CBSE
Class XI Biology
Sample Paper – 8

Time: 3 hrs **Total marks: 70**

General instructions:

1. All questions are compulsory.
2. The question paper consists of four sections A, B, C and D.
3. Internal choice is given in all the sections. A student has to attempt only one of the alternatives in such questions.
4. Section A contains 5 questions of 1 mark each.
5. Section B has 7 questions of 2 marks each.
6. Section C is of 12 questions of 3 marks each.
7. Section D has 3 questions of 5 marks each.
8. Wherever necessary, the diagrams drawn should be neat and properly labelled.

SECTION A

1. Why are urochordates also called tunicates? [1]

OR

What are parapodia? State their function.

2. Why is a neem leaf called pinnately compound? [1]

3. Name the polymer of fructose. [1]

4. What are the requirements needed for the chemiosmotic synthesis of ATP in chloroplasts? [1]

OR

What is an LHC? Where is it present?

5. Which glands secrete sebum? [1]

SECTION B

6. Why are bryophytes called amphibians of the plant kingdom? [2]

7. Mention any two types of vacuoles found in animal cells along with their functions. [2]

8. How does the partial pressure of O_2 (pO_2) and CO_2 (pCO_2) affect the binding and dissociation of carbaminohaemoglobin? [2]

9. What is emphysema? What causes it? [2]

OR

Amylase is secreted by two glands. Name them. What is the action of amylase on food?

10. Write any two peculiar features of parasitic Platyhelminthes. [2]

11. List any two differences between fibrous roots and adventitious roots. [2]

OR

Draw a diagram of mango indicating the arrangement of its pericarp. Describe its pericarp in short.

12. What is crossing over? Name the enzyme responsible for it. [2]

SECTION C

13. Distinguish between intracellular and extracellular digestion. [3]

14. How many hearts are found in earthworm? Give their location in the body of the earthworm. [3]

OR

Describe the exoskeleton of cockroach.

15. Draw a neat diagram of the digestive system of frog. [3]

16. What is meant by modification of root? What type of modification of root is found in [3]

i. Banyan tree
ii. Turnip
iii. Mangrove trees

17. Giving an example, describe the different types of amino acids based on the number of carboxyl and amino groups in them. [3]

OR

Draw the structures of

a. Cholesterol
b. Uracil
c. Triglyceride

18. [3]

i. What are nuclear pores? Mention their function.
ii. What is interkinesis?

19. [3]

i. Describe the primary structure of protein.

ii. Name the sugars present in nucleic acids.

20. What is glycolysis? Name the two monosaccharides which readily enter the glycolytic pathway. [3]

21. What is oxidative phosphorylation? Name the enzyme involved in this process and its location. [3]

22. Describe the dentition found in an adult human. [3]

OR

What is succus entericus? State its role.

23. What is the importance of plasma proteins? [3]

OR

Diffusion of gases occurs in the alveolar region only and not in the other parts of the respiratory system. Why?

24. A cyclic process occurs in C_3 plants which is light dependent and needs O_2. This process does not produce energy but rather consumes energy. [3]

(a) Name the given process.

(b) What are the end products of this process?

(c) Where does it occur?

SECTION D

25. Describe the internal structure of a dorsiventral leaf with the help of labelled diagrams. [5]

OR

i. Draw a diagram to show the Hatch–Slack pathway.

ii. Name two plants in which the C_4 pathway occurs.

iii. What is the first stable product of the C_4 cycle?

26. [5]

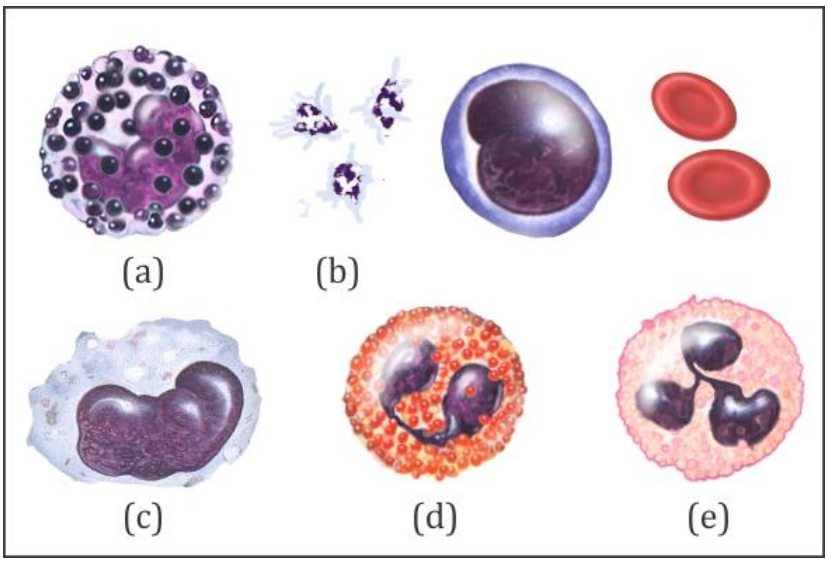
i. What is a reflex arc?

ii. Name the components of the reflex pathway.

iii. Draw a diagram to show the knee-jerk reflex.

OR

Study the blood cells carefully shown in the figure and answer the following questions:



i. Name the various types of blood cells labelled as (a), (b), (c), (d) and (e).

ii. Give one important function of each.

27. Explain polarisation and depolarisation of the membrane of a nerve fibre. [5]

OR

(a) Expand MSH. Where is it synthesised in the human body? Mention its function.

(b) How does the thymus gland or thymosin play a major role in the development of immunity?

CBSE
Class XI Biology
Sample Paper – 8 Solution

SECTION A

1. Urochordates are also called tunicates because the adult body is enclosed within a leathery test or tunic formed of a cellulose-like organic substance termed tunicin.

OR

Parapodia are lateral appendages. They help in locomotion.

2. A neem leaf is pinnately compound because its lamina is completely broken up into distinct segments or leaflets which are separately articulated at the base.

3. Insulin

4. It requires a membrane, a proton pump, a proton gradient and the enzyme ATPase.

OR

LHC is light harvesting complex. It is present in both photosystem I and photosystem II.

5. Sebaceous glands (wax glands)

SECTION B

6. Bryophytes are called amphibians of the plant kingdom because they live in soil but require an external layer of water for their existence so that the male gametes can swim and reach the archegonia.

7.

i. In *Amoeba*, the contractile vacuole is involved in excretion and osmoregulation.
ii. In protists, food vacuoles contain digestive enzymes which help digest nutrients.

8. When pCO_2 is high and pO_2 is low as in the tissue, more binding of carbon dioxide with haemoglobin occurs, whereas when the pCO_2 is low and pO_2 is high as in the alveoli, dissociation of CO_2 from carbaminohaemoglobin takes place.

9. Emphysema is inflation or abnormal distension of the bronchioles or alveolar sacs of the lungs. As the alveolar septa collapse, the surface area for gas exchange is greatly reduced.

Causes of emphysema:

i. Cigarette smoking
ii. Inhalation of other smoke or toxic substances over a period of time

OR

- Amylase is secreted by salivary glands and pancreas.
- Salivary glands secrete saliva which contains salivary amylase into the buccal cavity and converts starch to maltose.
- The pancreas secretes pancreatic juice containing pancreatic amylase into the duodenum. It acts on starch and breaks it into maltose.

10. Features of parasitic Platyhelminthes:

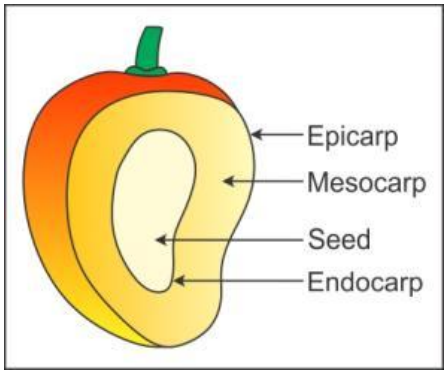
- They have a thick cuticle.
- They lack an alimentary canal and absorb the nutrients directly through their body surface.
- They even show the presence of hooks and suckers.

11. Differences between fibrous roots and adventitious roots:

Fibrous roots	Adventitious roots
1. They arise from the radicle which becomes repeatedly branched and a tuft of roots arise from the base of the stem.	1. They arise from any part of the plant, other than the radicle.
2. They are meant for anchorage and absorption.	2. They serve functions like storage, climbing and respiration.
3. They are characteristic of grasses.	3. They are found in a variety of plants.
4. They are usually present below the soil.	4. They may be underground or aerial.

OR

In mango, the pericarp is well differentiated into an outer thin epicarp, a middle fleshy edible mesocarp and an inner endocarp which is stony and hard.



12. Crossing over is the phenomenon of exchange of equivalent segments between non-sister chromatids of homologous chromosomes during prophase I of meiosis.
The enzyme recombinase is involved in the phenomenon of crossing over.

SECTION C

13.

Intracellular Digestion	Extracellular Digestion
(i) It occurs within the cells. (ii) Only a few enzymes are associated with this digestion. (iii) It occurs in unicellular organisms and some lower organisms.	(i) It occurs outside the cells in the cavity of the alimentary canal. (ii) A large number of digestive glands and enzymes are associated with this digestion. (iii) It occurs in multicellular organisms.

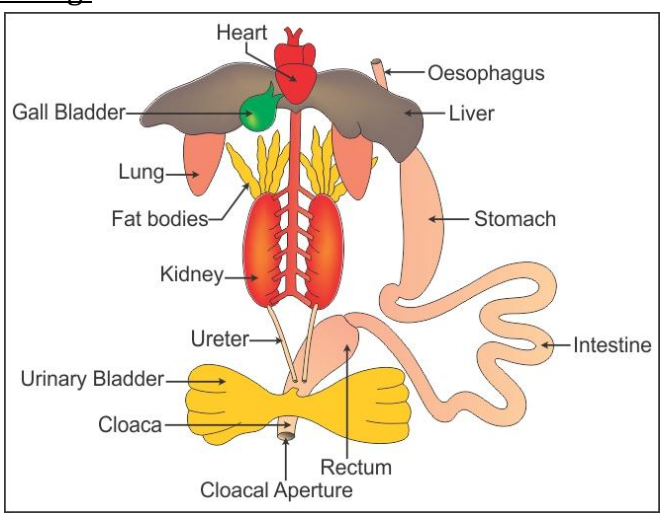
14. In earthworm, four pairs of tubular hearts are present.
The anterior two pairs of the hearts known as the lateral hearts lie in the 7^{th} and 9^{th} segments, while the posterior pairs called latero-oesophageal hearts are situated in the 12^{th} and 13^{th} segments.

OR

Exoskeleton of cockroach:

- In cockroach, the exoskeleton is hard, chitinous and brown.
- It is made of hardened plates called sclerites.
- The sclerites present on the dorsal side are called tergites, and the ones present on the ventral side are sternites.
- Tergites and sternites are joined to one another by a flexible, articular membrane called the arthrodial membrane.

15. Digestive system of frog:



16. Modification of the root is a change in the shape, size, structure and normal functioning of the root to perform some secondary functions or a particular adaptation.

(a) Banyan tree: In banyan trees, long roots develop from branches which go deep down to reach the ground to provide additional mechanical support to the banyan tree. This modification is called a prop root.

(b) Turnip: In turnip, the root is modified to store extra food. This modification is called napiform fleshy tap root.

(c) Mangrove trees: The roots of mangrove trees get modified into pneumatic structures to provide additional oxygen to the plant. This modification of roots is called respiratory roots or pneumatophores.

17. Based on the number of amino and carboxyl groups, amino acids are of the following types:

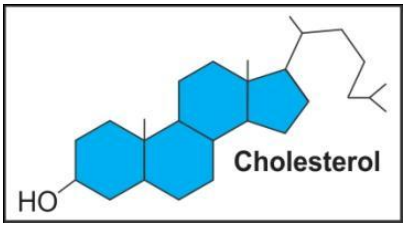
i. Acidic amino acids: These amino acids have an extra carboxylic group. Examples: Glutamic acid and aspartic acid

ii. Basic amino acids: They have an additional amino group without forming amides. Examples: Arginine and lysine

iii. Neutral amino acids: These amino acids have one amino group and one carboxylic group. Examples: Glycine and valine

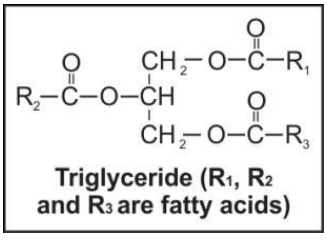
OR

a. Cholesterol



b. Uracil

c. Triglyceride



18.

i. At several places, the nuclear envelope is interrupted by minute pores formed by the fusion of its two membranes; these pores are referred to as nuclear pores.
The nuclear pores serve as the passage for the movement of RNA and protein molecules in both directions between the nucleus and the cytoplasm.

ii. Interkinesis is the short phase between meiosis I and meiosis II.

19.

i. <u>Primary structure of protein:</u>
   - The primary structure of protein gives positional information or information about the sequence of amino acids.
   - The left end of the protein chain is represented by the first amino acid (i.e. the N-terminal amino acid) and the right end is represented by the last amino acid (i.e. the C-terminal amino acid).

ii. Ribose and deoxyribose

20. Glycolysis is the process of partial oxidation of glucose or a similar hexose sugar into two molecules of pyruvic acid through a series of ten enzyme-mediated reactions.
The two monosaccharides are glucose and fructose which readily enter the glycolytic pathway.

21. It is the synthesis of energy-rich ATP molecules with the help of energy liberated during oxidation of reduced coenzyme (NADH, $FADH_2$) produced in respiration.
The enzyme required for this synthesis is called ATP synthase (Complex V).
ATP synthase is located in F_1 or the headpiece of the F_0–F_1 or elementary particle which is present in the inner mitochondrial membrane.

22. Human beings have diphyodont (two sets of teeth—milk or deciduous and permanent), thecodont (teeth are embedded in sockets of the jaw bones) and heterodont teeth (different type of teeth).
An adult human has 32 permanent teeth which are of four different types—incisors (I), canines (C), premolars (PM) and molars (M).
The arrangement of teeth in each half of the upper and lower jaw in the order I, C, PM, M is represented by the dental formula.
The dental formula in human beings is <u>2123</u>.

OR

- The mucus secreted by the goblet cells of the intestinal mucosal epithelium and the secretions of the brush border cells of mucosa are together called succus entericus.
- Enzymes present in the succus entericus act on the products formed during digestion, i.e. dipeptides, disaccharides, monoglycerides and nucleosides, to form simple absorbable products.

23. The major plasma proteins are fibrinogens, globulins and albumins.

Importance of plasma proteins:

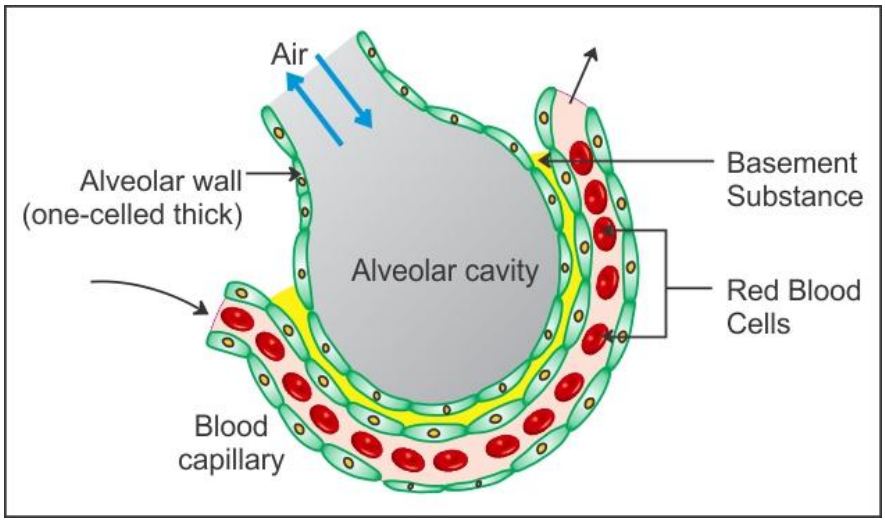
i. Fibrinogens help in the clotting or coagulation of blood.

ii. Globulins, also called immunoglobulins, are involved in the defence mechanisms of the body.

iii. Albumins and globulins retain water and thus help in maintaining the osmotic balance.

OR

Alveoli are the primary sites of exchange of gases. The alveolar region has enough pressure gradient to facilitate diffusion of gases. Other regions of the respiratory system do not have the required pressure gradient. Also, the membrane of the alveoli is thin enough to facilitate the exchange of gases in a convenient manner.



24.

(a) Photorespiration

(b) Glycerate and carbon dioxide

(c) Photorespiration occurs in the stroma of chloroplasts, peroxisomes and mitochondria.

SECTION D

25. Dorsiventral (dicotyledonous) leaf:

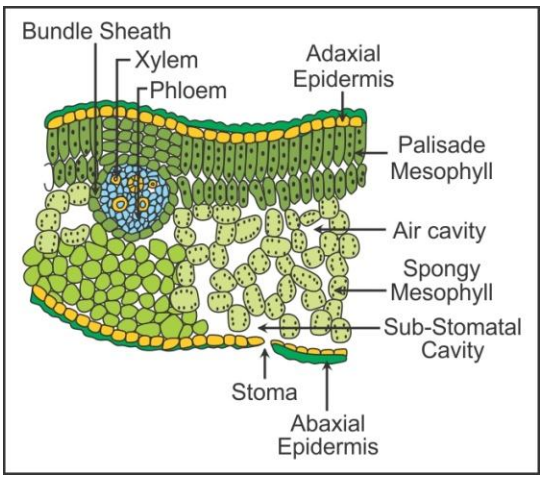
The vertical section of a dorsiventral leaf through the lamina shows three main parts—epidermis, mesophyll and vascular system.

i. Epidermis: The epidermis has two parts:

(a) Upper or adaxial epidermis: It is a single layer composed of a row of compactly arranged parenchyma cells which possesses a thick cuticle on the outer surface of the upper (adaxial) epidermis. Stomata are generally absent in this layer.

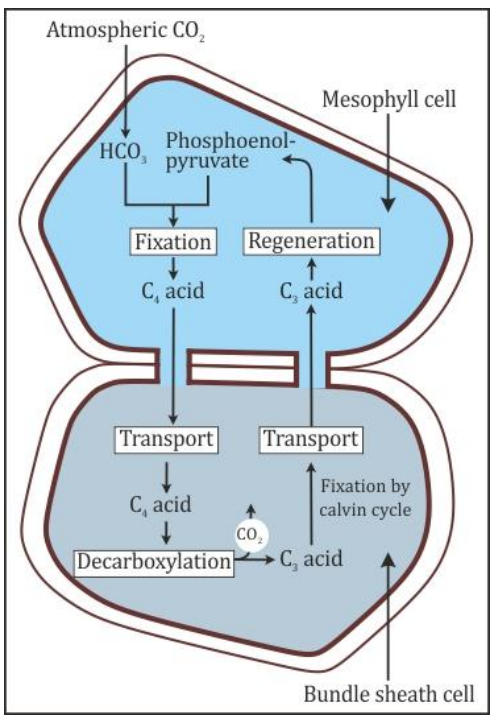
(b) The lower or abaxial epidermis bounds the leaf on the lower surface and bears stomata.

ii. Mesophyll: The tissue between the upper and lower epidermis is called the mesophyll. It possesses chloroplasts and carries out photosynthesis. It has two types of cells—palisade parenchyma and spongy parenchyma. The palisade parenchyma is made of elongated cells which are arranged vertically and parallel to each other. The oval or round and loosely arranged spongy parenchyma is situated below the palisade cells and extends to the lower epidermis. There are numerous large spaces and air cavities between these cells.



iii. Vascular system: It is made of several vascular bundles of varying sizes depending on the venation. These are found at the boundary between the palisade and spongy regions. Each vascular bundle is surrounded by a sheath of compactly arranged parenchyma cells called bundle sheath. The xylem lies towards the upper side of the leaf, while the phloem is found towards the lower surface.

1.



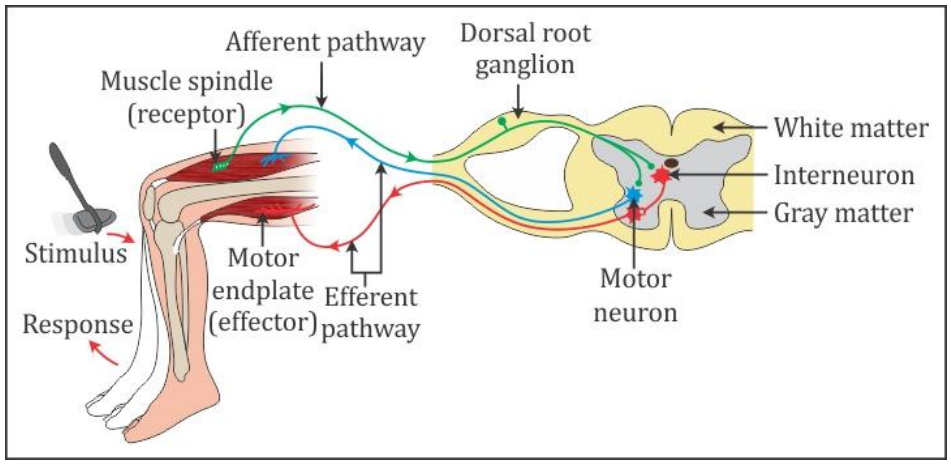
2. Maize and sugarcane
3. Oxaloacetic acid

26.

i. The path followed by the stimulus up to eliciting a response in a reflex action is called the reflex arc.

ii. The reflex pathway comprises the following components:
   (a) Specific receptor
   (b) Afferent neuron
   (c) Intermediate or relay neuron
   (d) Efferent neuron
   (e) Effector organ

iii.



OR

i.
   (a) Basophil
   (b) Blood platelets
   (c) Monocyte
   (d) Eosinophil
   (e) Neutrophil

ii. Functions:
   (a) Basophils release histamine and heparin into the blood.
   (b) Blood platelets help in blood clotting.
   (c) Monocytes are phagocytic in action and engulf bacteria and cellular debris.
   (d) Eosinophils have antihistamine properties.
   (e) Neutrophils are phagocytic. They engulf microbes.

27. Polarisation of the membrane of a nerve fibre:

- At rest, the axon membrane is more permeable to potassium ions than to sodium ions.
- It is impermeable to sodium ions, negatively charged protein and chloride ions.
- The interior/axoplasm is negatively charged and the ECF/exterior is positively charged.
- There exists a potential difference across the membrane, and hence, the membrane is said to be polarised.
- The potential difference across the membrane is called resting potential.

Depolarisation of the membrane of a nerve fibre:

- The electrical potential difference which occurs across the membrane of an axon when stimulated by a threshold stimulus is called depolarisation.
- The membrane becomes more permeable to sodium ions than to potassium ions.
- The potential difference in the stimulated/depolarised membrane is called action potential.
- The action potential spreads like a wave along the axon membrane in the form of an impulse or spike.

OR

(a) MSH stands for melanocyte-stimulating hormone.
It is synthesised in the pars intermedia of adenohypophysis.
MSH acts on the melanocytes of the skin and regulates the pigmentation of the skin.

(b) Thymosin plays a major role in the differentiation of T-lymphocytes which provide cell-mediated immunity.
They promote production of antibodies for humoural immunity.