Exam Date & Time: 02-Dec-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH END SEMESTER EXAMINATIONS, DEC 2023

PHYSICAL AND ORGANIC CHEMISTRY [CHM 2121]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) i) In a first-order reaction, it takes the reactant 40.5 minutes to be 25% decomposed. Calculate the rate constant of the reaction.

A) ii) Derive the relationship between the free energy of a component in the solution to its free energy in its vapor state. (4)

B) i) Explain the solution properties of hydrochloric acid and water system.

ii) Derive an equation to show the relationship between the relative lowering of vapor pressure and mole fraction of the solute. (4)

C) Give a reason for the following.

i) Hydrolysis of Sucrose is a first-order reaction.
ii) For Ideal solution $\Delta V_{mix.}=0$ (2)

2) Derive Gibbs Phase rule and Langmuir adsorption isotherm. (4)

A)

B) i) Explain the capillary rise method to determine the surface tension.

ii) Explain the phase diagram of the Napthalene-Benzene system. (4)

C) Write a note on the following.

i) Variation of Solubility of Aniline- water system with temperature.

ii) Adsorption on charcoal in aqueous potassium chloride solution. (2)

3) Explain any two factors that affect the strength of acids and bases with a suitable example. (4)

A)

B) i) Explain the boiling temperature and composition curve for the benzene-toluene system.

ii) Derive Clausious clapyron equation for the fusion process. . (4)

C) Explain conductometric titration of weak acid against standard strong base . (2)

4) Discuss the primary and secondary structures of proteins. (4)

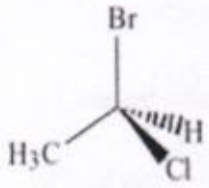
A)

B) Explain any two reactions of glucose. Write any two methods of preparation of amino acids. (4)

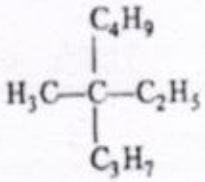
C) Discuss the stability of free radicals based on the inductive effect. (2)

5) Differentiate between enantiomers and diastereoisomers. Assign the suitable nomenclature for the following compounds.

A)



(a)



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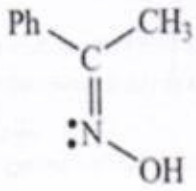

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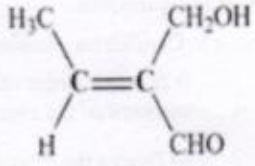
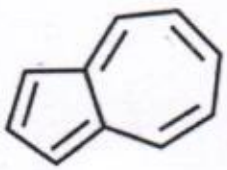


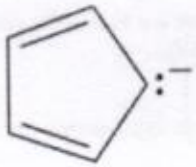
(d) (4)

B) Explain Huckel's rule of aromaticity. Explain the aromaticity of the following compounds with a suitable reason.

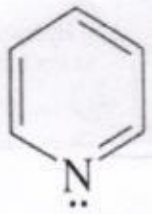


(a)

(b)



(c)



(d) (4)

C) Discuss the classification of peptides based on the peptide linkage with an example for each. (2)

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