

- (viii) Which of the following is disproportion reaction?
 (a) Cannizzaro reaction (b) Aldol condensation
 (c) Schmidt reaction (d) Beckmann reaction.
- (ix) Which of the following contains the same number of carbons as glucose?
 (a) Allulose (b) Arabinose (c) Ribose (d) Glyceraldehyde.
- (x) Rate of physical adsorption increases with
 (a) increase in temperature (b) decrease in pressure
 (c) decrease in temperature (d) decrease in surface area.

Group - B

- 2.(a) Write down without derivation the expression for Maxwell's distribution of molecular speed in three dimensions and use this to obtain the expression for average molecular kinetic energy.
- (b) What is protective colloid? Give an example.
- (c) What are emulsions? Name and explain their types. What is the difference between colloid and emulsion?

$$(1 + 4) + 2 + (1 + 2 + 2) = 12$$

- 3.(a) What is peptization?
- (b) Define the term adsorption. How does chemisorption differ from physisorption?
- (c) What are lyophilic and lyophobic sols? Give one example of each type.
- (d) Write a short note on electrical double layer.

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

Group - C

- 4.(a) What is the osmotic pressure at 25°C when 72.5 ml of a solution containing 4.25 grams of electrolyte CaCl_2 (molar mass=111 g/mole) is prepared?(Consider CaCl_2 as a strong electrolyte).
- (b) State and derive Raoult's Law.
- (c) Define reverse osmosis.
- (d) 2g of benzoic acid ($\text{C}_6\text{H}_5\text{COOH}$) dissolved in 25 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant for benzene is 4.9 K kg mol⁻¹. What is the percentage association of acid if it forms dimer in solution?

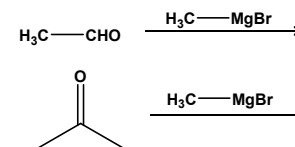
$$3 + 3 + 2 + 4 = 12$$

5. (a) Distinguish between diffusion and osmosis.
- (b) Explain the following term: electrophoresis
- (c) Explain what is meant by fugacity and discuss how this quantity is measured with the help of the value of compressibility factor.
- (d) Which colligative property is preferred for the molar mass determination of macro molecules? Why?

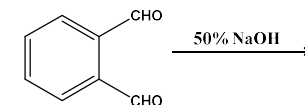
$$3 + 2 + (2 + 3) + 2 = 12$$

Group - D

6. (a) How would you synthesize acetone from Grignard reagent?
- (b) Show the industrial method of synthetic steps of aspirin from phenol. What are the uses of aspirine?
- (c) Arrange the order of reactivity with suitable explanation:



- (d) Write down the detailed reaction mechanism for the formation of product. Based upon redox concept identify the type of reaction.



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

7. (a) What is the basic difference between resonance and tautomerism? Give one example of each with explanation.
- (b) Write short note on Friedel-Crafts acylation.
- (c) $\text{H}_3\text{C}-\text{CHO} + \text{H}_3\text{C}-\overset{\text{H}_2}{\underset{\text{H}}{\text{C}}}-\text{CHO} \xrightarrow{\text{Dil. NaOH}}$
- How many products formation can take place in the above aldol condensation? Explain mechanistically.
- (d) Identify the final product with mechanism when acetone is heated with catalytic amount of H_2SO_4 .

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

Group – E

8. (a) How will you convert D-glucose to D-fructose?
 (b) How does fructose react with excess phenyl hydrazine? Identify product with mechanism.
 (c) Give appropriate structural formula to illustrate aldopentose.
 (d) What happened if D-Glucose is treated with aqueous ammonium hydroxide?
 (e) Exemplify one acidic and one basic amino acid.

3+ 3+ 2+ 2 + 2 = 12

9. (a) How will you convert glycine to phenyl alanine via Erlenmeyer Azlactone synthesis?
 (b) How will you synthesis alanine-phenyl alanine dipeptide in solution phase?
 (c) What is mutarotation of glucose.
 (d) Draw the two dipeptides formed from each pair of amino acids tyrosine and glycine.

3+ 4 + 2 + 3 = 12**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) The high temperature limiting value of molar heat capacity of carbon dioxide will be
 (a) 13/2 R (b) 11/2 R (c) 9/2 R (d) 7/2 R.
- (ii) Lyophilic colloids are normally
 (a) reversible colloids (b) irreversible colloids
 (c) aerosol (d) none of these.
- (iii) The most probable speed of certain gas at 27°C is 400 ms⁻¹. The temperature at which the speed will be 800 ms⁻¹ is
 (a) 54°C (b) 108°C (c) 216 °C (d) 927 °C.
- (iv) Which one of the followings forms micelles in aqueous solution above certain concentration?
 (a) dodecyl trimethyl ammonium chloride
 (b) glucose (c) urea (d) Pyridinium chloride.
- (v) The increasing order of magnitude of the most probable speed (C_{mp}), average speed c (C_{av}), and root mean square speed (C_{rms}) is as follows:
 (a) $C_{rms} > C_{av} > C_{mp}$ (b) $C_{av} > C_{rms} > C_{mp}$
 (c) $C_{mp} > C_{av} > C_{rms}$ (d) $C_{av} > C_{mp} > C_{rms}$.
- (vi) Isocyanate is formed in which of the following cases?
 (a) Cannizzaro reaction (b) Aldol condensation
 (c) Curtius rearrangement (d) Beckmann rearrangement.
- (vii) Example of optically inactive amino acid is
 (a) Glycine (b) Alanine (c) Tryptophan (d) Serine.