

(vii) How many stereo isomers are possible for aldohexose sugar?

(a) 16 (b) 6 (c) 12 (d) 14.

(viii) What is the heaviest of the twenty naturally occurring amino acids?

(a) Tryptophan (b) Phenylalanine

(c) Tyrosine (d) Histidin.

(ix) Which of the following compound after treatment with Grignard reagent followed by hydrolysis will give primary alcohol?

(a) Acetone (b) Formaldehyde

(c) Acetaldehyde (d) Benzaldehyde.

(x) The protecting power of lyophilic colloidal sol is expressed in terms of

(a) critical miscelle concentration (b) oxidation number

(c) coagulation value (d) gold number.

**Group – B**

2.(a) Distinguish between diffusion and osmosis.

(b) Why a person suffering from high blood pressure is advised to take minimum quantity of common salt?

(c) Derive Langmuir adsorption isotherm. Write the limitations of Langmuir adsorption equation.

**3 + 2 + (5 + 2) = 12**

3. (a) Explain the term electrophoresis with suitable example.

(b) Which colligative property is preferred for the molar mass determination of macro molecules and why?

(c) Write down, without derivation, Maxwell’s expression for the distribution of speed in three dimensions and depict the appropriate curve of 1/n dn/dc against c. with the help of curve obtain the expression for the most probable speed of a molecule.

(d) Write short note on reverse micelle.

**3+ 2 + (1+ 1+ 3) + 2 = 12**

**Group – C**

4. (a) Use without derivation the relationship between critical constants and the vander Waal’s constant and obtain the reduced equation of states. Explain the significance of this equation.

(b) Write down the difference between Sol & Gel? Write short note on electrical double layer.

(c) 0.636 gm of acetic acid (CH3COOH) is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.0205°C. Calculate the van’t Hoff factor and the dissociation constant of acid.

**(3 + 1) + (1 + 3) + 4 = 12**

5.(a) Derive Duhem Margules equation.

(b) Derive thermodynamically π = cRT, where π = Osmotic pressure and c = concentration in moles/lit.

(c) Define or explain the following terms: Reverse Osmosis and van’t Hoff factor.

**3+ 6 + 3 = 12**

**Group – D**

6. (a) What will be the products when benzaldehyde is treated with ethyl methyl ketone separately in presence of dil. acid and dil. base?

(b) What happens when glyoxal is treated with 50% NaOH?

(c) Write down the products when

(i) CH3MgBr is treated with CH3CH2CN followed by hydrolysis in acidic medium.

(ii) Aniline is treated with anhydrous AlCl3 and alkyl halide.

(d) How would you convert Benzene to 1 Butyl benzene.

**4 + 2 + (2 × 2) + 2=12**

7.(a) What are the limitations of Friedel-Craft alkylation?

(b) Write down the major product with mechanism when benzene is treated with n − propyl chloride (CH3CH2CH2Cl) in presence of anhydrous AlCl3.

(c) Write down the chemical steps for industrial synthesis of DDT from benzene.



(d)

Depict the mechanism for the formation of product. Identify the industrial name of the product with its application.

**3+ 3+ 3 + (2 + 1) =12**

**Group – E**

8. (a) D-fructose reduces Tollen’s reagent or Fehling’s reagent. Explain why?

(b) Write down the products when glucose is separately treated with bromine-water and HNO3.

(c) Show the synthetic route of alanine via Strecker synthesis.

(d) What is isoelectric point of an amino acid?

**3+ 4 + 3 + 2 = 12**

9. (a) Why osazone doesn’t undergo a further intramolecular rearrangement involving the C3 position?

(b) Why peptide molecules can be synthesized by the stepwise condensation reaction between amino group of one amino acid and carboxyl acid group of other amino acid? Explain.

(c) How will you synthesise gly-trp dipeptide in the solution phase?

(d) How will you convert glucose to fructose?

**2+ 3+ 4 + 3=12**