CBSE SAMPLE PAPER – 07 (Solved)

Class-XI

BIOLOGY (THEORY)

Time: 3 Hrs **MM: 70**

General Instructions

1. The question paper comprises of five Sections A, B, C, D and E.
2. All questions are compulsory.
3. There is no overall choice however; internal choice has been provided in one question of 2 marks, one question of 3 marks and all the two questions of five marks category. Only one option in such question is to be attempted.
4. Questions1 to 5 in section A are very short questions of one mark each. These are to be answered in one word or one sentence each.
5. Questions 6 to 9 in section B are short questions of two marks each. These are to be answered in approximately 20-30 words each.
6. Questions 10 to 20 in section C are questions of three marks each. These are to be answered in approximately 30-50 words each. Question 21 is of 4 marks.
7. Questions 22 to 23 in section D are questions of five marks each. These are to be answered in approximately 80-120 words each.
8. Questions 24 to26 in section E is based on OTBA of 10 marks.

Section – A

1. How can the age of a tree be determined?
2. What is meant by glycosidic bond?
3. Why do plants need potassium?
4. Why is dehydration essential to seed dormancy?
5. Define vital capacity.

Section – B

6. Draw a labelled diagram of a Bacteriophage.

   Or

   Draw a labelled diagram of a funaria plant.
7. Mention two functions of calcium in meristems and zinc in plants.

8. What is diatomaceous earth? Mention two uses of it.

9. What is meant by taxon and herbarium?

Section – C

10. How ATP is synthesized in the electron transport particles of the mitochondria?

11. What is meiosis? Bring out its significance.

12. Describe the structure of actin.

13. Describe competitive inhibition of enzyme activity with an example.

14. Draw a labelled diagram of the mouth parts of cockroach.

Or

Draw a labelled diagram of structure of monocot seed.

15. Draw a labelled diagram of human respiratory system.

16. Describe the quaternary structure of proteins.

17. Differentiate rods and cones.

18. Differentiate C3 and C4 pathways of photosynthesis.

19. Mention two important functions and one deficiency symptom of potassium in plants.

20. Schematically represent haplo-diplontic life cycle.

21. Ratan lives in a remote village. Suddenly he comes to know that his father has arranged the marriage of his younger sister, who is only 14 years old, to a well-to -do middle aged man living in a nearby village. Ratan objected to his father's act. Ratan was not convinced by his father's idea that a better groom might not be available later. Ratan complained to the village head and got the problem.

a. What value do you find in Ratan?

b. What was main reason for early marriage of girls?

c. How biological you think the practice of early child marriage not good?

Section – D

22. Describe the process of cyclic photophosphorylation.

Or

What is mineral nutrition in plants? How are essential elements classified on the basis of their functions in plants?

23. Draw a standard ECG and explain the different segments in it

Or

Explain structure of human heart with labelled diagram.

Section-E (OTBA) Questions

24.	OTBA Question	2 mark
25.	OTBA Question	3 mark
26.	OTBA Question	5 mark

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ANSWERS

Section-A

1. The age of a tree can be determined by counting annual growth rings in the lower part of the stem.

2. It is a linkage between monosaccharides to form di and polysaccharides. Forming this bond, one carbon gives up its OH group and the other loses the hydrogen from its OH group.

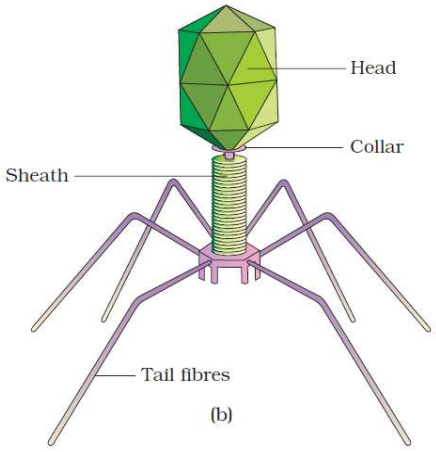
3. Potassium is involved in many physiological processes like respiration, photosynthesis, stomatal movement and protein synthesis.

4. It prevents enzymatic hydrolysis of stored food and enables the seed to survive a long period of dormancy.

5. It is the amount of air, which one can exhale with maximum effort after inhalation with maximum effort.

Section-B

6.



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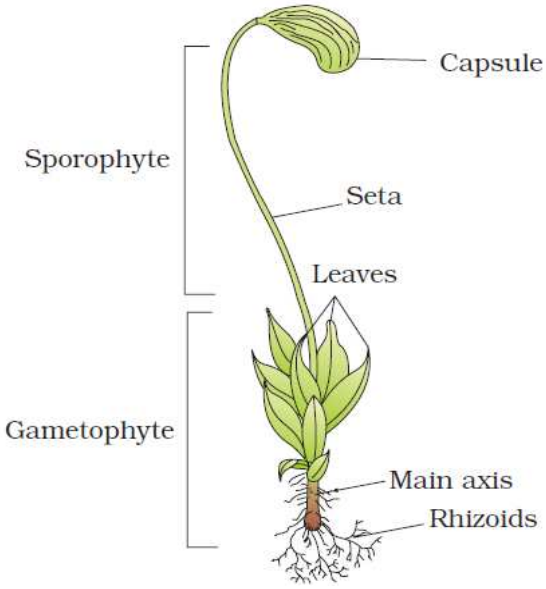


7. Calcium

   - For the formation of spindles during cell wall.
   - For the formation of middle lamella.

   Zinc

   - For the synthesis of auxin.
   - For activation of carboxylases.

8. It refers to the deposits of the indestructible siliceous cell wall of diatoms in the ocean floor.

   Uses:

   a) As an absorbent for liquid nitroglycerine to make explosives.
   b) For filtering the liquids in sugar factories.
   c) As inert extender in paints.
   d) For insulation in boilers and blast furnace.
   e) In powdered form as abrasive in silver polish and tooth paste. (Any two).

9. Taxon is unit of classification that represents a rank.

   Herbarium is a collection of plants that have been dried, pressed and preserved on sheets.

Section-C

10. This synthesized with the help of complex V (ATP synthase). Complex V consists of F_0 – F_1 components. Fo is an integral membrane protein complex that act as the channel through which the proteins pass across the membrane into the matrix. The passage of protons through the channel is coupled to the catalytic site of F_1 component and one molecule of ATP is synthesized for every $2H^+$ passing through F_0.

11. This is a cell division where the number of chromosomes is reduced to half in the daughter cells.

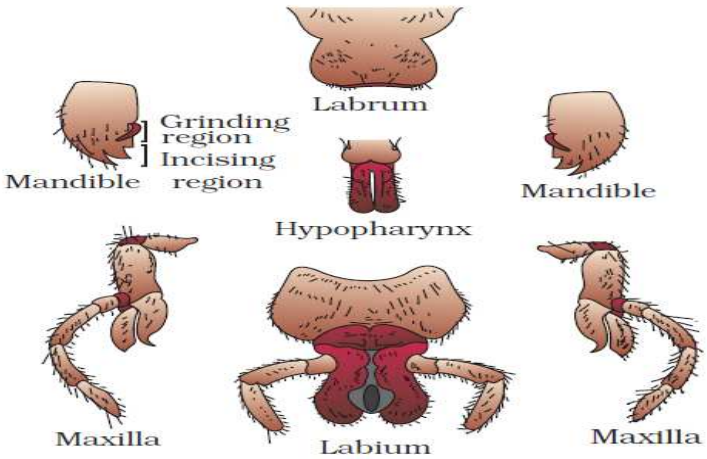
    Significance It ensures the maintenance of a constant chromosome number, characteristic of a species.

- The crossing over results in variations of genetic characters in the progeny; variation is necessary for survival of species and it is the raw material for evolution.

12. Actin filament contain three proteins namely, actin (F-actins and G-actins), tropomyosin and troponin. Each actin filament consists of two F-actins which are helically wound to each other. Each F-actin is a polymer of globular actin. Two filaments of tropomyosin also run close to F-actins throughout their length. Troponin is a complex protein found at regular intervals on the tropomyosin. In the reacting state, a subunit of troponin masks the actin-binding site of myosin.

13. It is the phenomenon in which a substance closely resembling the substrate in its molecular structure competes with it for the active site on the enzyme. Eg – Malonate resembles succinate in its structure and inhibits the action of succinate dehydrogenase. Competitive inhibition is used in the control of bacterial pathogens.

14.



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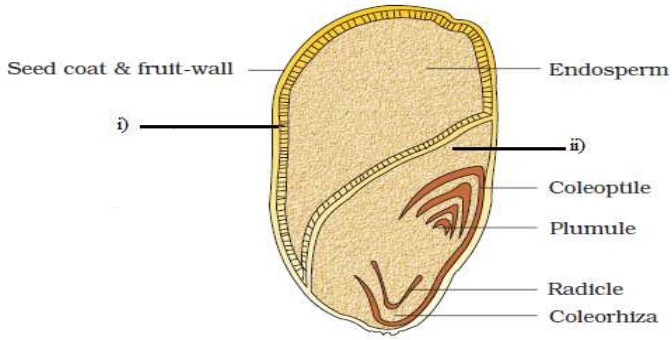

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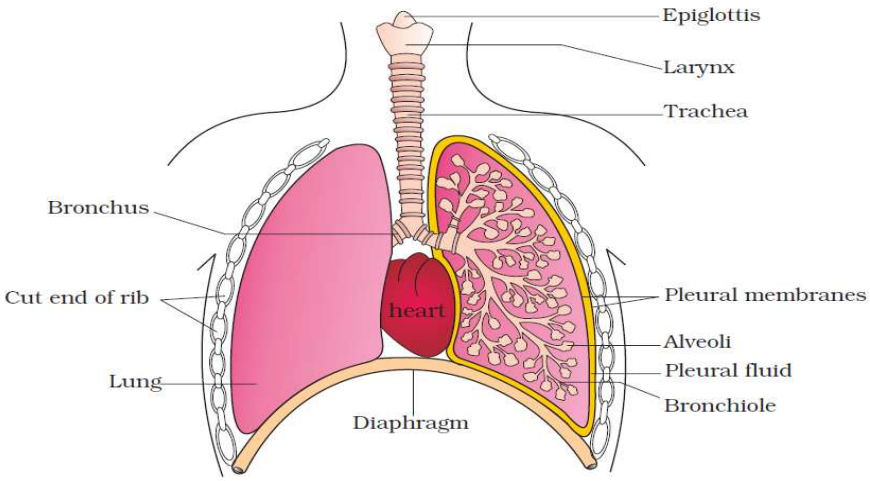


16. Protein has many subunits (polypeptide chains), each having a primary, secondary or tertiary structure of its own, the protein is said to be in its quaternary structure. Egs – Myoglobin, Insulin, Haemoglobin.

17.

Rods	Cones
These are meant for vision in dim light.	These are meant for vision in bright light.
They do not have the ability to make coloured image.	They have the ability to make coloured image.
These contain the visual pigment rhodopsin.	These contain the pigment iodopsin.

18.

C3 pathway	C4 pathway
The primary acceptor of RuBP.	The primary acceptor is PEP.

The first product is phosphoglyceric acid.	The first product is oxaloacetic acid.
The enzyme is sensitive to high temperature and oxygen concentration.	The enzyme is not much affected by oxygen concentration.
The pathway becomes saturated at higher concentration of carbon dioxide.	The pathway becomes saturated at a lower concentration of carbon dioxide.

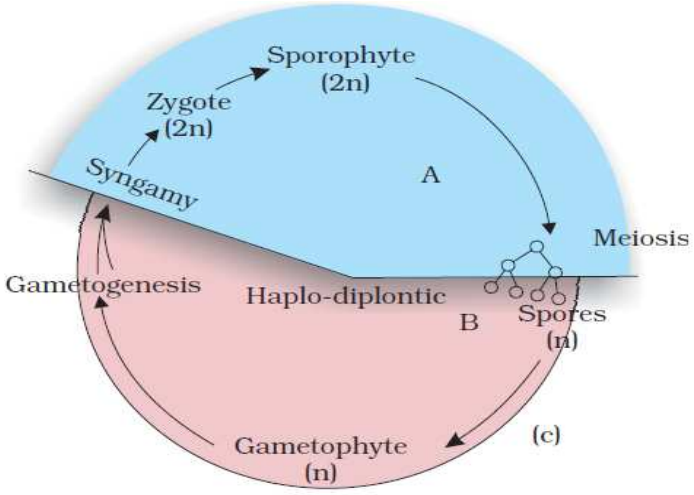
19. Potassium

- In opening and closing of stomata.
- Activates a number of enzymes.
- Involved in protein synthesis.
- Maintains turgidity of cells.
- Maintains anion-cation balance of cells.

Symptoms

- Interveinal chlorosis.
- Scorched leaf tips.
- Shorter internodes.
- Disintegration of plastids.

20.



21.

a) Ratan shows the responsibility of brother as well as social inequality of woman.

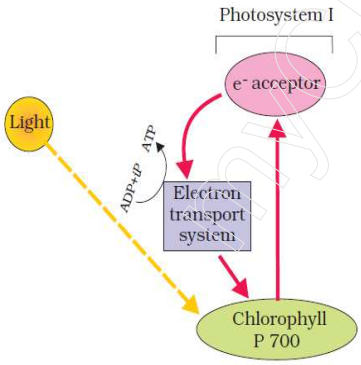
b) The main reason behind the early child marriage is to complete his social responsibility of girls marriage as soon as possible and decreasing sex ratio.

c) The body of girl is not ready to withstand the sex-related matter and later on early pregnancy.

Section-D

22. Living organism have the capability of extracting energy from oxidisable substances and store this in the form of bond energy. Special substances like ATP carry this energy in their chemical bonds. The process of which ATP is synthesized by cells (in mitochondria and chloroplasts) is named phosphorylation. Photophosphorylation is the synthesis of ATP from ADP and inorganic phosphate in the presence of light. When only PS I is functional, the electron is circulated within the photosystem and the phosphorylation occurs due to cyclic flow of electrons. A possible location where this could be happening is in the stroma lamellae. While the membrane or lamellae of the grana have both PS I and PS II the stroma lamellae membranes lack PS II as well as NADP reductase enzyme. The excited electron does not pass on to $NADP^+$ but is cycled back to the PS I complex through the electron transport chain (Figure 13.6). The cyclic flow hence, results only in the synthesis of ATP, but not of $NADPH + H^+$. Cyclic photophosphorylation also occurs when only light of wavelengths beyond 680 nm are available for excitation.

Or



Mineral nutrition refers to how plants obtain their nutrient elements from soil, water or air and use them for their growth and development.

Essential elements:

Most of the minerals present in soil can enter plants through roots. In addition to the 17 essential elements, there are some beneficial elements such as sodium, silicon, cobalt and selenium. They are required by higher plants. Essential elements can also be grouped into four broad categories on the basis of their diverse functions. These categories are:

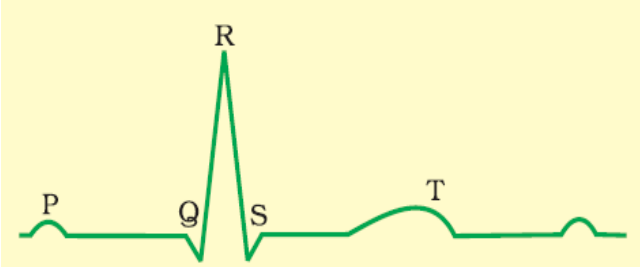
(i) Essential elements as components of biomolecules and hence structural elements of cells (e.g., carbon, hydrogen, oxygen and nitrogen).

(ii) Essential elements that are components of energy-related chemical compounds in plants (e.g., magnesium in chlorophyll and phosphorous in ATP).

(iii) Essential elements that activate or inhibit enzymes, for example Mg2+ is an activator for both ribulose bisphosphate carboxylase-oxygenase and phosphoenol pyruvate carboxylase, both of which are critical enzymes in photosynthetic carbon fixation; Zn2+ is an activator of alcohol dehydrogenase and Mo of nitrogenase during nitrogen metabolism.

(iv) Some essential elements can alter the osmotic potential of a cell. Potassium plays an important role in the opening and closing of stomata.

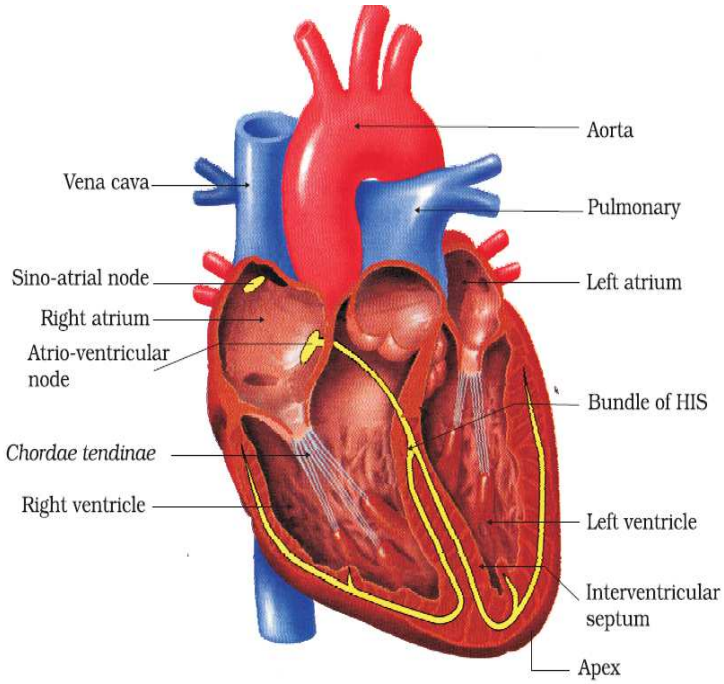
23. ECG a graphical representation of the electrical activity of the heart during a cardiac cycle. A patient is connected to the machine with three electrical leads (one to each wrist and to the left ankle) that continuously monitor the heart activity. For a detailed evaluation of the heart's function, multiple leads are attached to the chest region. Here, we will talk only about a standard ECG. 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. Obviously, by counting the number of QRS complexes that occur in a given time period, one can determine the heart beat rate of an individual. Since the ECGs obtained from different individuals have roughly the same shape for a given lead configuration, any deviation from this shape indicates a possible abnormality or disease.



Or

Human circulatory system, also called the blood vascular system consists of a muscular chambered heart, a network of closed branching blood vessels and blood, the fluid which is circulated. Heart is situated in the thoracic cavity, in between the two lungs, slightly tilted to the left. It has the size of a clenched fist. It is protected by a double walled membranous bag, pericardium, enclosing the pericardial fluid. Our heart has four chambers, two relatively small upper chambers called atria and two larger lower chambers called ventricles. A thin, muscular wall called the inter-atrial septum separates the right and the left atria, whereas a thick-walled, the inter-ventricular septum, separates the left and the right ventricles. The atrium and the ventricle of the same side are also separated by a thick fibrous tissue called the atrio-ventricular septum.

Each of these septa is provided with an opening through which the two chambers of the same side are connected. The opening between the right atrium and the right ventricle is guarded by a valve formed of three muscular flaps or cusps, the tricuspid valve, whereas a bicuspid or mitral valve guards the opening between the left atrium and the left ventricle. The openings of the right and the left ventricles into the pulmonary artery and the aorta respectively are provided with the semilunar valves. The valves in the heart allows the flow of blood only in one direction, i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or aorta. These valves prevent any backward flow.



The entire heart is made of cardiac muscles. The walls of ventricles are much thicker than that of the atria. A specialized cardiac musculature called the nodal tissue is also distributed in the heart. A patch of this tissue is present in the right upper corner of the right atrium called the sino-atrial node (SAN). Another mass of this tissue is seen in the lower left corner of the right atrium close to the atrio-ventricular septum called the atrio-ventricular node (AVN). A bundle of nodal fibres, atrioventricular bundle (AV bundle) continues from the AVN which passes through the atrio-ventricular septa to emerge on the top of the interventricular septum and immediately divides into a right and left bundle.

These branches give rise to minute fibres throughout the ventricular musculature of the respective sides and are called purkinje fibres. These fibres alongwith right and left bundles are known as bundle of HIS. The nodal musculature has the ability to generate action potentials without any external stimuli, i.e., it is autoexcitable. However, the number of action potentials that could be generated in a minute varies at different parts of the nodal system. The SAN can generate the maximum number of action potentials, i.e., 70-75 min–1, and is responsible for initiating and maintaining the rhythmic contractile activity of the heart. Therefore, it is called the pacemaker. Our heart normally beats 70-75 times in a minute (average 72 beats min–1).