

# Class XI Session 2025-26

## Subject - Biology

### Sample Question Paper - 1

Time Allowed: 3 hours

Maximum Marks: 70

#### General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

#### Section A

1. Taxon is a: [1]  
a) Group of living organisms                      b) Ranking  
c) Group of related species                      d) Group of related families
2. What is the main role of skin in human? [1]  
a) Attack                      b) Protection  
c) Thermoregulation                      d) Excretion
3. Proteins are made up of \_\_\_\_\_. [1]  
a) Nucleosides                      b) Monomers  
c) Heteropolymers                      d) Homopolymers
4. The quiescent centre is found in the plant at: [1]  
a) Leaf tip                      b) Root tips  
c) Cambium                      d) Shoot tips
5. A person suffers punctures in his chest cavity in an accident without any damage to the lungs. Its effect could be: [1]  
a) Reduced breathing rate                      b) Rapid increase in breathing rate  
c) No change in respiration                      d) Cessation of breathing
6. Which pigment acts directly to convert light energy to chemical energy? [1]  
a) Carotenoid                      b) Xanthophyll  
c) Chlorophyll b                      d) Chlorophyll a



7. Rahul is anaemic and a few days ago suffered from massive haemorrhage. Now, what problems he may face: [1]
    - a) No glomerular filtration
    - b) All of these
    - c) Accumulation of waste products in body
    - d) Very low blood pressure
  8. Frog shows which kind of excretion? [1]
    - a) Ammonotelic in water and ureotelic on land
    - b) Ammonotelic
    - c) Ureotelic
    - d) Uricotelic
  9. In rosette plants, bolting is due to: [1]
    - a) Cytokinins
    - b) ABA
    - c) Auxins
    - d) Gibberellins
  10. Which one is peat moss? [1]
    - a) Equisetum
    - b) Sphagnum
    - c) Marchantia
    - d) Chara
  11. The epithelial cells of Bowman's capsule are called: [1]
    - a) Filtration slits
    - b) Calyces
    - c) Podocytes
    - d) Slit pores
  12. Regarding the functions of our respiratory system, mark the wrong entry. [1]
    - a) Exchange of gases
    - b) Cleans up the air
    - c) Humidifies the air
    - d) Warms up the air
  13. **Assertion (A):** Mushrooms are called fairy rings. [1]  
**Reason (R):** Mushroom consists of two parts-stipe and pileus.
    - a) Both A and R are true and R is the correct explanation of A.
    - b) Both A and R are true but R is not the correct explanation of A.
    - c) A is true but R is false.
    - d) A is false but R is true.
  14. **Assertion (A):** Asthma is a difficulty in inspiration. [1]  
**Reason (R):** It occurs due to spasm in the bronchioles.
    - a) Both A and R are true and R is the correct explanation of A.
    - b) Both A and R are true but R is not the correct explanation of A.
    - c) A is true but R is false.
    - d) A is false but R is true.
  15. **Assertion (A):** Coenzymes are also called prosthetic groups. [1]  
**Reason (R):** Coenzymes and prosthetic groups are cofactors.
    - a) Both A and R are true and R is the correct explanation of A.
    - b) Both A and R are true but R is not the correct explanation of A.
    - c) A is true but R is false.
    - d) A is false but R is true.
  16. **Assertion (A):** The maximum volume of air a person can breathe in after a forced expiration is called vital capacity. [1]  
**Reason (R):** This includes ERV, TV, and IRV.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

### Section B

17. How are open Vascular bundles differ from closed vascular bundles? [2]
18. Where is the Bidder's canal located and how is it useful in frog? [2]
19. Define hormone and classify them on basis of their chemical nature. [2]
20. List any two difference between anabolism and catabolism. [2]
21. Are the enzymes that catalyze the dark reactions of carbon fixation located inside the thylakoids or outside the thylakoids? [2]

OR

Can girdling experiments be done in monocots? If yes, How? If no, why not?

### Section C

22. What is the basis of classification of algae? [3]
23. Distinguish between the following by giving a main point: [3]
- i. Worm and Snake.
  - ii. Bony fishes and Cartilaginous fishes.
24. What are nucleotides? Describe their structure. [3]
25. "The role of ethylene and abscisic acid is both positive and negative". Justify the statement. [3]
26. Write the difference between red and white muscles. [3]
27. Write the differences between: [3]
- a. Blood and Lymph
  - b. Open and Closed system of circulation
  - c. Systole and Diastole
  - d. P-wave and T-wave

OR

What is :

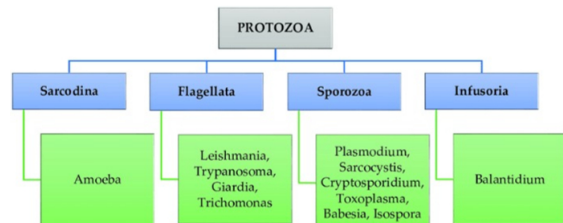
- i. blood,
  - ii. Serum?
28. i. Where are ceruminous glands present? What is their functional significance? [3]
- ii. Explain any two functions of cerebrospinal fluid in humans.

### Section D

29. **Read the following text carefully and answer the questions that follow:** [4]
- Sarcodines are unicellular/jelly-like protozoa found in fresh or sea water and in moist soil. Their body lacks a periplast. Therefore, they may be naked or covered by a calcareous shell. They usually lack flagella and have temporary protoplasmic outgrowths called pseudopodia. These pseudopodia or false feet help in movement and capturing prey. They include free-living forms such as Amoeba or parasitic forms such as Entamoeba. Zoo flagellates ciliates and I sporozoans are other groups of protozoan protists. They are all unicellular and



heterotrophic. They may be holozoic, saprobic or parasitic.



- i. Write two lines about flagellated protozoans and also mention some flagellated protozoans. (1)
- ii. Observe the given protozoan classification and mention what is the basis of protozoan classification. (1)
- iii. Mention some locomotory organs of protozoa. (2)

**OR**

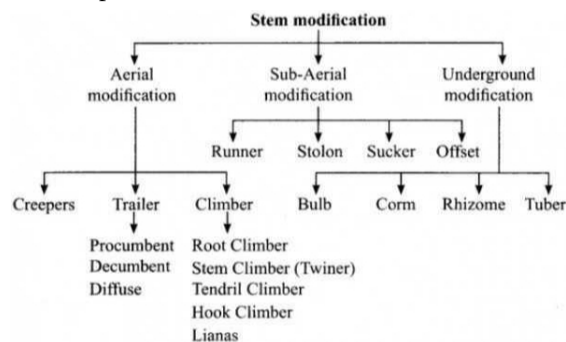
Which protozoan group has two nuclei, macronucleus, and micronucleus? Mention characteristics of it. (2)

30. **Read the following text carefully and answer the questions that follow:**

**[4]**

Various parts of the plant such as stems leaves, and even fruits are modified into underground parts to perform various functions such as stems, leaves, and even fruits.

The stems in ginger and banana are underground and swollen due to storage of food. They are called rhizome. Rhizome of ginger is a modification of stem because it bears nodes, internodes, terminal buds, scaly leaves and buds, which give rise to aerial shoots. It is not a root because root does not have nodes and internodes. Also, rhizome does not perform the function of roots i.e. anchorage and absorption, rather it serve as reservoir for storage of food. Similarly, corm is an underground stem in Colocasia (jimikand) The tips of the underground stem in potato become swollen due to accumulation of food and forms tuber.



- i. Observe the given flow chart and mention what are the four types of Underground stem modification also mention one example of each. (1)
- ii. Ginger is an underground stem but why it is distinguished from a root? (1)
- iii. Why do the tips of modified stems in potatoes become swollen? (2)

**OR**

Are all underground parts of a plant roots? (2)

### Section E

31. Distinguish anaphase of mitosis from anaphase I of meiosis.

**[5]**

**OR**

Briefly describe the significance of cell division.

32. Describe the pentose phosphate pathway.

**[5]**

**OR**

Describe briefly the main steps on glycolysis from triose phosphate onwards. Highlight the reactions which release energy.

33. What structural and functional attributes must a cell have to be called a living cell?

**[5]**

**OR**

Give the factors that govern the size of the cell.

# Solution

## Section A

1.  
**(b) Ranking**  
**Explanation:**  
Each category in the taxonomic hierarchy represents the rank and is commonly termed as a taxon. Hence, the correct option is Ranking.
2.  
**(b) Protection**  
**Explanation:**  
The skin is one of the largest organs in the body in surface area and weight. The skin consists of two layers: the epidermis and the dermis. Beneath the dermis lies the hypodermis or subcutaneous fatty tissue. The skin has three main functions: protection, regulation, and sensation.
3.  
**(c) Heteropolymers**  
**Explanation:**  
Proteins are made of building blocks which are different. Proteins are heteropolymers made of amino acids.
4.  
**(b) Root tips**  
**Explanation:**  
A quiescent centre is a small group of cells with low mitotic activity. It is found at the tips of growing roots in the root meristem.
5.  
**(d) Cessation of breathing**  
**Explanation:**  
The movement of air into and out of the lungs is carried out by creating a pressure gradient between the lungs and the atmosphere. The pressure within the lungs is less than the atmospheric pressure so there is a negative pressure in the lungs with respect to atmospheric pressure.  
If there is a puncture in the chest, there would be very less or no pressure gradient in the lungs which may cause cessation of breathing.
6.  
**(d) Chlorophyll a**  
**Explanation:**  
Chlorophyll a converts solar energy to chemical energy in the form of carbohydrates.
7.  
**(b) All of these**  
**Explanation:**  
If the anaemic person suffered from massive haemorrhage, the problem he may face includes very low blood pressure, accumulation of wastes products in the body, and no glomerular filtration in the kidney.



8.  
(c) Ureotelic  
**Explanation:**  
Excretion of urea as metabolic waste is known as Ureotelism. Animals secreting urea are called ureotelic. Frog is ureotelic.
9.  
(d) Gibberellins  
**Explanation:**  
Gibberellins also promote bolting (internode elongation just prior to flowering) in beet, cabbages, and many plants with rosette habit.
10.  
(b) Sphagnum  
**Explanation:**  
Sphagnum is also known as peat moss as it provides peat that has long been used as fuel.
11.  
(c) Podocytes  
**Explanation:**  
Podocytes are cells in the Bowman's capsule in the kidneys that wrap around capillaries of the glomerulus. The Bowman's capsule filters the blood, retaining large molecules such as proteins while smaller molecules such as water, salts, and sugars are filtered as the first step in the formation of urine.
12.  
(b) Cleans up the air  
**Explanation:**  
Our respiratory system humidifies the air, warms up the air, and helps in the exchange of gases. However, the respiratory system does not clean up the air.
13.  
(b) Both A and R are true but R is not the correct explanation of A.  
**Explanation:**  
The basidiocarps or mushrooms often lie in rings. Therefore, these are also known as fairy rings. Each basidiocarp consists of two parts-stipe and pileus. The stipe or stalk is fleshy while, the pileus is an umbrella-like cap of the mushroom.
14. (a) Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Both A and R are true and R is the correct explanation of A.
15.  
(d) A is false but R is true.  
**Explanation:**  
Cofactor may be inorganic or organic in nature. Organic cofactors are of two types, coenzymes and prosthetic groups. Coenzymes are easily separable nonprotein organic cofactors. Prosthetic groups are nonprotein organic cofactors firmly attached to apoenzymes (protein part of enzyme).
16. (a) Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Both A and R are true and R is the correct explanation of A.

#### Section B

17. **Open Vascular bundles:** These vascular bundles contain a strip of cambium in between phloem and xylem. Open vascular bundles are collateral and bicollateral.



**Closed Vascular bundles:** Intrafascicular cambium is absent. Closed vascular bundles can be collateral or concentric.

18. Bidder's canal is present in the kidney of a frog. It communicates with the ureter, which leaves the kidney near its end and opens into the cloaca.
19. **Hormone:** It is a regulatory substance produced in an organism and transported in tissue fluids such as blood or sap to stimulate specific cells or tissues into action.

**Hormones on the basis of chemical nature:**

- i. Steroid Hormones
- ii. Amine Hormones
- iii. Peptide Hormones
- iv. Protein Hormones
- v. Glycoprotein Hormones

20. Difference between anabolism and catabolism are:

Anabolism	Catabolism
It is the sum total of constructive processes.	It is the sum total of destructive processes.
Energy is stored.	Energy is released.

21. The stroma contains enzymes which are capable of utilizing ATP and NADPH<sub>2</sub> to produce carbohydrate during the dark reaction.

The carbon fixation occurs in the stroma by a series of enzymes catalysed steps which are located outside the thylakoids (in stroma) and not inside the thylakoids.

OR

Girdling experiments cannot be done in monocots. The stem of monocot has vascular bundles scatter all over the width of the stem. Hence, we cannot reach a specific band of phloem for girdling.

### Section C

22. The main basis of classification of algae is the presence or absence of pigments, which impart an algae its colour.

Chlorophyceae contains chlorophyll a and b, giving it the green colour and the name blue-green algae'.

Phaeophyceae contains chlorophyll a and c and fucoxanthin. The fucoxanthin gives it the brown colour and hence the name "brown algae'.

Rhodophyceae contains chlorophyll a and d and phycoerythrin. The phycoerythrin gives the distinct red colour and hence the name 'red algae'.

23. **Difference between Worm and Snake:**

Worm	Snake
Elongated animals, Scales, and shields absent.	Limbs absent. Scales. Scales and shields are absent.
It includes Platyhelminthes, aschelminthes and Annelida worms.	They are included in reptilia
Limbs absent. Setae absent.	They lay eggs.

**Difference between Bony Fishes and Cartilaginous fishes:**

Bony fishes	Cartilaginous fishes
Endoskeleton is bony. e.g. Clarias.	Endoskeleton is cartilaginous. e.g. dogfish.
Their exoskeleton is made up of cycloids (thin bony plates), aligned based on whether the outer edges are spiny or smooth.	Their exoskeleton is made of placoid (very small denticles coated with lots of sharp enamel)
They fertilize their eggs externally.	Their mode of fertilization is through internal mechanisms.

24. **Nucleotides:** They are small, complex molecules made of C, H, O, N, P. Each nucleotide consists of 3 units: a **nitrogenous base**, a **pentose sugar**, and **phosphate groups**. The nitrogenous base is a **purine** (adenine or guanine) or **pyrimidine** (thymine/cytosine/ uracil). The sugar may be ribose in ribonucleotide or deoxyribonucleotide. Combination of a nitrogenous base and a pentose sugar forms a **nucleoside**. Nucleotides are mono or di or triphosphates of nucleosides, e.g., Adenosine monophosphate (AMP), Adenosine diphosphate (ADP) and Adenosine triphosphate (ATP).

25. **Ethylene** is a gaseous hormone. It influences the horizontal growth of seedlings and promotes senescence and abscission of leaves. It is effecting in fruit ripening. It causes **epinasty** also.

**Abscisic acid (ABA)** is essential for the regulation of abscission and dormancy of bud. It acts as a growth inhibitor. It has a role in



abscission of leaves and bud dormancy. It inhibits seed germination.

So the role of ethylene and ABA is both positive and negative also.

26. **Red and White Muscles.** Muscle contains a red coloured oxygen storing pigment called myoglobin. Myoglobin content is high in some of the muscles which gives a reddish appearance. Such muscles are called the Red fibres. These muscles also contain plenty of mitochondria which can utilize the large amount of oxygen stored in them for ATP production. These muscles, therefore, can also be called aerobic muscles.

On the other hand, some of the muscles possess very less quantity of myoglobin and therefore, appear pale or whitish. These are the White fibres. Number of mitochondria are also few in them, but the amount of sarcoplasmic reticulum is high. They depend on anaerobic process for energy.

27. a. Blood contains RBCs and hence can transport gases. Lymph doesn't contain RBCs and cannot transport gases. Lymph mainly contains WBCs and play a role in the immune system of the body.
- b. The Open Circulatory System is a system in which fluid (called hemolymph) in a cavity called the hemocoel bathes the organs directly with oxygen and nutrients and there is no distinction between blood and interstitial fluid this combined fluid is called hemolymph or haemolymph. The cardiovascular systems of humans are closed, meaning that the blood never leaves the network of blood vessels.
- c. Systole is the contraction of heart muscle and diastole is the dilatation of the heart muscle.
- d. Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart. The P-wave represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole. The T-wave represents the return of the ventricles from excited to normal state (repolarisation). The end of the T-wave marks the end of systole.

OR

- i. **Blood:** It is specialised kind of living fluid connective tissue of opaque red colour of alkaline reaction and salty in taste. Its specific gravity is 1.050-1.060. The blood contains a fluid part of the plasma, and the solid part the corpuscles.
- ii. **Serum:** is the name given to blood plasma which has its protein fibrinogen removed. In this form, the plasma cannot clot, so it can be stored in hospital blood banks for transfusions in emergencies.
28. i. **Ceruminous Glands:** These glands are present in external auditory meatus.
- Their functional significance:**
- a. Function as **flypaper traps** for the insects and dust etc.
- b. They secrete **wax** which provides **protection** against infections.
- ii. a. It protects the brain and spinal cord. It acts as a cushion jolts to ANS.
- b. Excretion of excretory waste.

#### Section D

29. i. Flagellated protozoans are either free-living or parasitic protozoans that have flagella. Sleeping sickness is caused by parasitic versions of the parasite. Trypanosoma is a good example.
- ii. • Locomotion
- Protozoan are eukaryotic having different shapes and sizes. Some are ciliated flagellated or both may be absent.
- iii. a. Cilia
- b. Flagella
- c. Pseudopodia

OR

Ciliata has two nuclei, macronucleus, and micronucleus.

Ciliates are characterized as organisms propelled by rows of cilia and possessing two types of nuclei. They are a large macronucleus involved in vegetative functions of the organism, and a small micronucleus involved in sexuality.

30. i. • Rhizome - Ginger, turmeric, Banana
- Bulb - Tulips, Lilies, Daffodils, Onion, Garlic
- Corm - Colocasia, Yam, Saffron
- Tuber - Potato, Artichokes
- ii. It has nodes and internodes. Such nodes and internodes are not found in the roots.
- iii. Modified stem in the potato is underground and it becomes swollen because food gets accumulated to form tubers.

OR





No. Many different parts of plants, like the stem, leaves and fruits, get modified to act as underground structures that can perform functions other than those of roots.

### Section E

31.	<b>Anaphase of mitosis</b>	<b>Anaphase I of meiosis</b>
	The centromere of every chromosome divides.	The centromere does not divide.
	Separation of sister chromatids takes place.	Homologous chromosomes are separated.
	Only one chromatid of every chromosome moves to the pole. The number and types of chromosomes at each pole is the same as in the parent nucleus. Chromosomes are single-stranded	Each homologous pair of chromosomes moves to the pole with both the chromatids. chromosomes are double-stranded
	The chromatids moving to one pole are genetically identical to those moving to the opposite pole.	The chromosomes moving to one pole are not genetically identical to those moving to the opposite pole.

OR

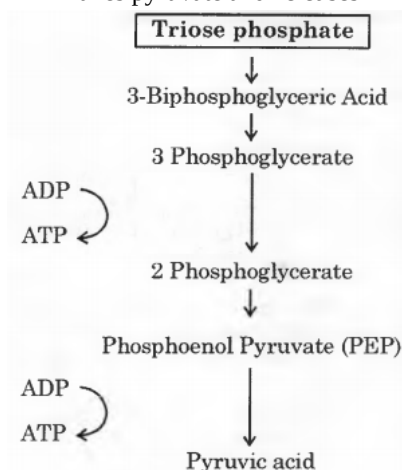
Cell division is significant in the following ways

- Cell multiplication:** Cell division is a means of cell multiplication or the formation of new cells from pre-existing cells.
  - Continuity:** It maintains continuity of living matter generation after generation.
  - Multicellular organisms:** The body of a multicellular organism is formed of innumerable cells. They are formed by repeated divisions of a single cell or zygote. As the number of cells increases, many of them begin to differentiate, form tissues and organisms.
  - Cell size:** Cell division helps in the maintenance of a particular cell size which is essential for efficiency and control of cell activities.
  - Genetic similarity:** The common type of cell division or mitosis maintains the genetic similarity of all the cells in an individual despite being different, i.e., structurally and functionally.
32. **Pentose Phosphate Pathway:** The glucose is broken down into  $\text{CO}_2$  and water during aerobic respiration. It is the principal pathway of respiration. Oxidation of glucose also takes place by another pathway called the pentose phosphate pathway. In this pathway, glucose 6-phosphate (6C) produced during the early stages of glycolysis (photosynthates produced during photosynthesis are oxidized to give rise to 6-phosphogluconate). The reaction occurs in the presence of the enzyme called **glucose-6-phosphate dehydrogenase**. It generates NADPH. The 6-phosphogluconate molecule is again oxidized by the enzyme. **6-phosphogluconate dehydrogenase**. After this one molecule, each of ribulose-5-phosphate, carbon dioxide, and NADPH are formed. Ribulose-5-phosphate undergoes many changes to produce intermediates like glyceraldehyde-3-phosphate and fructose-6-phosphate. All these reactions occur in the cytoplasm of the cells.

OR

Two moles of triose phosphate are **interconvertible**. They are dihydroxyacetone phosphate and 3-bi phosphoglyceraldehyde. 3-phosphoglyceraldehyde is converted into 1, 3, bi phosphoglycerate and  $\text{NAD}^+$  is reduced to NADH. Phosphoglycerate kinase catalyses the formation of 3-phosphoglycerate and **ATP is produced**. 3-phosphoglycerate is converted into 2-phosphoglycerate and PEP.

PEP makes pyruvate and **releases ATP**.



33. A cell must have the following structural and functional attributes to be called a living cell:

- i. **Plasma Membrane:** A cell should have a plasma membrane. Without the plasma membrane, the contents of the cell cannot get a container and cells won't be able to maintain its independent existence.
- ii. **Functional Attributes of Plasma Membrane:** The plasma membrane should be selectively permeable so as to facilitate the exchange of materials between the cell and its environment.
- iii. **Protoplasm:** A cell must have a protoplasm to be called a living cell. It is the protoplasm which contains all the materials necessary for life to continue. If protoplasm dries up, the cell becomes dead; as in the case of sclerenchymatous cells.
- iv. **Endoplasmic Reticulum:** Endoplasmic reticulum is necessary for the exchange of materials between nucleoplasm and cytoplasm. It is also necessary for the synthesis of various materials; like protein and lipid. Thus, a cell must have an ER to be considered a living cell.

Mitochondria are not mandatory for all living cells. For example; Red Blood Cells do not have mitochondria yet they are living cells. The prokaryotes do not have mitochondria but they are living cells.

The nucleus is not mandatory for all living cells. For example; mitochondria lack a nucleus. Similarly, prokaryotic cells lack a nucleus. Another important aspect of cells is that a cell is always formed from a pre-existing cell; as proposed in the Cell Theory.

OR

**Factor Governing Cell Size:** Like all other living things, cells have a definite age and a maximum size. This process of cell division goes on in the body all the time. It is on this account, the cells do not grow beyond a certain size and limit.

Surface	Volume ratio
A	6: 1
B	3 : 1
C	2 : 1

Volume ratio decreases with the increase in size. The size of the cell is co-related to the functions it performs.

Surface: Volume ratio decreases with the increase in size. The size of the cell is co-related to the functions it performs. As cell increases in volume, its surface area is increased (not to some extent). The volume determines the chemical activity of the cells per unit of time. The surface area determines the amount of absorption as well as the amount of release of waste products by cells. As the living cell grows, its rate of waste product formation and the need for intake of substances from the outside increases at a faster rate than that of the surface area. The small size of the cells of the large/bigger organisms compensates the disproportionate increase in volume and surface area of the cells. The cells are tiny structures. They are small in volume to maintain a large surface area to volume ratio.