PAPER: ORGANIC CHEMISTRY II (16SCCCH8) CLASS: III B.Sc., CHEM

TWO MARK QUESTIONS WITH ANSWERS

UNIT-I

1. **Define carbohydrate**

   Carbohydrates can also be defined chemically as neutral compounds of carbon, hydrogen and oxygen. Carbohydrates come in simple forms such as sugars and in complex forms such as starches and fiber

2. **How to classify carbohydrate?**

   Carbohydrates are classified into **three** subtypes: monosaccharides, disaccharides, and polysaccharides.

3. **What is meant by interconversion?**

   It is a process in which two things are each converted into the other, often as the result of **chemical** or physical activity.

4. **Define ascending series**
   Ascending series is the series which is buildup the carbohydrate by increasing one carbon atom in the conversion
   Ex : conversion of aldopentose into aldohexose

5. **Define descending series**

   Descending series is the series which is buildup the carbohydrate by decreasing one carbon atom in the conversion
   Ex : conversion of aldohexose into aldopentose

6. **Define epimerization**

   Epimerization is a process of forming an **epimer** by changing one asymmetric centre in a compound that has more than one

7. **Define sucrose**

   Sucrose is a disaccharide sugar, meaning it is made up of two monosaccharide sugar units. In the case of **sucrose**, the two units are glucose and fructose.

8. **Define maltose**

A disaccharide composed of two glucopyranose molecules connected with an acetal linkage containing an anomeric carbon

9. **Define starch**

Starch, a white, granular, **organic chemical** that is produced by all green plants. **Starch** is a soft, white, tasteless powder that is insoluble in cold water, alcohol, or other solvents. **Starch** is a polysaccharide comprising glucose monomers joined in α 1,4 linkages.

10. **Define cellulose**

Cellulose is the most abundant **organic** molecule in nature. It is a polysaccharide assembled from glucose monomer units, and it (together with other materials such as hemicellulose and lignin) is the main constituent of plant cell walls.

UNIT- II

1. **Define amino acids**

An **amino acid** is an **organic** molecule that is made up of a basic **amino** group ($-NH_2$), an acidic carboxyl group ($-COOH$), and an **organic** R group (or side chain) that is unique to each **amino acid**.

2. **Define zwitter ion**

Zwitterion. **Zwitterion**: A molecule having a net formal charge of zero, but negative and positive formal charges on individual atoms within its structure. The charged atoms must be joined by one or more covalent bonds.

3. **Define isoelectric point**

The **isoelectric point**, pI, is the pH of an aqueous solution of an amino acid (or peptide) at which the molecules on average have no net charge. For simple amino acids such as alanine, the pI is an average of the pK_a's of the carboxyl (2.34) and ammonium (9.69) groups

4. **Define peptide**

Peptide, any **organic** substance of which the molecules are structurally like those of proteins, but smaller. **Peptide** molecules are composed of two or more amino acids joined through amide formation involving the carboxyl group of each amino acid and the amino group of the next.

5. **Define peptide linkages**

   A **peptide linkage** is a **chemical** bond formed between two molecules when the carboxyl group of one molecule reacts with the amino group of the other molecule, releasing a molecule of water (H2O).

6. **Define proteins**

   The **definition** of a **protein** is a substance that has amino acids, compounds and carbon, hydrogen, oxygen, nitrogen and sometimes sulfur and is found in many foods. An example of a **protein** is the type of nutrient found in meats.

7. **How to classify proteins?**

   Proteins can be classified as:
   (a) Simple proteins. On hydrolysis they yield only the amino acids and occasional small carbohydrate compounds. Examples are: albumins, globulins, glutelins, albuminoids, histones and protamines.
   (b) Conjugated proteins. These are simple proteins combined with some non-protein material in the body. Examples are: nucleoproteins, glycoproteins, phosphoproteins, haemoglobins and lecithoproteins.
   (c) Derived proteins. These are proteins derived from simple or conjugated proteins by physical or chemical means. Examples are: denatured proteins and peptides.

8. **Define denaturation**

   Denaturation is a process in which proteins or nucleic acids lose the quaternary structure, tertiary structure, and secondary structure which is present in their native state, by application of some external stress or compound such as a strong acid or base, a concentrated inorganic salt, an **organic** solvent

9. **Define nuclei acid**

   Nucleic acid, naturally occurring **chemical** compound that is capable of being broken down to yield phosphoric **acid**, sugars, and a mixture of organic bases (purines and pyrimidines). The two main classes of **nucleic acids** are deoxyribonucleic **acid** (DNA) and ribonucleic **acid** (RNA)

10. **Define vitamins**

    A *vitamin* is defined as any *organic* compound that a living organism requires, but which it is not capable of producing itself, or cannot produce in the amounts required by the body

11. **Discuss the classification of vitamins.**

There are two main types of vitamins; fat-soluble vitamins (Vitamins A, D, E, and K) and **water**-soluble vitamins (Vitamins B and C).

UNIT – III

1. **Define alkaloids**

   Alkaloids are a class of naturally occurring **organic compounds** that mostly contain basic nitrogen atoms. This group also includes some related **compounds** with neutral and even weakly acidic properties. **Alkaloids** are produced by a large variety of organisms including bacteria, fungi, plants, and animals.

2. **Discuss the classification of alkaloids**

   - True alkaloids" contain nitrogen in the heterocycle and originate from amino acids.
   - "Protoalkaloids", which contain nitrogen (but not the nitrogen heterocycle) and also originate from amino acids
   - Peptide and cyclopeptide alkaloids.
   - Pseudoalkaloids – alkaloid-like compounds that do not originate from amino acids.

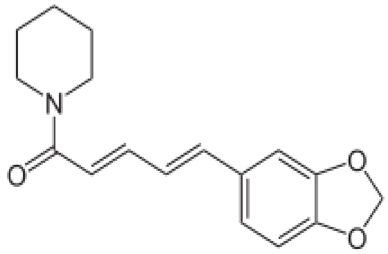
3. **Define terpenoids**

   The **terpenoids** are a large and diverse class of naturally occurring **organic chemicals** derived from **terpenes**. Most are multicyclic structures with oxygen-containing functional groups. About 60% of known natural products are **terpenoids**. ... **Terpenes** are hydrocarbons.

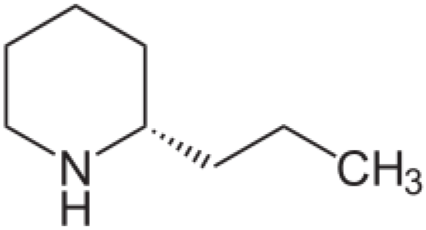
4. **Define isoprene rule**

   The **isoprene rule** dictates how **isoprene** units are joined together in a head to tail configuration. The tail of the first molecule joins the head of the second molecule to form a larger unit. The simplest example is myrcene. This substance is used as an intermediate in the manufacture of flavor and fragrance chemicals.

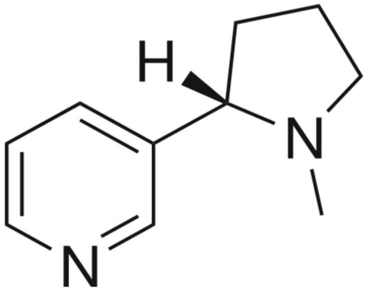
5. **Write the structure of piperine**



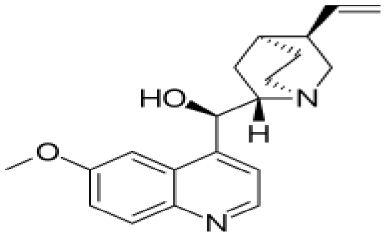
6. **Write the structure of coniine**



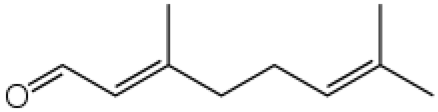
7. **Write the structure of nicotine**



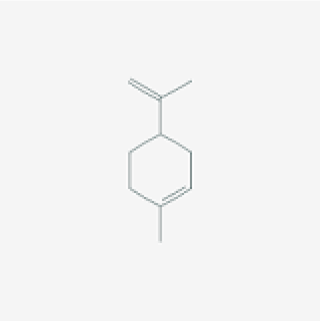
8. **Write the structure of quinine**



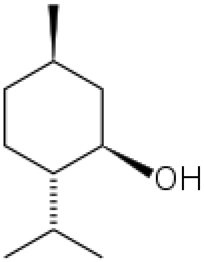
9. **Write the structure of citral**



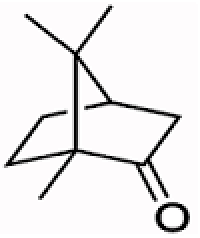
10. Write the structure of limenone



11. Write the structure of menthol



12. Write the structure of camphor



UNIT - IV

1. **Define molecular rearrangement**

A **rearrangement** reaction is a broad class of organic reactions where the carbon skeleton of a **molecule** is rearranged to give a structural isomer of the original **molecule**.

2. **Write Pinacol-pinacolone rearrangement**

   The *pinacol–pinacolone rearrangement* is a method for converting a 1,2-diol to a carbonyl compound in organic chemistry. The 1,2-*rearrangement* takes place under acidic conditions. The name of the *rearrangement* reaction comes from the *rearrangement* of *pinacol* to *pinacolone*.

3. **Write Benzil-benzilic acid rearrangement**

   The **benzilic acid rearrangement** is formally the 1,2-**rearrangement** of 1,2-diketones to form α-hydroxy–carboxylic **acids** using a base. This reaction receives its name from the reaction of benzil with potassium hydroxide to form **benzilic acid**. The reaction is formally a ring contraction when used on cyclic diketones.

4. **Write Benzidine rearrangement**

   Under acidic conditions, 1,2-diphenylhydrazines are known to rearrange into 4,4’-diaminobiphenyls (benzidines).

5. **Write claisen rearrangement**

   Claisen rearrangement is an organic chemical reaction that offers a powerful method in the formation of carbon-carbon bonds. The reactant of this reaction – allyl vinyl ether, is converted into a gamma, delta-unsaturated carbonyl compound when subjected to heat or a Lewis acid

6. **Write Fries rearrangement**

   The Fries rearrangement is a rearrangement reaction of a phenolic ester to a hydroxy aryl ketone by catalysis of Lewis acids. It involves migration of an acyl group of phenol ester to the aryl ring

7. **Write Hofmann rearrangement**

   The Hofmann rearrangement is the organic reaction of a primary amide to a primary amine with one fewer carbon atom. The reaction is named after its discoverer – August Wilhelm von Hofmann.

8. **Write Curtius rearrangement**

The Curtius rearrangement, first defined by Theodor Curtius in 1885, is the thermal decomposition of an acyl azide to an isocyanate with loss of nitrogen gas

9. **Write Lossen rearrangement**

The **Lossen rearrangement** is the conversion of a hydroxamate ester to an isocyanate. Typically O-acyl, sulfonyl, or phosphoryl O-derivative are employed. The isocyanate can be used further to generate ureas in the presence of amines or generate amines in the presence of H_2O.

10. **Write Beckmann rearrangement**

The **Beckmann rearrangement** is an organic reaction used to convert an oxime to an amide under acidic conditions. The reaction begins by protonation of the alcohol group forming a better leaving group.

11. **Write Dienone- phenol rearrangement**

Transformation of a diketone to **phenol** in presence of acid as known as the **Dienone Phenol Rearrangement**. As the name implies, this reaction results in the transformation of a quinoid structure to a benzenoid ring

UNIT – V

1. **Define spectroscopy**

Spectroscopy is the study of the interaction between matter and electromagnetic radiation. Historically, spectroscopy originated through the study of visible light dispersed according to its wavelength, by a prism

2. **What is the principle of UV?**

UV spectroscopy obeys the Beer-Lambert law, which states that: when a beam of monochromatic light is passed through a solution of an absorbing substance, the rate of decrease of intensity of radiation with thickness of the absorbing solution is proportional to the incident radiation as well as the concentration of the solution.

3. **Define IR spectroscopy**

Infrared spectroscopy involves the interaction of infrared radiation with matter. It covers a range of techniques, mostly based on absorption spectroscopy. As with all spectroscopic techniques, it can be used to identify and study chemical substances. Samples may be solid, liquid, or gas

4. **Define bathochromic shift**

Bathochromic shift is a change of spectral band position in the absorption, reflectance, transmittance, or emission spectrum of a molecule to a longer wavelength

5. **Define hypsochromic shift**

Hypsochromic shift is a change of spectral band position in the absorption, reflectance, transmittance, or emission spectrum of a molecule to a shorter wavelength (higher frequency).

6. **Give the principle for NMR**

The *principle* behind *NMR* is that many nuclei have spin and all nuclei are electrically charged. If an external magnetic field is applied, an energy transfer is possible between the base energy to a higher energy level (generally a single energy gap).

7. **Define NMR**

Nuclear magnetic resonance spectroscopy, most commonly known as NMR spectroscopy or magnetic resonance spectroscopy, is a spectroscopic technique to observe local magnetic fields around atomic nuclei.

8. **Define chemical shift**

In nuclear magnetic resonance (*NMR*) spectroscopy, the *chemical shift* is the resonant frequency of a nucleus relative to a standard in a magnetic field. Often the position and number of *chemical shifts* are diagnostic of the structure of a molecule.

9. **Define spin-spin coupling**

Spin-spin coupling is the interaction between the **spin** magnetic moments of different electrons and/or nuclei. In **NMR** spectroscopy it gives rise to multiplet patterns, and cross-peaks in two-dimensional **NMR** spectra. Between electron and nuclear **spins** this is termed the nuclear hyperfine interaction.

10. Write selection rule for IR

The **selection rule** says, that vibrations are only **IR** active (or allowed), if the molecular dipole moment changes during the vibration. A diatomic molecule with the same atoms cannot be excited to vibrate because no dipole moment is present

5 MARK AND 10 MARK QUESTIONS

UNIT-I

5 MARKS

1. **Explain the properties of glucose**
2. **Explain the properties of fructose**
3. **Discuss the interconversion of monosaccharides**
4. **Explain ascending series with example**
5. **Explain descending series with examples**
6. **Discuss the cyclic structure of glucose**
7. **Write a note on polysaccharides**

10 MAARKS

1. **Elucidate the structure of glucose**
2. **Determine the size of sugar rings**
3. **Discuss the structure of sucrose**
4. **Write the structural elucidation for maltose**

UNIT – II

5 MARKS

1. **Give the methods of preparation of amino acids**
2. **Differentiate DNA & RNA**

3. **Write the color reactions of proteins**
4. **Give the biological importance of Vitamins A,B1 &B2**
5. **Give the biological importance of Vitamins B12 & C**

10 MARKS

1. **Write a note on reactions of amino acids**
2. **Discuss the structure of proteins**
3. **Write a note on end group analysis**
4. **What are Vitamins? How they are classified? Give their biological importance with its structure.**

UNIT –III

5 MARKS

1. **How to synthesis conine?**
2. **How to synthesis limonone?**
3. **How to synthesis quinine?**
4. **How to synthesis nicotine?**
5. **How to synthesis piperine?**
6. **How to synthesis citral?**
7. **How to synthesis menthol?**
8. **How to synthesis camphor?**

10 MARKS

1. **Discuss the isolation of alkaloids**
2. **Discuss the special isoprene rule**
3. **How to synthesis conine & limonene?**
4. **How to synthesis quinine & nicotine?**
5. **How to synthesis piperine & citral?**
6. **How to synthesis menthol & camphor?**

UNIT – IV

5 MARKS

1. **Give the mechanism for Pinacol – pinacolone rearrangement**

2. **Give the mechanism for Dienone - phenol rearrangement**
3. **Give the mechanism for benzil – benzilic acid rearrangement**
4. **Give the mechanism for Beckmann rearrangement**
5. **Give the mechanism for Hofmann rearrangement**
6. **Give the mechanism for Fries rearrangement**
7. **Give the mechanism for Curtius rearrangement**
8. **Give the mechanism for Claisen rearrangement**
9. **Give the mechanism for Lossen rearrangement**
10. **Give the mechanism for Benzindine rearrangement**

10 MARKS

1. **Give the mechanism for Pinacol – pinacolone rearrangement with evidences**
2. **Give the mechanism for Dienone - phenol rearrangement with evidences**
3. **Give the mechanism for benzil – benzilic acid rearrangement with evidences**
4. **Give the mechanism for Beckmann rearrangement with evidences**
5. **Give the mechanism for Hofmann rearrangement with evidences**

UNIT - V

5 MARKS

1. **Discuss the types of electronic transition**
2. **Write the solvent effects on λmax value**
3. **Give the number and types of fundamental vibrations**
4. **Give the position of IR absorbtion frequencies for organic compounds**
5. **Discuss the factors affecting chemical shift**
6. **Write a note on splitting of signals**

10 MARKS

1. **Discuss the instrumentation of UV-Visible spectroscopy**
2. **Discuss the instrumentation of IR spectroscopy**
3. **Discuss Woodward Fieser rule with examples**
4. **Draw and explain NMR spectrum for EtOH, isopropylbromide and n-propylbromide.**