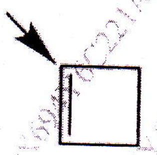
F. Y. B. Pharm (Sem - II) 23/08/25

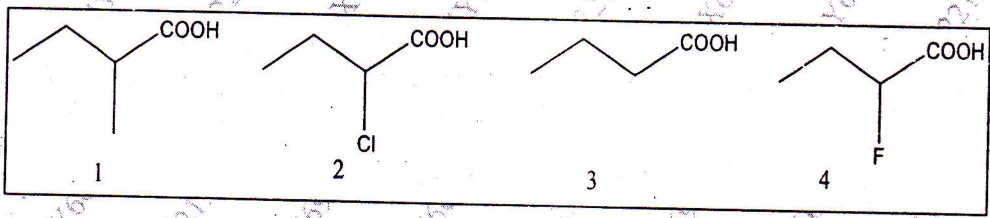
Time: 3 Hours **Marks: 75**

Q.I Answer the following multiple choice questions: **(20)**

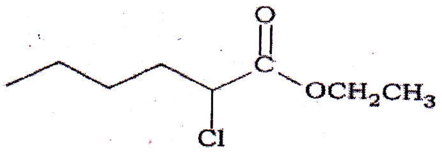
1. The compounds $CH_3CH_2OCH_2CH_3$ and $CH_3OCH_2CH_2CH_3$ are________.
   a. Enantiomers
   b. Position
   c. Metamerism
   d. Functional
2. Identify the hybridization of the indicated carbon in the following structure.



   a. sp^2
   b. sp
   c. sp^3d
   d. sp^3
3. Which of the following compounds reacts slowly with Lucas reagent at room temperature?
   a. 1-Butanol
   b. 2-Propanol
   c. 2-Butanol
   d. 2-Methyl-2-propanol
4. Arrange the following in increasing order of acidity.



   a. 4<2<3<1
   b. 1>3>2>4
   c. 4>2>3>1
   d. 1<3<2<4
5. Acetaldehyde on treatment with Tollen's reagent gives a precipitate of________.
   a. Ag
   b. $AgNO_3$
   c. Cu_2O
   d. AgCl
6. Select IUPAC name of the following compound.

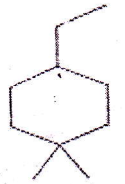


   a. Ethyl 2-chlorohexanoate
   b. 1-Chlorohexyl ethanoate
   c. 2-Chlorohexyl ethanoate
   d. Ethyl 1-chlorohexanoate
7. Choose the incorrect option regarding alkyl halide.
   a. Alkyl halide beyond C18 are colourless solids
   b. Alkyl halides are soluble in water and insoluble in organic solvents
   c. Alkyl halides are very reactive compounds
   d. Alkyl halides have higher boiling point than alkanes

8. Which of the following reagents cannot be used to prepare an alkyl chloride from an alcohol?
   a. $HCl+ZnCl_2$
   b. NaCl
   c. $SOCl_2$
   d. PCl_5

9. A hydrazone will result from the reaction of hydrazine with ________.
   a. A phenol
   b. An aldehyde
   c. An alcohol
   d. An acid

10. Select the appropriate IUPAC nomenclature for the following compound.



   a. 1-ethyl-4-4-dimethylcyclohexane
   b. 1-ethyl-4-4-dimethylcyclohexene
   c. 4-ethyl-1-1-dimethylcyclohexane
   d. 3-ethyl-1-1-dimethylcyclohexane

11. Conjugated alkenes are characterised by?
   a. Alternating π and σ bonds.
   b. Adjacent π bonds.
   c. π bonds separated by two or more σ bonds.
   d. A cyclic system containing $\sigma\pi$ electrons.

12. Which of the following statements regarding the S_N2 mechanism is wrong?
   a. S_N2 reactions are bimolecular.
   b. S_N2 reactions are usually second order.
   c. The S_N2 mechanism occurs in one step.
   d. S_N2 reactions usually occur in two steps.

13. Choose the correct order of reactivity of hydrogen halide towards alcohol.
   a. HCl> HBr>HI
   b. HI>HBr>HCl
   c. HBr>HCl>HI
   d. HBr>HI>HCl

14. What is the major product formed when 2-bromobutane heated with alcoholic KOH?
   a. 1-butene
   b. 2-butene
   c. 1-butene : 2-butene (50:50)
   d. 2 methyl propane

15. The major product of the following reaction is:

$$CH_3\text{-}CH_2\text{-}Cl + (CH_3)_2\text{-}NH \longrightarrow ?$$

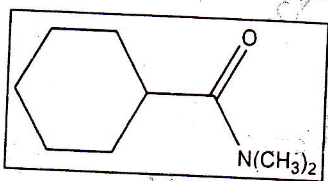
   a. 1° amine
   b. 2° amine
   c. 3° amine
   d. Amide

16. Which statement best describes the mechanism of S_N2 reaction?
   a. Front side attack with retention of configuration
   b. Front side attack with inversion of configuration
   c. Back side attack with inversion of configuration
   d. Back side attack with retention of configuration

17. In the addition of HX to a double bond the hydrogen goes to the carbon that already has more hydrogen is a statement of ________.
   a. Hund's rule
   b. Markovnikoff's rule
   c. Saytzeffs rule
   d. Anti Markovniknov's rule

18. Hydroboration- oxidation of 2- Methylpropene gives ________.
   a. 1- Butanol
   b. 1,2- Propanediol
   c. 2- Methyl-2-propanol
   d. 2- Methyl-1-propanol

19. Select the appropriate IUPAC nomenclature for the following compound.



   a. N,N-Dimethylcyclohexanamide
   b. 1-(Dimethylaminooxo)cyclohexane
   c. N,N-Dimethylcyclohexanone
   d. N, N-Dimethylcyclohexanecarboxamide

20. Which of the following statements is false about tautomers?
   a. Tautomers are structural isomers
   b. Tautomers are structural isomers which exist in dynamic equilibrium
   c. Tautomerism involves movement of atoms
   d. Tautomers have independent existence

Q. II Attempt any TWO questions from the following. **20M**

1. a) Identify the product A, B, C, D, and E.

$$CH_3\text{-}CH_2\text{-}CH_2\text{-}OH \xrightarrow{SOCl_2} A \xrightarrow[\text{Alcohol}/\Delta]{KOH} B \xrightarrow[\text{Peroxide}]{HBr} C \xrightarrow[\text{Aq. EtOH}, \Delta]{NaCN} D \xrightarrow[\text{Hydrolysis}]{H^+} E$$

b) Explain in detailed kinetic and mechanism involved in formation of both the major and minor product, when 2-Chlorobutane reacts with alcoholic KOH. Comment on major and minor product formation.

2. a) Name the reaction (S_N1 or S_N2) when 2-Bromo-2-methylbutane reacts with reagent EtOH. Explain in detailed mechanism and stereochemistry for the same.

b) Explain how polar protic solvents favour S_N1 reaction and polar Aprotic solvents favour S_N2 reaction.

3. Write the products and detailed mechanism for the following reactions-
   i. Formaldehyde + Concentrated NaOH
   ii. Benzaldehyde + Acetic Anhydride
   iii. Benzaldehyde + KCN (Aqueous and alcoholic)
   iv. Propionaldehyde + Dilute NaOH
   v. Acetaldehyde + 2,4-Dinitrophenylhydrazine

Q.III Answer any SEVEN questions from the following.

1. Explain in detail the mechanism involved in the dehydration of 2-propanol.

2. Discuss in detail the mechanism of nucleophilic addition reaction in aldehyde and ketone with one example. Give the product of following reactions:
   Acetone + hydrazine
   Acetyl chloride + Pb/ $BaSO_4$

3. Explain any TWO method for synthesis of carboxylic acid.
   With the help of reactions give the qualitative test for amines.

4. Give a detailed account on halogenation of alkane with an example and elaborate on the reactivity of halogens.

5. Write a note on stability of conjugated dienes. Give Diel-Aider reaction.

6. Give the name of reagents to carry out following conversions.
   i. N,N-Dimethylacetamide to Dimethylethylamine
   ii. Methanol to Methylamine
   iii. Acetic acid to Chloroacetic acid
   iv. Acetic acid to Ethyl acetate
   v. Acetyl chloride to Acetaldehyde

7. Identify the structure A which on ozonolysis gives propanal and acetaldehyde. Explain the mechanism involved for the above reaction. Suggest starting material and reaction condition to obtain acetaldehyde by Rosenmund reaction.

8. A. Draw a structure for the following compounds. (Any 3)
   i. 2-Pentyn-4-ene
   ii. 2,3-Dichloro-1,5-dipentanamide
   iii. 1-ethoxy-2-nitropropane
   iv. 1,3-Pentadiene

   B. Which type of tautomerism is involved in Propanone? Draw a structure of its tautomer.

9. Differentiate between S_N1 and S_N2.