CBSE
Class XI Biology

Time: 3 hrs **Total marks: 60**

General instructions:

1. All questions are compulsory.
2. This question paper consists of five sections A, B, C, D and E. Section **A** contains **5** questions of **one** mark each, Section **B** is of **4** questions of **two** marks each, Section **C** is of **11** questions of **three** marks each, Section **D** is of **1** question of **four** marks and Section **E** is of **2** questions of **five** marks each.
3. There is no overall choice. However, an internal choice has been provided in **one** question of **2** marks, **one** question of **3** marks and two questions of **5** marks weightage. A student has to attempt only one of the alternatives in such questions.
4. Wherever necessary, the diagrams drawn should be neat and properly labelled.

SECTION A

1. What is the grass-green colour of green algae due to? [1]

2. What is the function of the ciliated epithelium in the human body? [1]

3. What are dyads? [1]

4. Name the enzyme which catalyses the phosphorylation of glucose. [1]

5. Where are the taste buds located in our tongue? [1]

SECTION B

6. Mention any four features present in animals grouped under Phylum Mollusca. [2]

7. Describe the 9+2 pattern of organisation in the axoneme of cilia/flagella. [2]

OR

Give the specific scientific terms for the following:

(a) Cluster of ribosomes found in the cytoplasm.

(b) Extensive infoldings of the inner membrane of mitochondria.

(c) Stacks of closely packed thylakoids.

(d) Stalked particles on the inner membrane of the mitochondria.

8. In what form do plants absorb magnesium from the soil? List any two magnesium deficiency symptoms observed in leaves. [2]

9. Why does the colour of a leaf kept in the dark frequently become yellow or pale green? Which pigment do you think is more stable? [2]

SECTION C

10. Angiosperms and gymnosperms are seed-producing plants. Although what we eat from Pinus plants (Chilgoza) are called dry fruits, they are not fruits. [3]

(a) Why are fruits not formed in gymnosperms?

(b) What are the two types of seeds found in Angiosperms with reference to the number of cotyledons? Give one example of each.

(c) What value do we learn from these differences?

11. Differentiate between brush-bordered epithelium and ciliated epithelium. [3]

12. Mention the special features of eye in cockroach. [3]

13. How is the study of plant anatomy useful to us? [3]

14. Describe the primary structure of proteins. [3]

15. Write any two characteristics of mitochondria and draw a labelled diagram of it.

OR

What are nuclear pores? Write their functions.

16. List the main differences between mitosis and meiosis. [3]

17. Explain the apoplastic movement of water in plants. [3]

18. How is ubiquinone reduced in the electron transport system? Where is it located? [3]

19. List the three major forms in which carbon dioxide is transported in our blood. [3]

20. Because of some physiological reasons, the blood glucose level of an otherwise normal person has shot up above normal. How will this condition be returned to normal through hormone action? [3]

SECTION D

21. Read the passage and answer the questions which follow:

Harish and his father went to see Mr Sharma who was not keeping well for some time. After reaching Mr Sharma's home, they came to know that he had been hospitalised for a kidney transplant after a renal failure. [4]

i. What is renal failure?
ii. What are the causes of renal failure?
iii. What is meant by kidney transplant?
iv. What human value is reflected in a kidney transplant?

SECTION E

22. Explain why? [5]

(a) Exogenous application of auxin fails to enhance the growth of intact plants.
(b) Vitamins are not considered plant growth hormones.
(c) It is appropriate to call a short-day plant a long-night plant.
(d) Plants belonging to halophytes and growing in marshy lands face great difficulty in germination.
(e) Gibberellins do not enhance the growth of isolated plant parts.

OR

(a) With the help of well-labelled diagrams, describe the process of plasmolysis in plants, giving appropriate examples.
(b) Explain what will happen to a plant cell if it is kept in a solution with higher water potential.

23. Briefly describe the structure of an eye with the help of a diagram. [5]

OR

i. What is meant by double circulation? Illustrate with the help of a diagram.
ii. What is its significance?

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Solution

SECTION A

1. It is due to the predominance of the pigments chlorophyll a and b.

2. The function of cilia in ciliated epithelium is to maintain a flow of mucus or liquid or suspended particles constantly in one direction.

3. Dyads are the two cells formed after meiosis I.

4. Hexokinase

5. Taste buds are located in the papillae on the upper surface of the tongue.

SECTION B

6. Features of Phylum Mollusca:

i. They have an organ system level of organisation.
ii. The body is covered with a calcareous shell.
iii. Gills are meant for respiration.
iv. The body is divided into head, muscular foot and visceral hump.

7. The core of the cilia/flagella called axoneme has nine pairs of doublets of radially arranged peripheral microtubules and a pair of centrally located microtubules. Such an arrangement of axonemal microtubules is referred to as the 9+2 arrangement.

The core of the cilia/flagella has a supporting axial shaft or axoneme in which the microtubules are arranged in the 9+2 (11-stranded) arrangement. In such an arrangement, nine pairs of doublets of microtubules are arranged peripherally and a pair of microtubules is arranged centrally.

OR

(a) Polyribosomes or polysomes
(b) Cristae
(c) Grana
(d) Oxysomes or elementary particles

8. Magnesium is absorbed by plants in the form of Mg^{2+}
The two magnesium deficiency symptoms include
i. Interveinal chlorosis with purple anthocyanin pigmentation appearing first in older leaves.
ii. Chlorotic areas may turn necrotic.

9. The colour of a leaf kept in the dark frequently becomes yellow or pale green because the chlorophyll is degraded and there is no formation of chlorophyll. Carotenoid pigments are more stable.

SECTION C

10.
(a) There is no fruit formation in gymnosperms because they lack an ovary.
(b) Seeds are
i. Dicotyledonous (with two cotyledons). Examples: Pea, bean
ii. Monocotyledonous (with one cotyledon). Example: Onion
(c) Differences will always exist among individuals; appreciate and bear with them.

11.

Brush-bordered Epithelium	Ciliated Epithelium
i. The cells bear microvilli on their free surface. ii. The microvilli increase the area of absorption. iii. Example: Columnar epithelial cells	i. The cells bear cilia on their free surface. ii. Cilia maintain the flow of mucus, liquid or suspended particles constantly in one direction. iii. Examples: Cuboidal and columnar epithelial cells

12.
i. Two large black-coloured, kidney-shaped, compound eyes are located on the dorsal side of the head.
ii. Each eye is composed of a large number of visual elements called ommatidia.
iii. Ommatidia help a cockroach to receive several images of an object. Such vision is called mosaic vision. It has more sensitivity and less resolution.

13. The study of plant anatomy is useful in many ways:

i. The study helps us understand the way a plant functions carrying out its routine activities such as transpiration, photosynthesis and growth and repair.

ii. It helps botanists and agriculture scientists to understand the disease and cure for plants.

iii. The study of plant anatomy helps in solving various problems related to taxonomy, phylogeny, food adulteration, archaeology and manufacture of various wood products.

14. It is the description of the basic structure of a protein.

In this, the protein exists as a long chain of amino acids arranged in a particular sequence; such a polypeptide is non-functional.

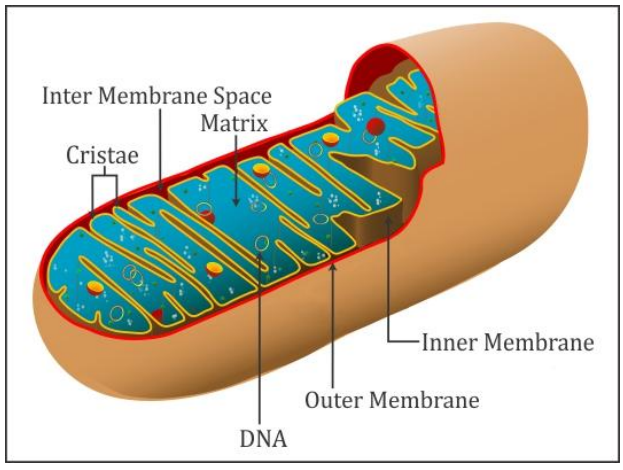
The positional information of amino acids in a protein is given by the primary structure of the protein. In this chain, the amino acid at the left end is the first amino acid (usually methionine), while the one at the right end is the last amino acid of the protein.

The first amino acid is called the N-terminal amino acid and the last is called the C-terminal amino acid.

15. Characteristics:

(a) They are cylindrical-shaped cell organelles which have finger-like folds in the inner membrane called cristae.

(b) Mitochondria are semi-autonomous due to the presence of their own DNA and ribosomes.



OR

Nuclear pores are the pores or perforations which occur at several places in the nuclear envelope.

Functions:

i. They maintain the shape of the nucleus.

ii. These nuclear pores are the passages through which movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm.

iii. They preserve the stability of genetic material by protecting it from respiratory breakdown which occurs in the cytoplasm.

16. Difference between mitosis and meiosis:

Mitosis	Meiosis
1. Takes place in somatic cells.	1. Takes place in gametic cells.
2. Two daughter cells are formed in the end.	2. Four daughter cells are formed in the end.
3. The number of chromosomes remains the same in daughter cells as compared to that in parent cells.	3. The number of chromosomes is halved in daughter cells as compared to that in parent cells.

17. In apoplastic movement of water, water moves through the cell wall but does not enter the cell sap. Thus, the movement of water is continuous except at the casparian strips. This flow occurs due to adhesive and cohesive forces of water molecules. Water does not enter the cell membrane or cytoplasm during this process.

18. Ubiquinone receives the electrons after its oxidation by NADH dehydrogenase (Complex I). It also receives reducing equivalents through $FADH_2$ which is generated during oxidation of succinate through the activity of succinate dehydrogenase (Complex II). This leads to reduction of ubiquinone to ubiquinol. Ubiquinone is located in the inner mitochondrial membrane.

19. Carbon dioxide is transported in three forms in our blood:

i. In the dissolved form in the plasma
ii. In the form of bicarbonates
iii. As carbaminohaemoglobin

20. The secretion of glucagon will be suppressed and insulin will be secreted in response to the high glucose level in blood. It acts on hepatocytes and adipocytes, and enhances cellular glucose uptake and utilisation. As a result, there is a rapid movement of glucose from the blood to hepatocytes and adipocytes, resulting in decreased blood glucose levels (hypoglycemia).

SECTION D

21.

i. Partial or total inability of the kidneys to carry out excretory and salt and water regulatory functions is known as renal failure.
ii. Many factors can cause renal failure. These include tubular injury, infection, electrolyte depletion, intrarenal precipitation of calcium and urates, and drug reaction.
iii. It involves grafting of a kidney from a compatible donor to restore kidney functions in a recipient suffering from kidney failure.
iv. The donor helps by donating a kidney to a needy patient.

SECTION E

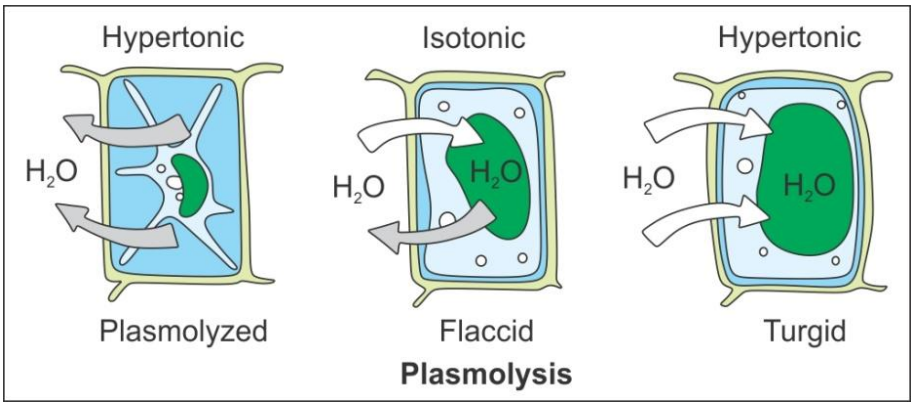
22.

(a) Auxin fails to cause growth of intact plants because the required amount of auxin is already present in such plants and they do not need an external supply of auxins.
(b) Vitamins have no specific influence on the growth of plants. They are essential dietary factors needed by an organism in small amounts. They influence the growth and metabolism through direct nutritive effects.
(c) Short-day plants need a long and uninterrupted dark period for flowering. Therefore, it is appropriate to call a short-day plant a long-night plant.
(d) Plants belonging to halophytes and growing in marshy lands face difficulty in seed germination due to the presence of a high concentration of salt in water. These plants solve this problem by vivipary.
(e) Gibberellins require the presence of meristematic cells to cause elongation growth. Therefore, they do not enhance the growth of isolated plant parts if meristematic cells are absent.

OR

(a) Plasmolysis is the shrinkage of the protoplast from the cell wall under the influence of a hypertonic solution.

If a plant cell is placed in a highly concentrated sugar or salt solution, water from the cell sap flows out due to exosmosis through the plasma membrane outside the cell. This causes contraction or shrinkage of the protoplast. Because the cell wall has very less elasticity, it cannot keep pace with the contraction of the plasma membrane. Ultimately, the protoplasm separates from the cell wall and assumes a spherical shape. This condition is called plasmolysis.



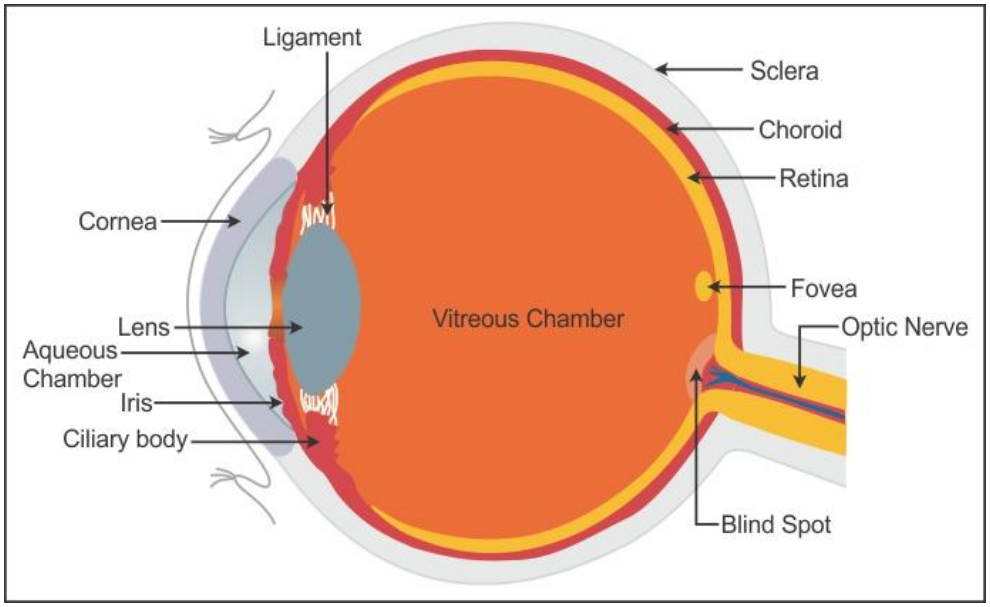
(b) Higher water potential occurs in a hypotonic or dilute solution. A plant cell present in such a solution will absorb water due to endosmosis. It will become turgid or swollen. The swollen protoplast develops a wall pressure which becomes equal to the water potential of the system which causes the endosmosis to stop.

23. Structure of eye: The human eye is a hollow, spherical structure. Its wall consists of three coats—the outer fibrous coat, the middle vascular coat and the inner nervous coat.

i. Fibrous coat: It consists of sclera and cornea.
   (a) Sclera covers most of the eye ball and contains many collagen fibres. It protects and maintains the shape of the eye ball.
   (b) Cornea is a transparent portion which forms the anterior one-sixth of the eyeball. It is vascular and absorbs oxygen from the air.

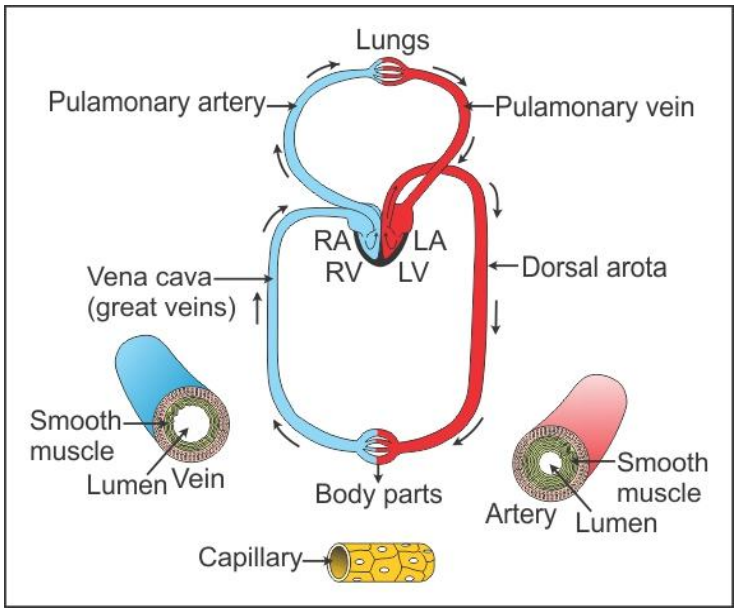
ii. Vascular coat: It comprises the choroid, the ciliary body and the iris.
   (a) The choroid lies adjacent to the sclera and contains numerous blood vessels which supply nutrients and oxygen to the other tissues, especially retina. It also contains pigmented cells which absorb light.
   (b) The ciliary body extends towards the inner side of the eye from the choroid coat. It is composed of ciliary muscles and ciliary processes. The ciliary processes secrete aqueous humour. The ciliary muscles are smooth muscles and are of two types—circular and meridional.
   (c) The iris is a circular muscular diaphragm containing pigments which give colour to an eye. It has an opening in the centre called the pupil.

iii. Nervous coat: It consists of the retina. The retina is a very delicate coat and lines the whole of the vascular coat. Its external surface is in contact with the choroid and its inner surface with the vitreous humour. It contains three layers of cells—ganglion cells, bipolar cells and photoreceptor cells. There are two types of photoreceptor cells—rods and cones. Rods contain the pigment rhodopsin and cones contain the pigment iodopsin. Rods are sensitive to dim light, whereas cones are sensitive to bright light. Colours can be seen with the help of cone cells. A small, yellowish area of the retina which lies exactly opposite to the centre of the cornea is called macula lutea or yellow spot. It has a depression at its centre called fovea centralis which has cone cells only. The point on the retina from where the optic nerves starts is called the blind spot. It lacks receptor cells and is insensitive to light.



OR

i. A circulatory system in which blood travels twice through the heart in one complete cycle of the body is called double circulation. It includes systemic and pulmonary circulations. The flow of blood from the heart to all the parts of the body and deoxygenated blood from the various parts of the body to the heart is called systemic circulation. The flow of deoxygenated blood from the heart to the lungs and the return of oxygenated blood from the lungs to the heart is called pulmonary circulation.



ii. Significance of double circulation:
(a) It prevents mixing of oxygenated and deoxygenated blood.
(b) There is optimum utilisation of oxygen because of this type of system.