

**Time allowed: 2:35 Hours**

**Note:** Answer all parts from Section 'B' and Section 'C' on the separately provided E-Sheet.  
Write your answers neatly and legibly. No extra E-Sheet will be provided.

**SECTION – B (Marks 42)**

**Q-2: Attempt all parts from the following. All parts carry equal marks.**

**(14×3=42)**

- i. Briefly discuss the working of the structure labeled as A in the diagram of NMR Spectroscopy given below.



**OR**

Which nail polish remover, acetone-base or non-acetone-base is better? Give a reason for your answer.

**(0.5+2.5)**

Identify the nutrients from the given information.

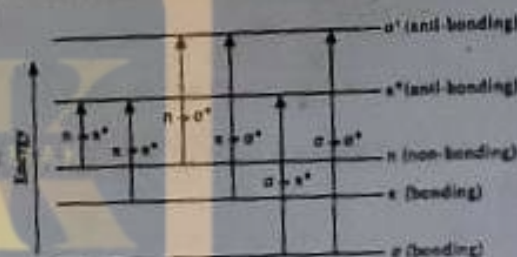
- They are known as the 'fuel of life'
- They form 50% of the dry weight of most organisms.
- It has a unique role in the storage and transformation of energy in the body.

**OR**

What features distinguish organic compounds from inorganic ones?

**(1×3)**

- iii. Identify the type of spectroscopy and briefly discuss it with reference to the diagram shown.



**OR**

Nylon is incredibly beneficial to us because of its specific characteristics. How?

- iv. On what principles refining of petroleum is done in Pakistan?

**OR**

Write an equation for:

- Oxidation of acetaldehyde
- Dehydration of pentanoic acid

- v. Mention some nutritional and biological importance of lipids in living organisms.

**OR**

Discuss the acid-catalyzed mechanism of nucleophilic addition to carbonyl group. Give at least one reaction to support your answer

- vi. How do we determine the structure information from an IR spectrum of a compound?

**OR**

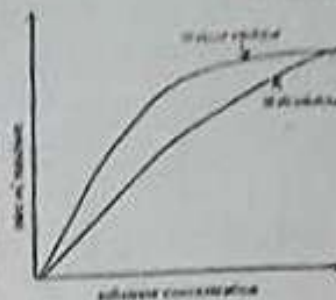
Give reason:

- The boiling point of carboxylic acids is higher than alcohols.
- Esters are considered as derivatives of carboxylic acids.

- vii. Draw all possible open-chain structures for the molecular formula  $C_5H_{11}$  and name them.

**OR**

The graph shows the effect of substrate concentration on the rate of an enzyme-controlled reaction with and without the addition of an inhibitor.



- Identify the inhibitor and discuss its effect with reference to the given graph. (0.5+1)
- Predict the effect of the inhibitor on the rate of reaction when substrate concentration is high. (1.5)

(1+1+1)

viii. Give structures of the following compounds:

- Isobutyric acid
- valeric acid
- formic acid

OR

Aldehydes and ketones both have a carbonyl group, yet they are categorized differently. why?

ix. Give type, structure and occurrence of lactose and ribose.

(1.5+1.5)

OR

Give complete reactions for the preparation of:

(1.5+1.5)

- benzoic acid from Toluene
- acetic acid from acetonitrile( $C_2H_3N$ )

x. Aldehydes are oxidized more easily than ketones. Why? Support your answer with an appropriate example. (1.5+1.5)

OR

Complete the equations:

- $CH_2 = CH_2 + H_2SO_4 \rightarrow ?$
- $C_5H_{12}OH \xrightarrow{H_2SO_4} ?$
- Benzene diazonium chloride  $+ 2H_2O \rightarrow ? + N_2 + HCl$

xi. How can an Ether be formed through Alcohol condensation? Give reactions to support your answer.

OR

Give methods for the preparation of Ethene from:

(1.5+1.5)

- Ethyl alcohol
- Ethyl bromide

xii. Compare the mechanism of two types of alkyl halide nucleophilic substitution reactions.

OR

Justify why alkanes are the least reactive organic compounds.

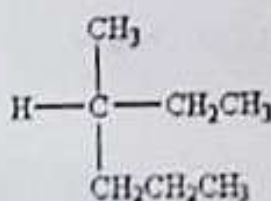
xiii. Apply your knowledge about Grignard reagents to answer the following questions.

- Write the general equations for the preparation of Grignard reagents.
- Why is a Grignard reagent so reactive?

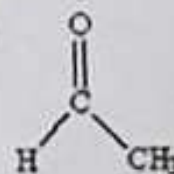
OR

How do symmetric alkynes and asymmetric alkynes differ in their reactions with halogen acids? (1.5+1.5)

xiv. Identify the Chiral molecule from the following. Give reason for your answer. (0.5+2.5)



A



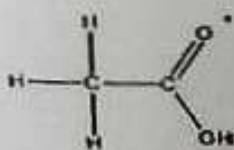
B



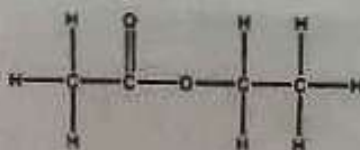
OR

Identify the functional groups of the following: (0.5x6)

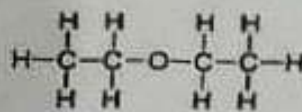
a.



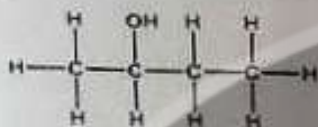
b.



c.



d.



e.



f.



### SECTION - C (Marks 26)

Note: Attempt all questions. Marks of each question are given within brackets.

Q-3: Trioxane is a cyclic trimer of formaldehyde, a precursor for the production of polyoxymethylene plastics. 17.471 g of trioxane upon complete combustion produces 10.477 g of water and 25.612g of carbon dioxide. The molecular mass of trioxane determined by mass spectrometry, is 90.079 a.m.u. calculate the empirical and molecular formulae of trioxane. (6)

OR

Draw structures of following:

(1x6)

- |                         |                         |                          |
|-------------------------|-------------------------|--------------------------|
| i. 1,3-butanol          | ii. Methoxymethane      | iii. sec. propyl alcohol |
| iv. Methyl phenyl ether | v. 2-phenyl-3-pentanone | vi. 2,3-pentadione       |

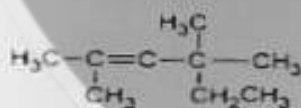
Q-4: Classify the synthetic adhesives on the basis of chemical composition. (3.5+3.5)

OR

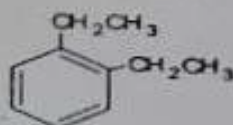
How will you relate the structure of DNA and RNA with their roles in genetic storage and transfer of genetic information? (7)

Q-5: Give IUPAC names of the following: (6)

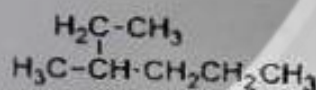
i.



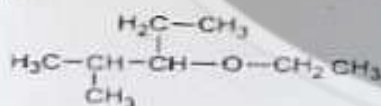
ii.



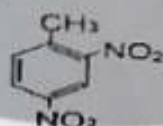
iii.



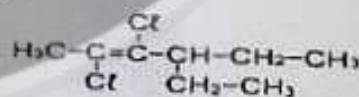
iv.



v.



vi.



OR

Apply your knowledge to discuss the mechanism of  $\beta$ -elimination reactions. (6)

Q-6: Write structural formula and give IUPAC names for all possible isomers of aldehydes and ketones of the molecule with formula  $C_5H_{10}O$  (7)

OR

Use the concept of Molecular Orbital Theory to discuss the structure of Benzene. (7)