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. Why are animals of Aschelminthes called roundworms? [1]

2. When do you refer to a vascular bundle as a closed bundle? [1]

3. What is the feature of a metacentric chromosome? [1]

4. Name the reduced form of ubiquinone. [1]

5. Which is the major site for the production of RBCs? [1]

SECTION B

6. What are mycorrhizae? How does it benefit the plant? [2]

7. What are plasmids? What characters do they confer to the bacteria? [2]

OR

Differentiate between prosthetic group and coenzyme.

8. Describe the two ways by which transport of oxygen takes place in the blood. [2]

9. Amylase is secreted by two different glands. Name them. What is the action of amylase on food? [2]

SECTION C

10. If both gymnosperms and angiosperms bear seeds, then why are they classified separately? [3]

11. Distinguish between adipose and blood tissues. [3]

12. Answer the following with reference to the anatomy of a dicot root: [3]

i. Where is the pericycle located?
ii. How are xylem vessels arranged?
iii. What do you call such an arrangement?

13. What are the following and where do you find them in the animal body? [3]

i. Chondrocytes
ii. Axons
iii. Ciliated epithelium

14. What is the significance of meiosis? [3]

15. What are leucoplasts? Mention their types. [3]

16. What is a mesosome in a prokaryotic cell? Mention the functions which it performs. [3]

17. Differentiate between glycolysis and fermentation. [3]

18. What are bulliform cells? Mention their important function. [3]

OR

(a) Mention the four special features of C_4 plants.
(b) What do you understand by mass or the bulk flow system?

19. Explain briefly the structure and function of human middle ear. [3]

20. Give the full form of FSH. Name the gland which secretes it. How does it differ in its function in a male and a female? What stops its secretion in a female? [3]

SECTION D

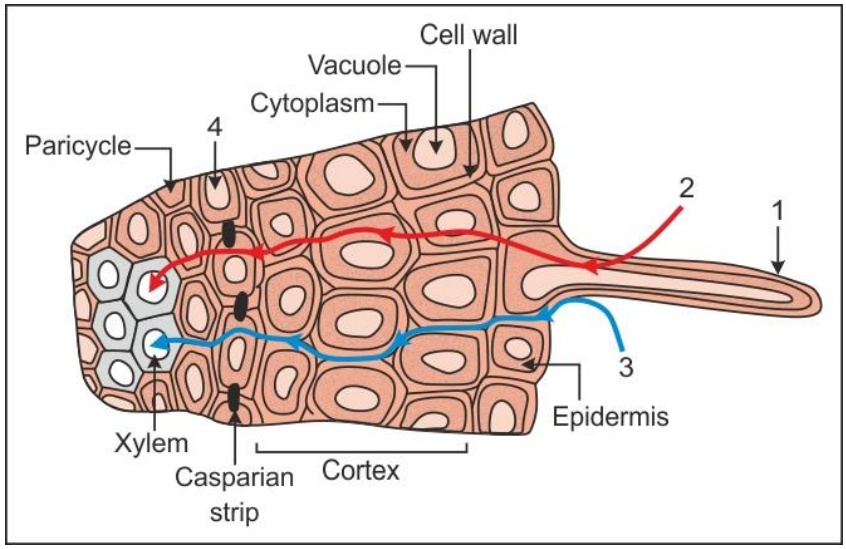
21. Read the passage and answer the questions which follow: [4]

Pranav's grandfather advised the children to sit under a green tree to beat the heat during summer days. Pranav followed his advice and found that the temperature under a tree was much lower than that inside the house. He asked his grandfather the reason. His grandfather explained that it is due to the phenomenon of transpiration.

i. What is transpiration?
ii. What is the significance of transpiration?
iii. What are the factors which affect transpiration?
iv. What value is displayed by the grandfather?

SECTION E

22. A portion of the transverse section of root is shown in the diagram. Label 1 to 4 and also write the function of parts 1 and 4. Briefly explain the pathways 2 and 3. [5]



OR

(a) Draw a labelled diagram of the Calvin cycle.
(b) Why is the Calvin cycle named so?
(c) Name the phases of the Calvin cycle.

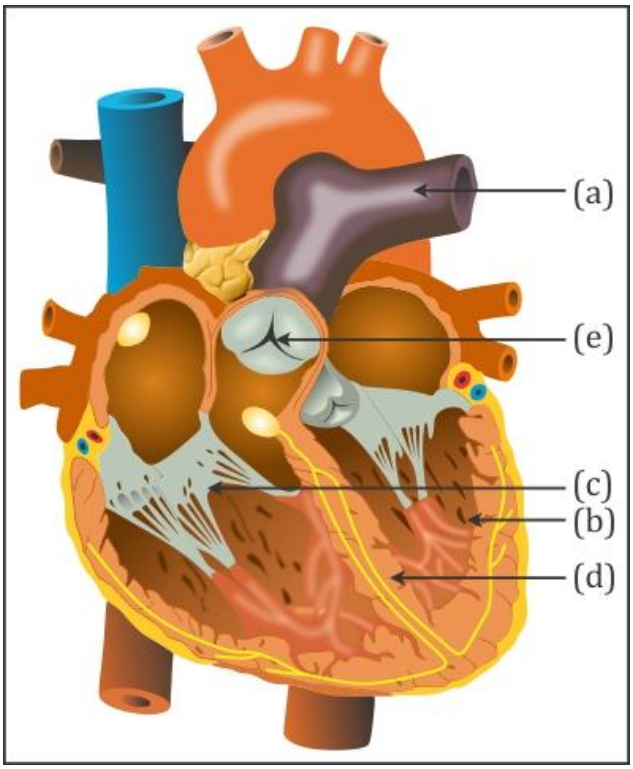
23. Briefly describe the structure of the human eye. [5]

OR

The figure of the internal structure of the mammalian heart is provided. Carefully study it and answer the following questions:

i. Name the parts labelled as a, b, c, d and e.

ii. Give one important function of each of these parts.



CBSE
Class XI Biology
Solution

SECTION A

1. They are called roundworms because their body is circular in cross-section.

2. When the vascular bundle lacks cambium, it is referred to as closed.

3. Metacentric chromosome has the centromere at the centre and the two arms are equal in length.

4. Ubiquinol

5. Bone marrow

SECTION B

6. The mutually beneficial or symbiotic association of a fungus with the root of a higher plant is known as mycorrhiza.
The plant is immensely benefited from the association with the fungus. Fungal hyphae take part in the absorption of water, dissolving essential minerals present in the organic debris and handling over the same to plant, absorbing inorganic salts present in the soil and producing various growth promoting substances. The fungus in return is dependent on the higher plant for shelter and food.

7. In addition to the genomic DNA, many bacteria have small circular DNA outside the genomic DNA. These are called plasmids.
Plasmid DNA confers certain unique characters such as resistance to antibiotics, fertility factor etc.

OR

Prosthetic Group	Coenzyme
(i) It is a non-protein group attached firmly to an apoenzyme. (ii) It requires a single apoenzyme for picking up and transferring a group. Example: Haem	(i) It is a non-protein group attached loosely to complex macromolecules with three-dimensional structures. (ii) It requires different apoenzymes for picking up and transferring a group. Examples: NAD+, NADP+

8. Oxygen in the blood is transported in the following two ways:

i. As dissolved gas: About 1–3% of oxygen is transported by blood in dissolved form in the plasma of blood.

ii. As oxyhaemoglobin: About 97–99% of oxygen is transported in chemical combination with haemoglobin in the red blood cells.

9. Amylase is secreted by salivary glands and pancreas.

Salivary glands secrete saliva which contains salivary amylase into the buccal cavity and converts starch into maltose.

The pancreas secretes pancreatic juice containing pancreatic amylase into the duodenum. It acts on starch and breaks it into maltose.

SECTION C

10. Gymnosperms and angiosperms are classified separately because of the following reasons:

i. The ovules are naked in gymnosperms but are enclosed inside the ovary in angiosperms.

ii. In gymnosperms, the wood is non-porous, i.e. the vessels are absent. In angiosperms, the wood is porous, i.e. the vessels are present.

iii. In gymnosperms, the endosperm is haploid and is formed before fertilisation and double fertilisation is absent, whereas in angiosperms, the endosperm is triploid and formed after double fertilisation.

11.

Adipose Tissue	Blood Tissue
(i) It is a loose connective tissue. (ii) The matrix has fibres. (iii) It is storage and metabolism of fats.	(i) It is a fluid connective tissue. (ii) The matrix does not have any fibre. (iii) It is meant for circulation of various substances and respiratory gases.

12.

i. The pericycle is positioned just inner to the endodermis.

ii. The protoxylem elements are towards the external surface, while the metaxylem elements are found towards the core.

iii. Such an arrangement of xylem is called exarch.

13.

i. Chondrocytes are cells of cartilage. These are large, rounded, mature cells occurring in groups in the matrix of the cartilage. The cartilage is found in the pinna, tip of the nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in the adults.
ii. Axon is the tail-like structure of a neuron. Each axon is a long, cylindrical process of the nerve cell. It arises from the cyton and conducts nerve impulses away from the cell body. It ends in a group of branches called terminal arborisations. These are present in the entire body.
iii. Ciliated epithelium consists of cells which bear fine, vibratile cytoplasmic processes called cilia on its free surface. Cilia help to trap and clear dust and foreign particles. It is found in the inner lining of bronchioles, urinary tubules of the kidneys, nasal passage, oviducts, ventricles of the brain etc.

14. Significance of meiosis:

i. Formation of gametes: Meiosis produces gametes for sexual reproduction.
ii. Crossing over: It introduces new combination of traits or variations.
iii. Maintenance of chromosome number: Meiosis reduces the number of chromosomes to half in the gametes so that fertilisation may restore the original diploid number in the zygote.

15. The leucoplasts are the colourless plastids of varied shaped and size with stored nutrient.

There are three types of special leucoplasts:

i. Amyloplasts: These are starch-containing leucoplasts.
ii. Elaioplasts: These are colourless plastids which store fat.
iii. Aleuroplasts: These plastids contain protein.

16. A mesosome is a membrane complex formed by infolding of the plasma membrane in prokaryotic cells. If a mesosome is attached to the nucleoid, it is called septal mesosome. A mesosome free from the nucleoid is called lateral mesosome. The lateral mesosome is rich in respiratory enzymes and thus takes part in respiration. The septal mesosome takes part in separation of daughter nucleoids, formation of the plasma membrane for rapid elongation and formation of the septum.

17.

Glycolysis	Fermentation
(i) It is the first step of respiration which occurs without requirement of oxygen and is common to both aerobic and anaerobic modes of respiration. (ii) Glycolysis produces pyruvic acid. (iii) It produces two molecules of NADH per glucose molecule.	(i) It is anaerobic respiration or respiration which does not require oxygen. (ii) Fermentation produces different products. The common ones are ethanol (and CO_2) and lactic acid. (iii) It generally utilises NADH produced during glycolysis.

18. Bulliform cells are modified, large, empty and colourless adaxial epidermal cells along the veins found in the leaves of grasses. They are also called motor cells.

Functions: When the bulliform cells have absorbed water and are turgid, the leaf surface is exposed. When they are flaccid due to water stress, they make the leaves curl inwards to minimise water loss.

OR

(a) Special features of C_4 plants:

i. They have a special type of leaf anatomy (Kranz anatomy).
ii. They tolerate higher temperatures.
iii. They show a response to high light intensities.
iv. They lack a process called photorespiration and thus have greater productivity of biomass.

(b) Mass flow is the movement of substances in bulk from one point to another as a result of pressure differences between the two points.

19. The middle ear consists of the tympanic cavity.

The tympanic cavity is filled with air and connected with the nasopharynx through the Eustachian tube (auditory tube).

Inside the cavity are present a small flexible chain of three small bones called ear ossicles—the malleus (hammer-shaped), the incus (anvil-shaped) and the stapes (stirrup-shaped).

The malleus is attached to the tympanic membrane on one side and to the incus on the inner side.

The incus in turn is connected with the stapes, which is attached to the oval window of the inner ear.

20. FSH – Follicle-stimulating hormone

It is secreted by the anterior pituitary.

In males, it stimulates spermatogenesis along with androgens. In females, it stimulates the growth of ovarian follicles and the secretion of estrogens.

A high oestrogen level stops the secretion of FSH in females.

SECTION D

21.

i. The loss of water in the form of vapours from the living tissues of aerial parts of the plant is termed transpiration.

ii. It controls the rate of absorption of water as well as upward movement of water and minerals.

iii. Atmospheric humidity, temperature, light and wind velocity are some of the factors affecting transpiration.

iv. The grandfather advised young children to enjoy the benefits of eco-friendly solutions in daily life.

SECTION E

22.

i. 1. Root hair, 4. Endodermis

Function of parts 1 and 4:

(a)

1. Root hair: The root hair are unicellular elongations of epidermal cells. Each root hair is about 0.05–15 mm long and 10 μ wide. It has a central vacuole filled with cell sap which determines the osmotic relations of the cell. Root hair are specialised for absorption of water.
4. Endodermis: It is the inner boundary of the cortex and is single layered. It is made of barrel-shaped cells which do not enclose intercellular spaces. Endodermis is called the starch sheath in stems. The major function of endodermis in roots is to prevent the loss of water and minerals.

ii. Pathway 2 – Symplast

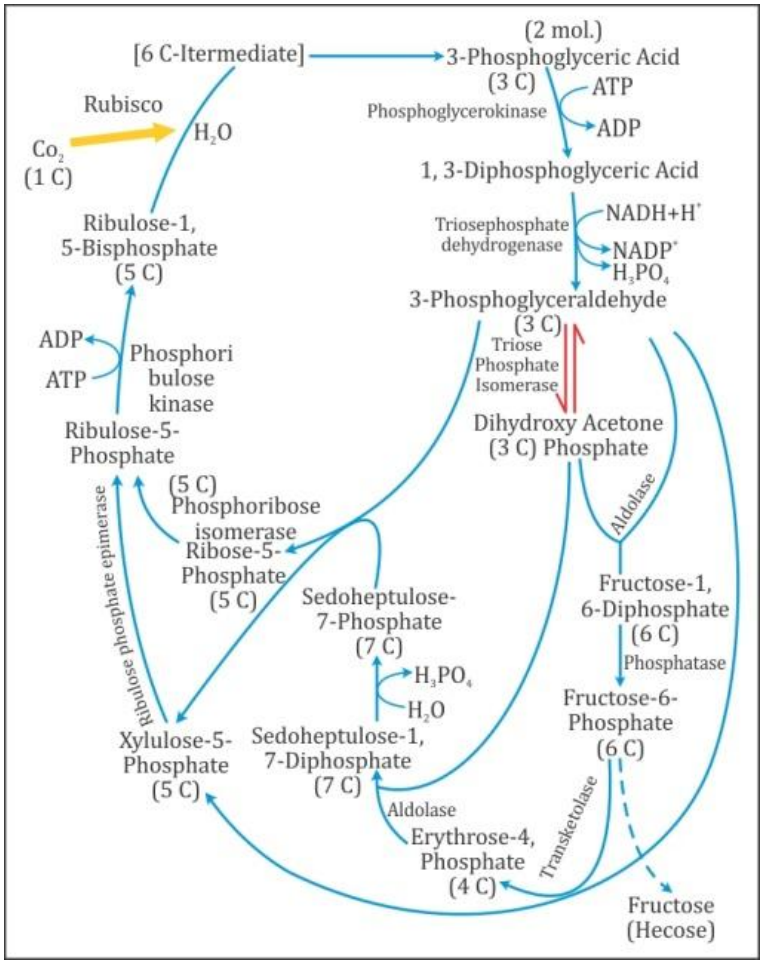
In this pathway, water moves from cell to cell through the living cytoplasm and plasmodesmata.

Pathway 3 – Apoplast

In apoplast, movement of water takes place through non-living cell walls and intercellular spaces.

OR

(a)



(b) The path of carbon in the dark reaction was traced by Melvin Calvin through a technique called autoradiography using 14C; hence, it is termed the Calvin cycle.

(c) The Calvin cycle consists of three phases:

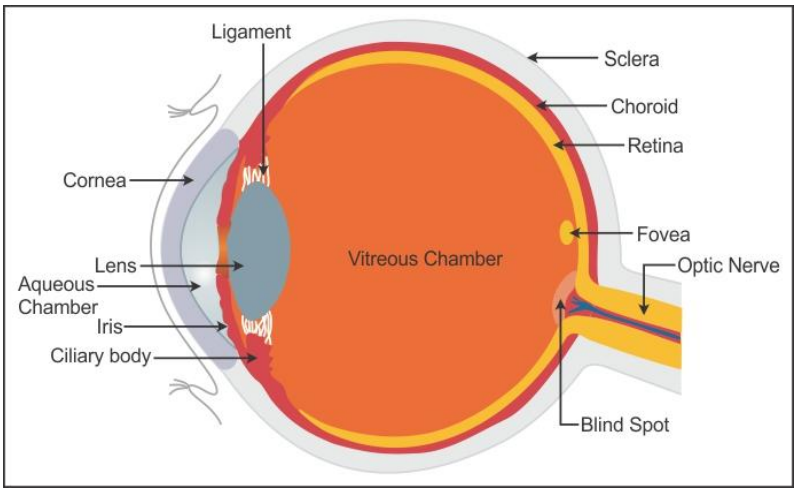
i. Carboxylation
ii. Reduction
iii. Regeneration of RuBP

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 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) Iris is a circular muscular diaphragm containing pigment which gives colour to an eye. It has an opening in the centre called the pupil.

iii. Nervous coat: It consists of retina. The retina is a very delicate coat and lines the whole of 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 pigment rhodopsin and cones contain 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 start is called the blind spot. It lacks receptor cells and is insensitive to light.



OR

(a) Pulmonary arch
(b) Left ventricle
(c) Tricuspid valve
(d) Interventricular septum
(e) Pulmonary (semilunar) valves

ii. Functions:
(a) It carries deoxygenated blood from the right ventricle to the lungs for oxygenation.
(b) It supplies oxygenated blood to various parts of the body through the aortic arch.
(c) Tricuspid valves prevent the backward flow of blood to the right auricle when the ventricles contract (ventricular systole).
(d) The interventricular septum completely divides the ventricles into the right and left ventricles to keep deoxygenated and oxygenated blood separate.
(e) Pulmonary (semilunar) valves are present at the base of the pulmonary arch. They prevent the backward flow of blood to the right ventricle during ventricular diastole.