Biomolecules

Question1

Match List-I with List-II for the following reaction pattern

Glucose $\xrightarrow{\text{Reagent}}$ **Product** $\longrightarrow$ **Structural prediction**

List - I (Reagents)	List-II (Structural prediction)
a. Acetic anhydride	i. Glucose has an aldehyde group
b. Bromine water	ii. Glucose has a straight chain of six carbon atoms
c. Hydroiodic acid	iii. Glucose has five hydroxyl group
d. Hydrogen cyanide	iv. Glucose has a carbonyl group

Choose the correct answer from the options given below.

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Options:

A. a-iv, b-iii, c-ii, d-i

B. a-iii, b-i, c-ii, d-iv

C. a-i, b-ii, c-iii, d-iv

D. a-iii, b-ii, c-i, d-iv

Answer: B

Solution:

The correct matching is:

• a. Acetic anhydride → iii. Glucose has five hydroxyl groups

(all five –OH's get acetylated to give the penta-acetate)

• b. Bromine water → i. Glucose has an aldehyde group

(Br_2/H_2O oxidises the –CHO to –COOH, leaving other –OH's untouched)

• c. Hydroiodic acid → ii. Glucose has a straight chain of six carbon atoms

(HI reduces and cleaves C–C bonds to give n-hexane)

• d. Hydrogen cyanide → iv. Glucose has a carbonyl group

(HCN adds to the C=O to form a cyanohydrin)

So the answer is Option B:

a–iii, b–i, c–ii, d–iv.

Question2

The correct sequence of α-amino acids, hormone, vitamin, carbohydrates respectively is

KCET 2025

Options:

A. Thiamine, Thyroxine, Vitamin A, Glucose

B. Glutamine, Insulin, Aspartic acid, Fructose

C. Arginine, Testosterone, Glutamic acid, Fructose

D. Aspartic acid, Insulin, Ascorbic acid, rhamnose

Answer: D

Solution:

Aspartic acid $\rightarrow \alpha-$ amino acid

Insulin $\rightarrow$ hormone

Ascorbic acid (Vitamin C) $\rightarrow$ Vitamin

Rhamnose (deoxy sugar) $\rightarrow$ Carbohydrate

Question3

Which examples of carbohydrates exhibit $\alpha-$ link, ($\alpha-$ glycosidic link) in their structure?

KCET 2025

Options:

A. Maltose and Lactose

B. Amylose and Amylopectin

C. Cellulose and Glycogen

D. Glucose and Fructose

Answer: B

Solution:

α - links over found in the structure of starch which consists of any lose and amylopectin.

Question4

The type of linkage present between nucleotides is

KCET 2024

Options:

A. phosphoester linkage

B. phosphodiester linkage

C. amide linkage

D. glycosidic linkage

Answer: B

Solution:

Phosphodiester linkage is the type of linkage present between nucleotides in a nucleic acid strand. This linkage involves the formation of a covalent bond between the phosphate group of one nucleotide's 5' carbon and the hydroxyl group of the 3' carbon of the adjacent nucleotide. This connection forms the backbone of DNA and RNA strands. Each phosphodiester linkage contributes to the stability and continuity of the nucleic acid structure, facilitating the polymerization of nucleotides into long chains.

In mathematical terms :

$$\text{Nucleotide}_1 \xrightarrow{\text{phosphodiester link}} \text{Nucleotide}_2$$

This linkage is crucial for the replication and function of genetic material. It contrasts with other types of linkages found in biology, such as glycosidic linkages, which form between sugars and bases in nucleotides, or amide linkages, found in proteins between amino acids.

Question5

$\alpha - D - (+)$-glucose and $\beta - D - (+)$-glucose are

KCET 2024

Options:

A. enantiomers

B. conformers

C. epimers

D. anomers

Answer: D

Solution:

α-D-(+)-glucose and $\beta - \mathrm{D} - (+)$-glucose are called anomers. These are the two cyclic hemiacetal forms of glucose that differ only in the configuration of the hydroxyl group at Cl .

Question6

The female sex hormone which is responsible for the development of secondary female characteristics and participates in the control of

menstrual cycle is

KCET 2024

Options:

A. testosterone

B. estradiol

C. insulin

D. thyroxine

Answer: B

Solution:

The correct answer is **estradiol** (Option B). Estradiol is a form of estrogen, the primary female sex hormone, and it plays a critical role in the development of secondary sexual characteristics in females (such as breast development) as well as regulating various phases of the menstrual cycle.

Question7

Sucrose is dextrorotatory but after hydrolysis the mixture show laevorotation, this is because of

KCET 2023

Options:

A. laevorotation of glucose is more than dextrorotation of fructose.

B. sucrose is a non-reducing sugar.

C. racemic mixture is formed.

D. laevorotation of fructose is more than dextrorotation of glucose.

Answer: D

Solution:

Sucrose exhibits laevorotation upon hydrolysis due to the specific arrangement of its constituent molecules. When sucrose is hydrolysed, it undergoes a chemical reaction that breaks the glycosidic bond, resulting in the formation of glucose and fructose as individual monosaccharides.

Since the rotation of glucose is opposite in sign to that of fructose, their combined effect leads to the observed laevorotation i.e. (laevorotation of fructose is more than dextrorotation of glucose.)

Question8

The correct order of match between column X and column Y is

	X		Y
I.	Vitamin A	i.	Muscular weakness
II.	Vitamin D	ii.	Increased blood clotting time
III.	Vitamin E	iii.	Night-blindness
IV.	Vitamin K	iv.	Osteomalacia

KCET 2023

Options:

A. I-iv, II-iii, III-ii, IV-i

B. I-ii, II-i, III-iii, IV-iv

C. I-iii, II-ii, III-iv, IV-i

D. I-iii, II-iv, III-i, IV-ii

Answer: D

Solution:

The correct match is I-iii, II-iv, III-i, IV-ii.

I. Vitamin A - (iii) Night blindness

II. Vitamin D - (iv) Osteomalacia

III. Vitamin E - (i) Muscular weakness

IV. Vitamin K - (ii) Blood clotting time

Question9

Thyroxine produced in the thyroid gland is an iodinated derivative of

KCET 2023

Options:

A. threonine

B. lysine

C. tyrosine

D. tryptophan

Answer: C

Solution:

Thyroxine, also known as tetraiodothyronine or T_4 is an iodinated derivative of the amino acid tyrosine. It is a hormone produce by the thyroid gland and plays a crucial role in regulating the metabolism and growth in the body.

Question10

Receptors are proteins and crucial to body communication process. These receptors are embedded in

KCET 2023

Options:

A. cell membrane

B. protein

C. endocrine gland

D. chromosomes

Answer: A

Solution:

Receptors are embedded in cell membranes or located intracellularly within cells.

Question11

A nucleic acid, whether DNA or RNA gives on complete hydrolysis, two purine bases, two pyrimidine bases, a pentose sugar and phosphoric acid. Nucleotides which are intermediate products in the hydrolysis contain

KCET 2022

Options:

A. a purine base, pentose sugar and ortho-phosphoric acid

B. purine or pyrimidine base and ortho-phosphoric acid

C. purine or pyrimidine base, a pentose sugar and ortho-phosphoric acid

D. purine or pyrimidine base and pentose sugar

Answer: C

Solution:

Three part of nucleotide are ortho phosphoric acid, pentose sugar and nitrogenous base (purine or pyrimidine base).

Question12

RNA and DNA are chiral molecules, their chirality is due to the presence of

KCET 2021

Options:

A. D-sugar component

B. L-sugar component

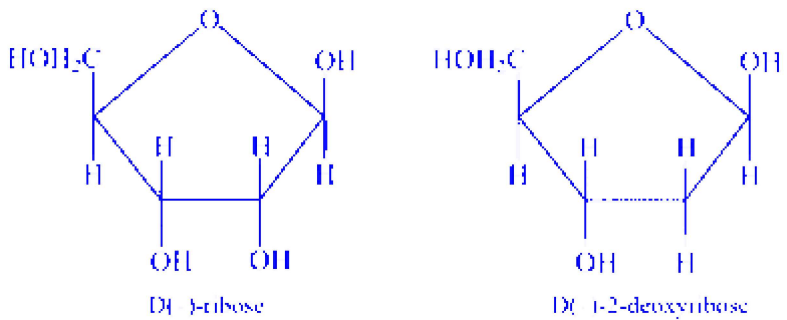
C. chiral bases

D. chiral phosphate ester unit

Answer: A

Solution:

RNA and DNA are chiral molecules, their chirality is due to the presence of D-sugar component.



Question13

Primary structure in a nucleic acid contain 3 bases as GATGC ... The chain which is complementary to this chain is

KCET 2021

Options:

A. G G T G A...

B. TGA A G...

C. C T A C G...

D. TTTAG...

Answer: C

Solution:

Primary structure in a nucleic acid contains bases as GATGC ..... . The chain which is complementary to this chain is CTACG..... .

Question14

Which one of the following vitamins is not stored in adipose tissue?

KCET 2020

Options:

A. A

B. B_6

C. D

D. E

Answer: B

Solution:

Vitamin B_6 is not stored in adipose tissue. It is a water-soluble vitamin, unlike vitamins A, D, and E which are fat-soluble and hence stored in adipose tissue.

Question15

Hypothyroidism is caused by the deficiency of

KCET 2020

Options:

A. vitamin B-12

B. adrenalin

C. thyroxine

D. glucocorticoid

Answer: C

Solution:

Hypothyroidism is caused due to deficiency of thyroxine. Which is normally secreted by thyroid gland and it controls the metabolism of carbohydrates lipids and proteins.

Question16

$C_1 - C_4$ glycosidic bond is not found in

KCET 2020

Options:

A. maltose

B. sucrose

C. lactose

D. starch

Answer: B

Solution:

Sucrose does not contain $C_1 - C_4$ glycosidic linkage as the glycosidic linkage in sucrose is between $C_1 - \alpha$ of glucose and $C_2 - \beta$ of fructose.

Question17

The vitamin that helps in clotting of blood is

KCET 2019

Options:

A. A

B. C

C. B_2

D. K

Answer: D

Solution:

Vitamin K helps in clotting of blood. Low levels of vitamin K can' raise the risk of uncontrolled bleeding. Vitamin A helps the heart, lungs, kidneys and other organs to work properly. Vitamin C helps in the growth, development and repair of all body tissues. Whereas vitamin B_2 helps to break down proteins, fats and carbohydrates.

Question18

In nucleic acids, the nucleotides are joined together by

KCET 2019

Options:

A. Phosphoester linkage

B. Phosphodiester linkage

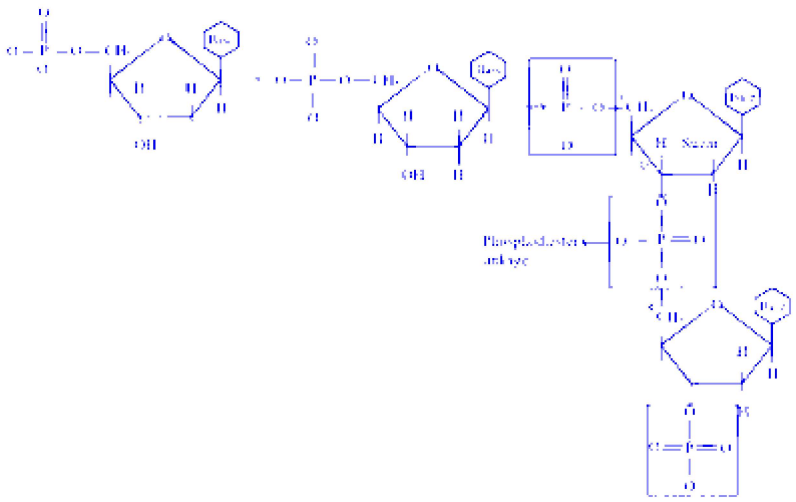
C. Phosphodisulphide linkage

D. Sulphodiester linkage

Answer: B

Solution:

In nucleic acids, the nucleotides are joined together by phosphodiester linkage.



Question19

Which of the following is generally water insoluble?

KCET 2019

Options:

A. Fibrous protein

B. Vitamin-C

C. Amylose

D. Glycine

Answer: A

Solution:

Fibrous proteins are insoluble in water. They have thread like structures in which polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, e.g. keratin and myosin. Vitamin C, amylose and glycine are water soluble.

Question20

Which of the following bases is not present in DNA?

KCET 2018

Options:

A. Adenine

B. Cytosine

C. Guanine

D. Uracil

Answer: D

Solution:

DNA is made up of four nucleotide bases: Adenine, Cytosine, Guanine, and Thymine. In contrast, RNA contains Uracil instead of Thymine. Here's a quick breakdown:

DNA Bases: Adenine, Cytosine, Guanine, Thymine

RNA Bases: Adenine, Cytosine, Guanine, Uracil

Since Uracil is found in RNA and not in DNA, the base that is not present in DNA is:

Option D: Uracil.

Question21

The glycosidic linkage involved in linking the glucose units in amylase part of starch is

KCET 2018

Options:

A. $C_1 - C_4\beta$-linkage

B. $C_1 - C_6\alpha$-linkage

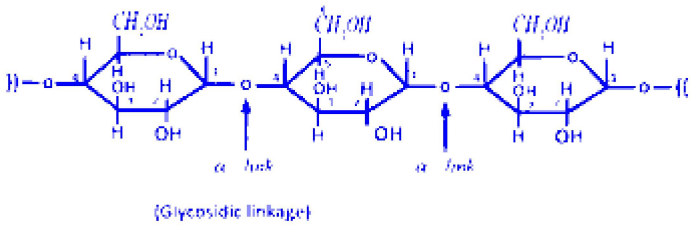
C. $C_1 - C_6\beta$-linkage

D. $C_1 - C_4\alpha$-linkage

Answer: D

Solution:

The glycosidic-linkage involved in amylase is present between C_1 and C_4. It can be shown as follows:



(Glycosidic linkage)

$\therefore$ (d) is the correct option.

Question22

The glycosidic linkage present in sucrose is between

KCET 2017

Options:

A. C – 1 of $-\beta$ glucose and C – 4 of α-glucose

B. C – 1 of α - glucose and C – 4 of β - fructose

C. C − 1 of α - glucose and C − 4 of α-glucose

D. C − 1 of α-glucose and C − 2 of β-fructose

Answer: D

Solution:

In sucrose glycosridic linkage present between $C-1$ of α-glucose and $C-2$ of β-fructose.

Question23

Hormones are secreted by ductless glands of human body. Iodine containing hormone is

KCET 2017

Options:

A. Adrenoline

B. Thyroxine

C. Testosterone

D. Insulin

Answer: B

Solution:

The iodine-containing hormone among the options is:

Option B: Thyroxine

Here's why:

Thyroxine (also known as T4) is produced by the thyroid gland, which is a ductless (endocrine) gland.

It contains iodine atoms (specifically four), which are essential for its biological activity.

The other hormones listed do not contain iodine:

Adrenoline (likely referring to adrenaline) is produced by the adrenal medulla.

Testosterone is produced by the testes.

Insulin is produced by the pancreas.

Thus, thyroxine is the correct answer.

Question24

Pick the wrong statements from the following.

KCET 2017

Options:

A. Deficiency of vitamin B6 (pyridoxime) results in convulsions

B. Sources of vitamin are yeast, milk, green vegetables and cereals

C. deficiency of vitamin D cause xerophthalmia

D. Consumption of citrus fruits and green leafy vegetables in food prevents scurvy

Answer: C

Solution:

Xerophthalmia is medical condition in which the eye fails to produce tear. It may be caused by vitamin A deficiency.

Vitamin D deficiency has associated with rickets.
