

Exam Date & Time: 08-Jan-2024 (09:30 AM - 12:30 PM)

**MANIPAL ACADEMY OF HIGHER EDUCATION**

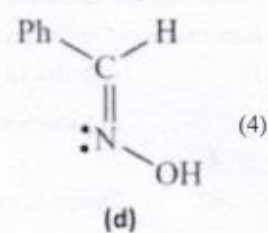
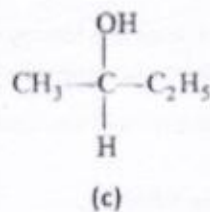
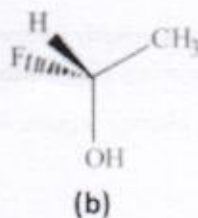
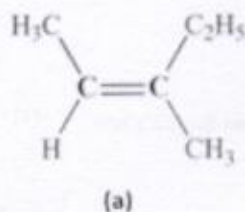
THIRD SEMESTER B.TECH END SEMESTER MAKE UP EXAMINATIONS, JAN 2024

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) Derive an expression for the determination of rate constant of first order reaction. (4)
- ii) Explain the solution properties of non ideal system showing negative deviation from Raoult's law. (4)
- A)
- B) Derive an equation for the following.
- i) The relationship between the free energy of a solvent and the free energy of a nonvolatile solute in solution. (4)
- ii) The relationship between the elevation in boiling point to the mole fraction of the solute.
- C) Differentiate between the following.
- i) Physisorption and chemisorption. (2)
- ii) Order and molecularity.
- 2) i) Explain the phase diagram of the water system. (4)
- ii) Explain the potentiometric titration of weak acid against standard sodium hydroxide solution. (4)
- A)
- B) i) Derive an equation to show the relationship between the vapor pressure of small liquid drops and the drop size. (4)
- ii) Explain the phase diagram of two-component system forming a Eutectic mixture. (4)
- C) Explain the solubility of the nicotine-water system with temperature. (2)
- 3) i) Explain the boiling temperature- composition curve for the chloroform-acetone system. (4)
- ii) Explain the adsorption of solute on charcoal in solution. (4)
- A)
- B) Discuss the resonance structure of benzene. Explain the electrophilic substitution reaction of benzene with the suitable mechanism. (4)
- C) Explain the Huckel's rule of Aromaticity with an example. (2)
- 4) Differentiate between bathochromic and hypsochromic shift. How dyes are classified based on application and structure? (4)
- A)
- B) Explain the classification of carbohydrates. Discuss the structure of Glucose. (4)

- C) What are heterocyclic compounds? Why pyridine is more basic than pyrrole? (2)
- 5) Define carbocations. Discuss the stability of carbocations based on the inductive effect and resonance effect. (4)
- A)
- B) Assign and explain the suitable nomenclature for the following compounds.



- C) Mention any four factors that affect the strength of acids and bases. (2)

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