

**CBSE**  
**Class XI Biology**

**Time: 3 hrs**

**Total marks: 60**

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**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.
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**SECTION A**

1. Name two non-chordate phyla where animals are radially symmetrical. [1]
2. Which type of meristem is a cylindrical meristem? [1]
3. What is the function of GLUT-4? [1]
4. Which part of the human body should one use to demonstrate the stages of mitosis? [1]
5. What is the advantage of synovial fluid? [1]

**SECTION B**

6. Describe the phylogenetic classification system. [2]
7. What are inclusion bodies? Give three examples of inclusion bodies found in prokaryotes. [2]

**OR**

Differentiate between essential and non-essential amino acids.

8. Give two reasons as to why photosynthesis is important for sustaining life on Earth. [2]
9. Describe the symport and antiport methods of transport. [2]

### SECTION C

10. Draw a labelled diagram of a Funaria plant showing the sporophyte and gametophyte. [3]
11. Name the types of cells present in the epithelium of gastric glands. Mention their secretions. [3]
12. Describe the process of fertilisation and development of an earthworm. [3]
13. [3]
- Name the tissue which lines the trachea in humans. State any one advantage of this tissue being present there.
  - Why is mosaic vision also known as nocturnal vision?
14. Who proposed the cell theory? List its main postulates. [3]
15. [3]
- What is the endomembrane system? List its components.
  - Why are mitochondria called semiautonomous organelles?
16. Define cytokinesis. How is it accomplished in animal cells? [3]
17. How does oxidative phosphorylation differ from photophosphorylation? Explain. [3]
18. There are three phases in the growth of a plant. Name them and also mention what each of them corresponds to. [3]
19. How does liver serve as a digestive as well as a secretory organ? [3]
- OR**
- State the role of pancreatic juice in the digestion of proteins.
20. Describe the three disorders of the skeleton and joints.. [3]

## SECTION D

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

Amit's grandfather complained of uneasiness. So, Amit took him to a nearby clinic. The doctor tied an inflatable cuff-like structure around his arm which was connected to a tube containing mercury and then pumped air into it. Thereafter, he released that air gradually. He told Amit that his grandfather was suffering from high blood pressure and gave some medicines and advised him rest. [4]

- i. What is meant by blood pressure?
- ii. Name the instrument which the doctor used for measuring blood pressure.
- iii. What is the harmful effect of high blood pressure on our health?
- iv. What value is displayed by Amit?

## SECTION E

22. What are the steps involved in the formation of a root nodule? [5]

**OR**

Explain with examples: Macronutrients, micronutrients, beneficial nutrients, toxic elements and essential elements.

23. [5]

- i. Where is the pancreas located?
- ii. Why is the pancreas considered an endocrine as well as an exocrine gland?
- iii. Draw a diagram to show the duct system of the pancreas pouring into the duodenum.

**OR**

How many vertebrae do we have in all? Categorise them on the basis of their location and give the specific number in each category.

**CBSE**  
**Class XI Biology**  
**Solution**

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**SECTION A**

1. Cnidaria and Echinodermata
2. Lateral meristem
3. It enables glucose transport into cells.
4. Bone marrow
5. It reduces friction between the articulating bones.

**SECTION B**

6. Phylogenetic classification systems take into account the evolutionary or phylogenetic relationships among various organisms. They assume that organisms belonging to the same taxa have a common ancestor.
7. Inclusion bodies are non-membrane-bound structures lying in the cytoplasm which store reserve materials.  
Examples: Phosphate granules, cyanophycean granules, glycogen granules

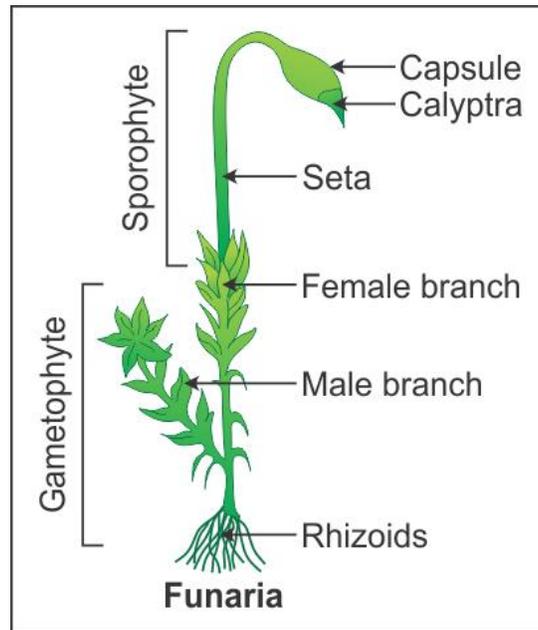
**OR**

<b>Essential</b>	<b>Non-essential</b>
(i) These amino acids cannot be synthesised in the body. (ii) Dietary proteins form the source of essential amino acids.	(i) These amino acids can be synthesised in the body. (ii) They need not be present in the diet.

8.
  - i. Oxygen is liberated in the atmosphere during the process of photosynthesis.
  - ii. The process of photosynthesis manufactures food for all living organisms.
9. Some carrier proteins allow transport only if two types of molecules move together. This is called cotransport. It is of two types:
  - i. In the symport method, both molecules cross the membrane in the same direction at the same time.
  - ii. In the antiport method, both molecules move in the opposite direction.

## SECTION C

10.



11. The following types of cells are present in the epithelium of gastric glands:

- i. Chief cells or peptic cells (zymogen cells) secrete gastric digestive enzymes as proenzymes or zymogens, pepsinogen and prorennin, small amount of gastric amylase and gastric lipase.
- ii. Oxyntic cells (parietal cells) secrete hydrochloric acid and Castle intrinsic factor (factor essential for absorption of vitamin B<sub>12</sub>).
- iii. Mucous cells (goblet cells) secrete mucus.

12. A mutual exchange of sperm occurs between two worms during mating. During mating, the male genital papilla of one earthworm is inserted into the spermathecal pore of the other earthworm to transfer the sperms and prostatic fluid. Mature sperm and egg cells and nutritive fluid are deposited in cocoons produced by the gland cells of the clitellum. Fertilisation and development occur inside the cocoon which slips off the worm and is deposited in or on the soil. After about three weeks, each cocoon produces 2–20 baby worms; the development is direct and does not involve any larval stage.

13.

- i. Pseudostratified columnar ciliated epithelium lines the trachea in humans.  
**Advantage:** The movements of the cilia propel the mucus and foreign particles towards the larynx.
- ii. Mosaic vision is also known as nocturnal vision because it more often occurs at night.

**14.**The cell theory was proposed by Schleiden and Schwann.

The main postulates of the cell theory are

- i. All living organism are composed of cells and their products.
- ii. New cells arise from pre-existing cells.

**15.**

- i. Many of the membranous organelles despite being distinct in terms of their structure and function are considered together as the endomembrane system because their functions are coordinated.

It includes

1. Endoplasmic reticulum
  2. Golgi complex
  3. Vacuoles
  4. Lysosomes
- ii. Because mitochondria possess a single circular DNA molecule, a few RNA molecules, 70 S ribosomes and other components needed for protein synthesis, they are called semiautonomous organelles.

**16.**Cytokinesis is the process by which the cytoplasm of a cell divides. It corresponds to the separation of the two daughter nuclei into two daughter cells.

In animal cells, a furrow appears in the cell membrane during late anaphase or early telophase. The furrow deepens and when they join in the centre, the cytoplasm is divided into two compartments. Each compartment with a daughter nucleus is known as a daughter cell.

**17.**

<b>Oxidative phosphorylation</b>	<b>Photophosphorylation</b>
(i) It is the process by which synthesis of ATP takes place with the help of energy liberated during the oxidation of the reduced coenzymes NADH and FADH <sub>2</sub> .	(i) It is the process of production of ATP by phosphorylation of ADP using light energy in photosynthesis.
(ii) It takes place in the mitochondrial electron transport system.	(ii) It occurs in the thylakoid membranes/electron transport in chloroplasts.
(iii) It occurs in all living cells.	(iii) It occurs in green photosynthetic tissues.
(iv) It takes place continuously in all living cells.	(iv) It takes place only in the presence of light.

**18.**

- i. Meristematic phase – It corresponds to the cell division phase.
- ii. Elongation phase – It corresponds to the cell enlargement phase. During this phase, there is maximum growth of a plant.
- iii. Maturation phase – It corresponds to cell differentiation. During this phase, there is not much of increase in weight or volume of plants.

**19.** The most important secretion of the liver is the bile.

Although bile does not contain any enzymes, it has a very significant role in the digestion of the lipase to act. Lipase converts the emulsified fats to fatty acids, glycerol and monoglycerides.

Thus, the liver acts as a secretory as well as a digestive organ.

**OR**

The pancreatic juice contains the inactive enzymes trypsinogen, chymotrypsinogen and procarboxypeptidases. Trypsinogen is activated into trypsin by the enzyme enterokinase, which in turn activates the other enzymes in the pancreatic juice.

Chymotrypsinogen and procarboxypeptidases get converted into chymotrypsin and carboxypeptidase. Chymotrypsin converts the proteins into peptides, and carboxypeptidase further converts peptides into a smaller peptide chain and amino acids.

**20.**

- i. Arthritis. It is caused by the inflammation of the joints. It is a common disease of old age which includes pain and stiffness in the joints.
- ii. Sprain. It refers to an injury to a joint capsule which involves stretching or tearing of tendons or ligaments. This condition may often remain for a week or may take more time. Thus, it may become chronic.
- iii. Osteoporosis. It results from excessive resorption of calcium and phosphorus from the bone which leads to more chances of fractures. The major causes of this disorder are imbalances of hormones such as calcitonin of thyroid, parathormone of parathyroids, sex hormones and deficiency of vitamin D.

## SECTION D

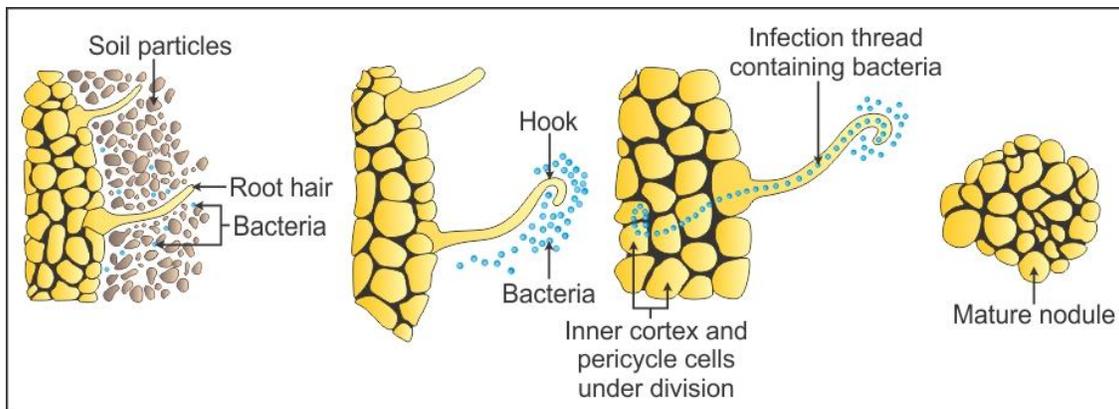
21.

- i. Blood pressure is the pressure against the walls of the blood vessels produced by the discharge of blood into them by contraction of the left ventricle of the heart.
- ii. Sphygmomanometer
- iii. A persistent high blood pressure results from the narrowing arterial lumen and reduced elasticity of arterial walls in old age. It can cause rupturing of capillaries and is a silent killer.
- iv. Amit was concerned about the health of his grandfather.

## SECTION E

22. Steps in the development of root nodules:

- (a) The roots of the legumes secrete flavonoids and betaines which attract Rhizobium bacteria.
- (b) The bacteria collect over the root hair and release Nod factors which cause curling of root hair.
- (c) The enzymes from the bacteria degrade the parts of the root hair cell wall which produces a thread-like structure called an infection thread.
- (d) The bacteria multiply and invade the infection thread and finally reach the inner cortex where they enter the cells and divide to form a knob-like protuberance called the root nodule.

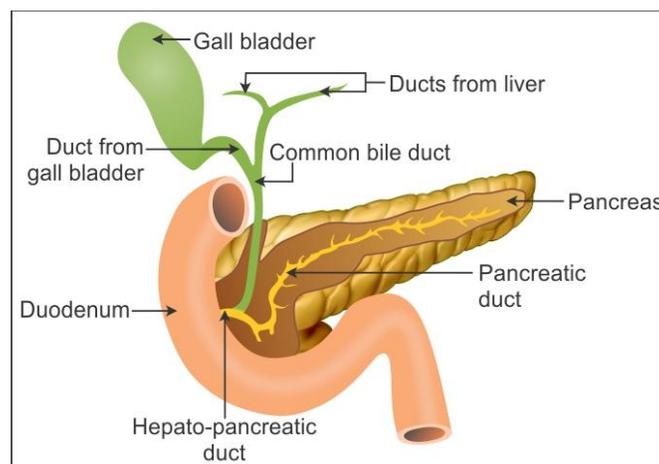


OR

- i. **Macronutrients:** Macronutrients are the elements which are required in large amounts for plant growth. They are present in plant tissues in concentrations of 1 to 10 mg/L of dry matter. The macronutrients include carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, potassium, calcium and magnesium. Of these, carbon, hydrogen and oxygen are mainly obtained from CO<sub>2</sub> and H<sub>2</sub>O, while the others are absorbed from the soil as mineral nutrition.
- ii. **Micronutrients:** Micronutrients or trace elements are the elements which are needed in very small amounts for plant growth (less than 0.1 mg/L of dry matter). These include iron, manganese, copper, molybdenum, zinc, boron, chlorine and nickel.
- iii. **Beneficial elements:** There are some elements which are required by higher plants in addition to macro and micronutrients. Such elements are called beneficial elements. Examples: Sodium, silicon, cobalt, selenium
- iv. **Toxic elements:** The elements which reduce the dry weight of tissues by about 10% are called toxic elements.
- v. **Essential elements:** An essential element is an element which has specific structural or functional roles in plants and without which plants are unable to complete their life cycle. Examples: Carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, potassium, calcium, iron, zinc, magnesium

### 23.

- i. It is an elongated compound gland, i.e. it has both exocrine and endocrine parts, located between the loops of the duodenum.
- ii. It is considered exocrine as well as endocrine as its exocrine portion secretes digestive enzymes, while the endocrine portion secretes two hormones, insulin and glucagon.
- iii. The duct of the pancreas joins the common bile duct to form the hepatopancreatic duct which opens into the duodenum of the alimentary canal. Its opening is guarded by the sphincter of Oddi.



**OR**

There are 26 vertebrae in our body:

- i. Cervical vertebrae are seven in number and located in the neck region.
- ii. Thoracic vertebrae are twelve in number and are present in the thoracic region of the trunk.
- iii. Lumbar vertebrae are five in number and are present in the abdominal region of the trunk.
- iv. Sacrum is the largest triangular bone at the end of the vertebral column in the hip region. It is only one in number.
- v. Coccyx is the small bone at the end and is vestigial in nature.