
CBSE SAMPLE PAPER – 06

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. Questions 1 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 to 26 in section E is based on OTBA of 10 marks.

Section – A

1. What do you understand by the term malnutrition?
2. What name is given to functional unit of kidney?
3. What is middle lamella?
4. How do rise in temperature affect
5. Where is electron transport system operative in mitochondria?

Section – B

6. What are biomolecules?
7. What is the chemical difference between a saturated and an unsaturated fat?
8. Explain the term exarch and endarch conditions of xylem.
9. Write a note on triglycerides.

Or

Explain haplontic and diplontic life cycles by giving examples.

Section – C

10. Describe PSI and PSII
11. What is systemic circulation? Describe its importance. Why are the walls of the ventricle more muscular than the walls of atria?
12. Explain the initiation of muscle contraction. What is the role of sarcoplasmic reticulum, myosin head and F-actin during contraction in striated muscles?
13. Why do plants of the legume family usually contain more protein than other plants?
14. Define: a) IRV and b) ERV
15. Enumerate the peculiar features that you find in phylum chordata.
16. What are the muscle tissues? What are the three types of muscles found in human beings?
17. List various functions of epithelial tissue.
18. Describe the process of crossing over. What is its significance?
19. Describe the structure of chloroplast.

Or

Draw a labelled diagram of female reproductive system of a cockroach.

20. Differentiate hyperglycemia and hypoglycemia.

21. A teenage girl accidentally became pregnant. She stopped coming to college and also preferred to remain isolated. She was scared to inform her parents. One of her friends Sweta met her and came to know about the problem. She took her to a doctor and got her aborted. She convinced the parents and kept the matter concealed.

- a. Did Sweta take the correct decision? What values did she show?
- b. What is the medical term for abortion? What is the period which is considered safe for abortion?
- c. What prevention may be taken to avoid pregnancy?

Section – D

22. Explain the system of ETS and oxidative phosphorylation.

Or

- a) Which one of the plant growth regulator would you use, if you are asked to:
 - I. Induce rooting in a twig
 - II. Quick ripening of a fruit
 - III. Delay in leaf senescence
 - IV. Induce immediate stomatal closure in leaves
 - V. Increase length of a dwarf plant
 - b) Define photoperiodism.
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23. Draw a labelled diagram of the detailed structure of a nephron.

Or

Write a note on two types of simple tissues with neat 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 state of nutrition in which person is not able to get proper food having all nutrients in correct proportion is called malnutrition.
2. Functional unit of kidney is called nephron.
3. A cementing layer of pectic materials holding together the primary cell walls of adjacent cells is called middle lamella.
4. Transpiration increases with increase in temperature. The rate of evaporation doubles with every rise in temperature by 10°C .
5. ETS is operative in the inner mitochondrial membrane.

Section-B

6. The molecules found in the organisms are called biomolecules or biological molecules.
7. If the carbons in the chain are single bonded, the fat is saturated and if there is atleast one double bond in the carbon chain, it is unsaturated fat.
8.
 - a) In roots, the protoxylem lies towards periphery and metaxylem lies towards the centre. Such arrangement of primary xylem is called exarch condition of xylem.
 - b) In stems, the protoxylem lies towards centre and metaxylem lies towards the periphery. Such arrangement of primary xylem is called endarch condition of xylem.
9.
 - a) Triglycerides are glycerides in which the glycerol is esterified with three fatty acids.
 - b) They are the main constituents of vegetable oil and animal fats.
 - c) Glycerol is a 3C-alcohol with 3-OH groups that serve as binding sites.

Or

Haplontic life cycle

- The haploid phase is dominant and the diploid phase is represented only by the zygote which undergoes meiosis.
 - Embryo and sporophyte are absent.
 - Example – algae (spirogyra).
 - Diplontic life cycle
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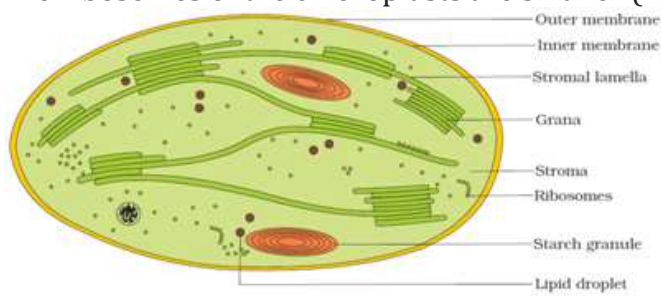
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- The diploid phase is dominant and few celled gametophytes are the only haploid phase in the life cycle.
 - Zygote develops into an embryo and then into a sporophyte.
 - Examples – angiosperms and gymnosperms.

Section-C

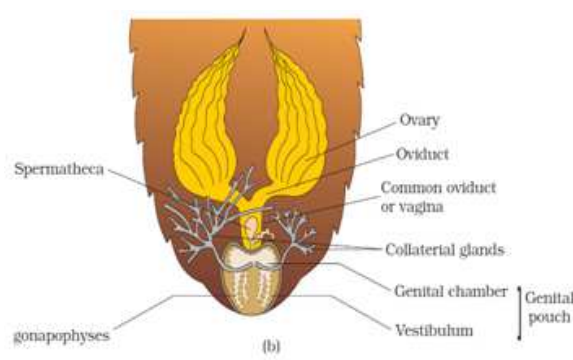
10. The pigments are organized into two discrete photochemical light harvesting complexes (LHC) within the PS I and PS II. These are named in the sequence of their discovery, and not in the sequence in which they function during the light reaction. The LHC are made up of hundreds of pigment molecules bound to proteins. Each photosystem has all the pigments (except one molecule of chlorophyll *a*) forming a light harvesting system also called antennae. These pigments help to make photosynthesis more efficient by absorbing different wavelengths of light. The single chlorophyll *a* molecule forms the reaction centre. The reaction centre is different in both the photosystems. In PS I the reaction centre chlorophyll *a* have an absorption peak at 700 nm, hence is called P700, while in PS II it has absorption maxima at 680 nm, and is called P680.
 11. Systemic circulation refers to the flow of oxygenated blood from the left ventricle to all parts of the body and the flow of deoxygenated blood from all parts except lungs of the body to the right atrium.
The importance of circulation are:-
 - a) To supply oxygen and nutrients to all parts of the body.
 - b) To remove carbon dioxide and other metabolic wastes from the body tissues.Ventricles are the pumping chambers and they have to exert more pressure for pumping the blood to various parts and so are more muscular. The atria are the receiving chambers and they have to pump the blood only the respective ventricles and so have less muscular wall.
 12. A nerve impulse arriving at the neuromuscular junction initiates the contractile response. A neurotransmitter released at the neuromuscular junction enters the sarcomere through its membrane channel. The opening of the channel results in the inflow of sodium ions inside the sarcomere and generates a component of the thin filament. As a result of conformational changes in the troponin, the active sites on the F-actin are exposed. These are the active sites specific to myosin head, which show myosin-dependent ATPase activity. The myosin head acts as hooks and attach to F-actin to form bridges.
 13. Plants of legume family have root nodules in which the symbiotic bacteria *Rhizobium* fix atmospheric nitrogen into ammonia which helps to synthesize amino acids, proteins, vitamins and nucleic acids.
 14.
 - a) Inspiratory Reserve Volume - The additional volume of air a person can inspire by a forcible inspiration. This averages 2500 – 3000 mL.
 - b) Expiratory Reserve Volume - The additional volume of air a person can expire by a forcible expiration. This averages 1000 – 1100 mL.
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15. The peculiar characteristics of the phylum Chordata are:
- i) The notochord is stiff and flexible rod of tissues lying ventral to nerve cord.
 - ii) All the chordates are triploblastic, coelomate and bilaterally symmetrical.
 - iii) They possess a post anal tail and closed blood vascular system.
 - iv) Presence of a dorsal hollow nerve cord and paired pharyngeal gill slits.
16. Each muscle is made of many long, cylindrical fibres arranged in parallel arrays. These fibres are composed of numerous fine fibrils, called myofibrils. Muscle fibres contract (shorten) in response to stimulation, then relax (lengthen) and return to their uncontracted state in a coordinated fashion. Their action moves the body to adjust to the changes in the environment and to maintain the positions of the various parts of the body. In general, muscles play an active role in all the movements of the body. Muscles are of three types, skeletal, smooth, and cardiac.
17. The various functions of epithelial tissues are:
- a) Protection – The epithelial tissue protects the underlying tissue from injury, chemicals, bacteria etc.
 - b) Sensation – The specialized epithelial tissue consisting of sensory nerve endings are found in the skin, eyes, nose, ears and the tongue.
 - c) Secretion – The epithelial tissue secretes definite chemical substances such as enzymes, hormones and lubricating fluids.
 - d) Absorption – The epithelial tissue lining the small intestine absorb nutrients from the digestion of food.
18. In pachytene stage of prophase I in Meiosis I, the bivalent chromosomes clearly appear as tetrads. This stage is characterized by the appearance of recombination nodules, the sites at which crossing over occurs between non-sister chromatids of the homologous chromosomes. Crossing over is the exchange of genetic material between two homologous chromosomes. Crossing over is also an enzyme-mediated process and the enzyme involved is called recombinase. Crossing over leads to recombination of genetic material on the two chromosomes. Recombination between homologous chromosomes is completed by the end of pachytene, leaving the chromosomes linked at the sites of crossing over.
19. The chloroplasts of the green plants are found in the mesophyll cells of the leaves. These are lens-shaped, oval, spherical, discoid or even ribbon-like organelles having variable length (5-10mm) and width (2-4mm). The chloroplasts are double membrane bound. Of the two, the inner chloroplast membrane is relatively less permeable. The space limited by the inner membrane of the chloroplast is called the stroma. A number of organized flattened
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membranous sacs called the thylakoids are present in the stroma (Figure 8.8). Thylakoids are arranged in stacks like the piles of coins called grana (singular: granum) or the intergranal thylakoids. In addition, there are flat membranous tubules called the stroma lamellae connecting the thylakoids of the different grana. The membrane of the thylakoids encloses a space called a lumen. The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins. It also contains small, double-stranded circular DNA molecules and ribosomes. Chlorophyll pigments are present in the thylakoids. The ribosomes of the chloroplasts are smaller (70S) than the cytoplasmic ribosomes (80S).



Or



20.

Hyperglycemia	Hypoglycemia
a. It results from hyposecretion of insulin.	It results from hypersecretion of insulin.
b. Its symptoms show high blood glucose level, breakdown of muscle tissue, loss of weight and tiredness.	It symptoms show low blood glucose level, hunger, sweating, irritability and double vision.

21.

a) Yes. Sweta expressed her helpful attitude and true friendship. She had socialcommitment and sensitivity to act as per the situation.

b) Medical termination of pregnancy (MTP) or Induced abortion. It is safe up to the first trimester of pregnancy (12 weeks).

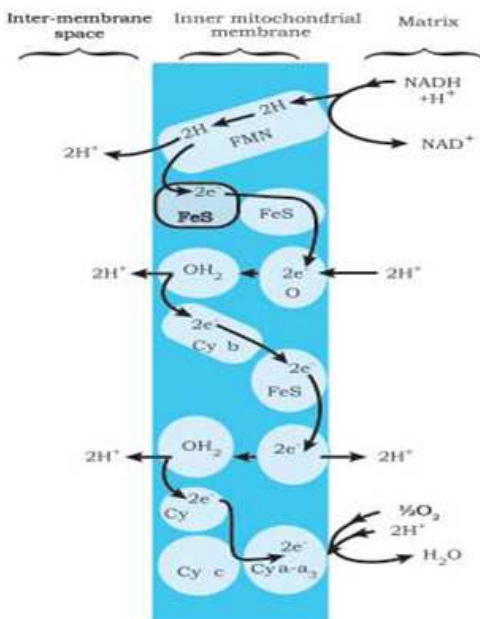
c) i) Abstinence

ii) Contraceptive methods.

Section-D

22. The following steps in the respiratory process are to release and utilize the energy stored in $\text{NADH} + \text{H}^+$ and FADH_2 . This is accomplished when they are oxidised through the electron transport system and the electrons are passed on to O_2 resulting in the formation of H_2O . The metabolic pathway, through which the electron passes from one carrier to another, is called the electron transport system (ETS) and it is present in the inner mitochondrial membrane. Electrons from NADH produced in the mitochondrial matrix during citric acid cycle are oxidised by an NADH dehydrogenase (complex I), and electrons are then transferred to ubiquinone located within the inner membrane. Ubiquinone also receives reducing equivalents via FADH_2 (complex II) that is generated during oxidation of succinate in the citric acid cycle.

The reduced ubiquinone (ubiquinol) is then oxidised with the transfer of electrons to cytochrome *c* via cytochrome *bc*1 complex (complex III). Cytochrome *c* is a small protein attached to the outer surface of the inner membrane and acts as a mobile carrier for transfer of electrons between complex III and IV. Complex IV refers to cytochrome *c* oxidase complex containing cytochromes *a* and *a*₃, and two copper centres.



When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP

from ADP and inorganic phosphate. The number of ATP molecules synthesized depends on the nature of the electron donor. Oxidation of one molecule of NADH gives rise to 3 molecules of ATP, while that of one molecule of FADH₂ produces 2 molecules of ATP. Although the aerobic process of respiration takes place only in the presence of oxygen, the role of oxygen is limited to the terminal stage of the process.

Yet, the presence of oxygen is vital, since it drives the whole process by removing hydrogen from the system. Oxygen acts as the final hydrogen acceptor. Unlike photophosphorylation where it is the light energy that is utilized for the production of proton gradient required for phosphorylation, in respiration it is the energy of oxidation-reduction utilized for the same process. It is for this reason that the process is called oxidative phosphorylation.

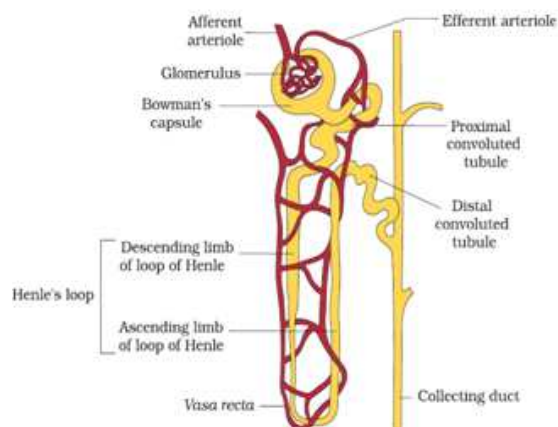
Or

a)

- i. Auxin – Indole Butyric acid
- ii. Ethylene
- iii. Cytokinins
- iv. Absciscic acid
- v. Gibberellins

b) It refers to the phenomenon in which a plant detects and responds to the relative length of day and night for some of its physiological functions.

23. Each kidney has nearly one million complex tubular structures called nephrons which are the functional units. Each nephron has two parts – the glomerulus and the renal tubule. Glomerulus is a tuft of capillaries formed by the afferent arteriole – a fine branch of renal artery. Blood from the glomerulus is carried away by an efferent arteriole. The renal tubule begins with a double walled cup-like structure called Bowman's capsule, which encloses the glomerulus. Glomerulus along with Bowman's capsule is called the *malpighian body* or *renal corpuscle*. The tubule continues further to form a highly coiled network – proximal convoluted tubule (PCT).

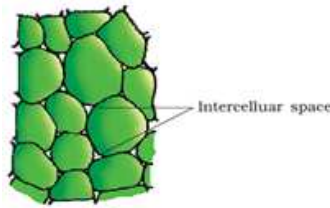


A hairpin shaped Henle's loop is the next part of the tubule which has a descending and an ascending limb. The ascending limb continues as another highly coiled tubular region called distal convoluted tubule (DCT). The DCTs of many nephrons open into a straight tube called *collecting duct*, many of which converge and open into the renal pelvis through medullary pyramids in the calyces.

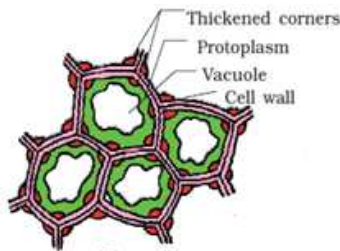
The Malpighian corpuscle, PCT and DCT of the nephron are situated in the cortical region of the kidney whereas the loop of Henle dips into the medulla. In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla. Such nephrons are called cortical nephrons. In some of the nephrons, the loop of Henle is very long and runs deep into the medulla. These nephrons are called juxta medullary nephrons. The efferent arteriole emerging from the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries. A minute vessel of this network runs parallel to the Henle's loop forming a 'U' shaped *vasa recta*. *Vasa recta* is absent or highly reduced in cortical nephrons.

Or

A simple tissue is made of only one type of cells. The various simple tissues in plants are parenchyma, collenchyma and sclerenchyma. Parenchyma forms the major component within organs. The cells of the parenchyma are generally isodiametric. They may be spherical, oval, round, polygonal or elongated in shape. Their walls are thin and made up of cellulose. They may either be closely packed or have small intercellular spaces. The parenchyma performs various functions like photosynthesis, storage, secretion.



The collenchyma occurs in layers below the epidermis in dicotyledonous plants. It is found either as a homogeneous layer or in patches. It consists of cells which are much thickened at the corners due to a deposition of cellulose, hemicellulose and pectin. Collenchymatous cells may be oval, spherical or polygonal and often contain chloroplasts. These cells assimilate food when they contain chloroplasts. Intercellular spaces are absent. They provide mechanical support to the growing parts of the plant such as young stem and petiole of a leaf.



Sclerenchyma consists of long, narrow cells with thick and lignified cell walls having a few or numerous pits. They are usually dead and without protoplasts. On the basis of variation in form, structure, origin and development, sclerenchyma may be either fibres or sclereids. The fibres are thick-walled, elongated and pointed cells, generally occurring in groups, in various parts of the plant. The sclereids are spherical, oval or cylindrical, highly thickened dead cells with very narrow cavities (lumen). These are commonly found in the fruit walls of nuts; pulp of fruits like guava, pear and sapota; seed coats of legumes and leaves of tea. Sclerenchyma provides mechanical support to organs.

