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(c) Carry out the following conversions (mechanism not necessary).



(d) Write down the IUPAC name and structure of the product when chlorobenzene reacts with trichloroacetaldehyde in presence of sulphuric acid. Give one use of the product.

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

Group – E

- 8. (a) What points are to be taken into consideration during the formation of peptide linkage between two amino acids?
 - (b) What form of glutamic acid would you expect to predominate in (i) strongly acidic solution (ii) strongly basic solution and (iii) at its isoelectric point (pI 3.2)?
 - (c) Convert D-Glucose to D-Fructose.
 - (d) Write short note on mutarotation.

3 + 3 + 3 + 3 = 12

- 9. (a) Synthesize glycine by Gabriel Phthalimide synthesis.
 - (b) What products would you expect (after hydrolysis) when Val. Lys. Gly is treated with 2, 4-dinitrofluorobenzene?
 - (c) "D-glucose and D-mannose gives the same osazone" why?
 - (d) Give appropriate structural formulas to illustrate each of the following:

(i) analdopentose (ii) a ketohexose (iii) epimers.

 $3 + 3 + 3 (1 \times 3) = 12$

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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 <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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: $10 \times 1 = 10$
 - $\begin{array}{ll} \text{(i)} & \mbox{The unit of the van der Waals constant 'a' is} \\ & (a) \ dm^{6} \ atm.mol^{-1} & (b) \ dm^{6} \ atm.mol^{-2} \\ & (c) \ dm^{3} \ atm.mol^{-1} & (d) \ dm^{3} \ atm^{-1} \ .mol^{-1} . \end{array}$
 - (ii) If *f* and P represent fugacity and pressure of a gas, then:
 (a) *f* for hydrogen > P for hydrogen and *f* for helium < P for helium
 (b) *f* for hydrogen < P for hydrogen and *f* for helium > P for helium
 (c) *f* for hydrogen > P for hydrogen and *f* for helium > P for helium
 (d) *f* for hydrogen > P for hydrogen and *f* for helium > P for helium.
 - (iii) Isotonic solutions have the same
 (a) vapour pressure
 (b) osmotic pressure
 (c) atmospheric pressure
 (d) internal pressure.

<i>c</i>		
	(c) reducing sugar	(d) polyccharide.
	(a) monosaccharide	(b)non-reducing sugar
(v)	Sucrose is a	
	(c) diffusion	(d) peptisation.
	(u) cougulation	

(vi) Therms speed of a certain gas at 27° C is 400 ms⁻¹. The temperature at
which the speed will be 800 m s⁻¹ is
(a) 54° C(b) 108° C(c) 600 K(d) 1200 K.

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(vii) Which one of the following salts will have the same value of Van't Hoff factor (i) as that of K_4 [Fe (CN)₆].

a) $Al_2(SO_4)_3$	(b) NaCl	(c) Al $(NO_3)_3$	(d) Na ₂ SO ₄ .
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- (viii) Friedel-Craft reaction is an example of
 - (a) $S_N 2$ reaction
 - (b) aromatic electrophilic substitution
 - (c) elimination reaction
 - (d) addition reaction.
- (ix) Isocyanate is formed in which of the following cases?

(a) Cannizzaro reaction	(b) Aldol condensation
(c) Curtius rearrangement	(d)Beckmann rearrangement.

(x) Separation of inorganic salts of low molecular weight is done by
(a) carboxylic acid
(b) alcohol
(c) aldehyde
(d) ketone.

Group – B

- 2. (a) What are lyophilic and lyophobic sols? Give one example of each type.
 - (b) Obtain the expression for volume correction and assume the expression for pressure correction to derive the Van der Waal's equation for n moles of a real gas and explain from this equation the departure of real gases from ideal behavior.
 - (c) State and explain the principle of equipartition of energy. Estimate molar heat capacity C_v for argon (monoatomic) and CO_2 (linear triatomic) gases at 100°C which is assumed to be at a high temperature. 3+5+4=12
- 3. (a) Write down the differences between a true solution and a colloidal solution.
 - (b) What is protective colloid? Give an example.
 - (c) Write a note on Dialysis.
 - (d) Write a short note on electrical double layer.

3 + 3 + 3 + 3 = 12

Group – C

4. (a) From the vapour pressure-temperature curves of solution and solvent, explain graphically the freezing point depression of the solution over that of the pure solvent. What is molal elevation constant?

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- (b) What are ideal solutions? Define the terms semi permeable membrane, osmosis and osmotic pressure.
- (c) 0.6 ml of acetic acid (CH₃COOH), having density 1.06 gm/cc, is dissolved in 1 litre of water. The depression of 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) Distinguish between diffusion and osmosis.
 - (b) Explain what is meant by fugacity and discuss how this quantity is estimated with the help of the value of compressibility factor.
 - (c) Vapour pressure of water at 293 K is 17.535 mm Hg. Calculate the vapour pressure of water at 293 K when 25 g of glucose is dissolved in 450 g of water.

3 + (2 + 3) + 4 = 12

Group – D

6. (a) Show the mechanism of conversion of the following reaction. Name the reaction.



- (b) What are the benefits of Friedel-Crafts acylation over Friedel-Crafts alkylation? Explain with a suitable example.
- (c) Give a brief note on industrial manufacture of phthalic anhydride from naphthalene.
- (d) Complete the following reactions.



- 7. (a) When benzene reacts with neopentyl chloride, $(CH_3)_3CCH_2Cl$, in presence of aluminium chloride, the major product is 2-methyl-2-phenylbutane, not neopentylbenzene. Explain this result.
 - (b) Show the steps in synthesis of aspirin from benzene in industry.

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