CBSE SAMPLE PAPER – 14 (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. What are intercalary meristems? Where do they occur?
2. Define the term 'region of elongation'.
3. What are flagellated protozoans? Give an example.
4. Define ammonification.
5. Differentiate open and closed circulatory system with an example for each.

Section – B

6. Grasses have evolved a mechanism to overcome photorespiration. Explain.
7. What is binomial nomenclature? Explain with an example

Or

a) How are archaebacteria able to tolerate extremes of climate?

b) What are couples and lead with reference to keys as taxonomical aids?

8. How is a metacentric chromosome different from an acrocentric chromosome?
9. Show diagrammatically the facilitated diffusion.

Section – C

10. What are respiratory substrates? Name the most common respiratory substrate.
11. Differentiate between aerobic respiration and fermentation
12. What are the events that take place in telophase of mitosis?
13. Draw the dorsal, ventral and lateral view of the body of the earthworm showing mouth opening.

OR

Describe the female reproductive system of a cockroach.

14. What is a photosystem? Differentiate between the two types of photosystems in a higher plant.
15. Define the following
    (i) Functional residual capacity.
    (ii) Expiratory capacity
    (iii) Total lung capacity
16. Differentiate between red algae and green algae.
17. Where is thymus located in human body? Name the hormone and mention its important function.
18. Bring out the significance of mitosis.
19. Name the following
    (i) The smallest known living cells.
    (ii) An acellular slime mould.
    (iii) A flagellated protozoan.
    (iv) A bilaterally symmetrical chrysophytes.
20. Draw the floral diagram of liliaceae.

21. Sakshi and Nisha are good friends and study in same class. While returning from school, they observed that some children are trying to kill a large snake with stick and stone. Both friends reach their and stopped the children from killing them and explained them about the importance of every creature.

a. What values do you find in Sakshi and Nisha?

b. Why each species are important for life?

c. How nature works properly due to every creature?

Section – D

22. Explain chemiosmotic hypothesis.

Or

Explain both pathways of water and ion absorption and movement in roots with neat sketch.

23. Draw the labelled diagram of pectoral and pelvic girdle.

Or

Explain different types of plastids, their pigments and functions.

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 meristem which occurs between mature tissues is known as intercalary meristem. They occur in grasses and regenerate parts removed by the grazing herbivores.
2. The cells proximal to this region undergo rapid elongation and enlargement and are responsible for the growth of the root in length. This region is called the region of elongation.
3. Flagellated protozoans: The members of this group are either free-living or parasitic. They have flagella. The parasitic forms cause diseases such as sleeping sickness. Example: Trypanosoma.
4. Decomposition of organic nitrogen of dead plants and animals into ammonia is called ammonification.
5. Open circulatory system is present in arthropods and molluscs in which blood pumped by the heart passes through large vessels into open spaces or body cavities called sinuses. Annelids and chordates have a closed circulatory system in which the blood pumped by the heart is always circulated through a closed network of blood vessels.

Section-B

6. In C_4 pathway the primary acceptor is phosphoenol pyruvate that is present in the mesophyll cells. Carboxylation results in oxaloacetic acid, which is converted into malic acid. Malic acid is transported to bundle sheath cells, where it breaks into pyruvic acid and carbon dioxide. This decarboxylation maintains a high concentration of carbon dioxide in the bundle sheath cells, where Calvin cycle, i.e., RuBP carboxylase is functioning, hence there is no photorespiration. C_4 pathway of photosynthesis requires 30 molecules of ATP for the synthesis of one molecule of glucose whereas C_3 pathway requires only 18 molecules of ATP; hence C_4 pathway requires 12 molecules of ATP more than that of C_3plants, for synthesizing one molecule of glucose / hexose.

7. It is a method of naming the organisms, in which every organism is given a scientific name, which has two parts the first is the name of the genus and the second part is the name of the species. In this, Mangifera is the name of the genus while indica is the name of the species belonging to the genus Mangifera.

OR

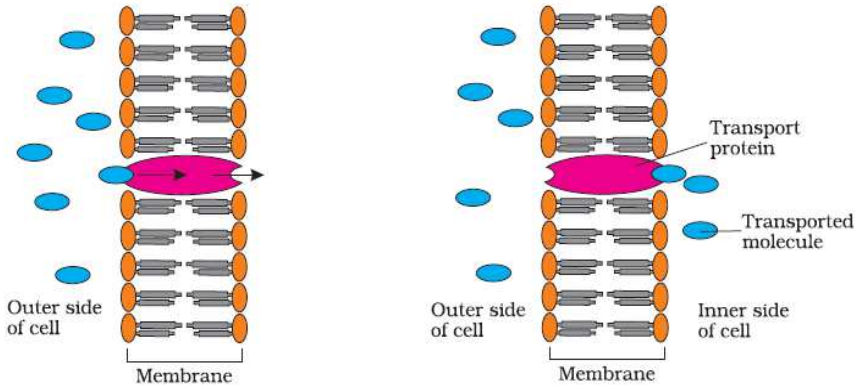
a) Archaebacteria are able to live in extreme conditions because of the branched chain lipids in their cell wall which help them to tolerate high saline conditions, high acidic or alkaline pH and extremes of temperature.

b) A couplet refers to a pair of contrasting characters, on which a key is based. Each statement in a key is called a lead.

8.

Metacentric Chromosome	Acrocentric Chromosome
The centromere is present right in the centre	The centromere is little away from the tip.
The two arms are almost equal	One arm is very long while the other is very short.

9.



Section-C

10. Respiratory substrates are those organic compounds, which are oxidised to yield energy. Glucose is the most common respiratory substrate.

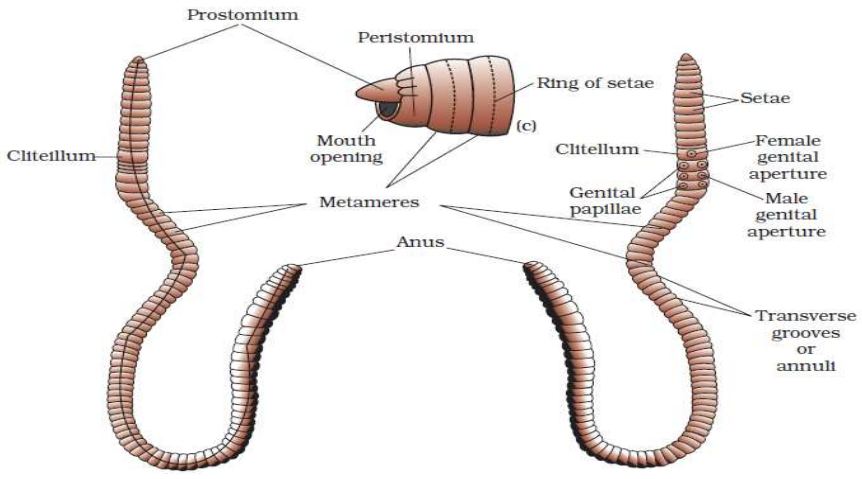
11.

Aerobic Respiration	Fermentation
It is a process in which glucose is completely broken down into carbon dioxide and water.	It is a process in which glucose is only partially oxidised to some organic compound
There is a net gain of thirty eight molecules of ATP for every molecule of glucose.	There is a net gain of only two molecules of ATP per molecule of glucose.
NADH is oxidised on the electron transport chain and the reaction is very vigorous.	NADH is slowly oxidised to NAD^+

12.

a) Chromosomes cluster at opposite spindle poles and their identity is lost as discrete elements.
b) Nuclear envelope assembles around the chromosome clusters.
c) Nucleolus, Golgi complex and ER reform.

13.



Or

- A pair of ovaries lies laterally in the 4^{th}, 5^{th} and 6^{th} segments of abdomen.
- Each ovary is formed of a group of eight ovaries, which contain rows of a ova in various stages of development; the proximal ovariole contains the youngest ova.
- The ovary continues down as a short muscular tube called oviduct.
- The right and the left oviducts unite into a median oviduct that leads into the vagina.
- Vagina opens by a slit – like opening in the 8^{th} sternum.
- A pair of spermatheca is present in the 6^{th} abdominal segment; they open into the genital chamber above the vulva and are used for storing the sperms.
- Three pairs of chitinous gonapophyses are present between the vulva and anus; they help in the deposition of ova.
- Collateral glands are branched tubular glands found on either side of the genital chamber; they help in the deposition open.

14. A photosystem is constituted by a reaction centre, other chlorophylls and accessory pigments.

PS I	PSII
It is constituted by those chlorophyll P_{700} and other pigment molecules which absorb light energy and pass on to P_{700}	It is constituted by those chlorophyll P_{680} and accessory pigments that pass on light energy to P_{680}
The reaction centre is P_{700}	The reaction centre is P_{680}
It is involved in both cyclic and non cyclic photophosphorylation.	It is involved only in non-cyclic photophosphorylation.

15.

a) Functional residual Capacity – When a person inhales and exhales in a normal way, the volume of air that remains in the lungs is known as functional residual capacity.

b) Expiratory Capacity – The volume of air that can be breathed out forcefully, after a normal inspiration, is called expiratory capacity.

c) Total Lung Capacity – It refers to the volume of air accommodated in the lungs, at the end of a forceful inspiration; it is the sum of tidal volume, inspiratory reserve volume, expiratory reserve volume and residual volume.

16. Any three points

Red Algae	Green Algae
They have characteristic pigments. R-phycoerythrin, phycocyanin, chlorophyll –a and chlorophyll –d.	They have characteristic pigments chlorophyll – a, chlorophyll –b, xanthophylls and carotene.
The reserve food materials are in the form of floridean starch.	The reserve food materials are in the form of pyrenoids and oil droplets.
Phycocolloids are present	Phycocolloids are absent.
They live in very deep marine waters	They live in moderate depths.

17. Thymus gland is located in front of the trachea in the thoracic cavity. It secretes hormone thymosin, which has a stimulating effect on the immune system. It promotes proliferation and maturation of T-lymphocytes.

18. Meiosis ensures the maintenance of a constant chromosome number, characteristic of a species. The crossing over results in variation of genetic characters in the progeny, variation is necessary for survival of species and it is the raw material for evolution.

19.

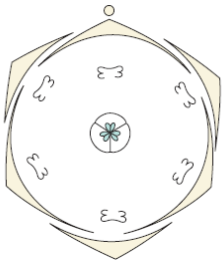
a) Mycoplasma

b) Physarum

c) Trypanosoma

d) Navicula

20.



21.

a) Both friends are sensitive about the nature and environment and tried their best to protect it.

b) Every species of food chain are essential to complete it. Each species is food for other that transfers energy and mass.

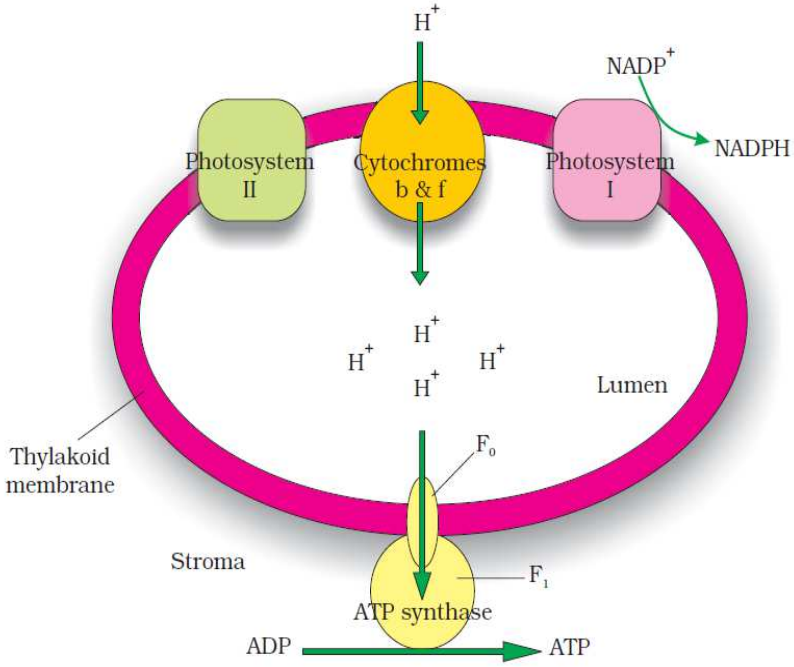
c) Snake feeds on frog and other insects that help in controlling the number of these species. If there is more frog other species on which frog feeds increase and ultimately effect the food chain.

Section-D

22.

Chemiosmotic Hypothesis

It was put forward to explain the mechanism of ATP synthesis. ATP synthesis is linked to the development of a proton gradient across the membranes of thylakoids. When electrons are transported through ETS, the protons get accumulated inside the thylakoids membrane. These protons are passed across the membrane into stroma because protons are removed from the stroma for two reasons. Firstly the primary electron acceptor is located towards the outside of the membrane and transfers its electrons to the H carrier. So this molecule removes a proton from the stroma while transporting an electron and releasing it into the lumen or inner side of the membrane. Secondly, the enzyme NADP-reductase is located on the stroma along with the electron from PSI need to be reduced to NADP.

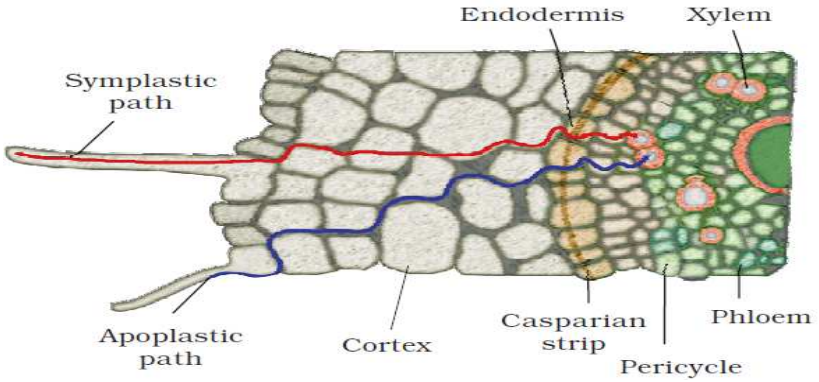


Thus as a result, the protons in the stroma get decreased creating a proton gradient across the thylakoids membrane. This gradient is important for ATP synthesis because energy is released by the breakdown of this gradient. The gradient gets broken due to the movement of protons across the membrane through trans membrane channel of the ATP synthetase. The other portion of ATP synthetase called F1 undergoes conformational changes with the energy provided by the breakdown of proton gradient and synthesizes ATP molecules.

Or

Most of the water flow in the roots occurs via the apoplast since the cortical cells are loosely packed, and hence offer no resistance to water movement. However, the inner boundary of the cortex, the endodermis, is impervious to water because of a band of suberised matrix called the casparian strip. Water molecules are unable to penetrate the layer, so they are directed to wall regions that are not suberised, into the cells proper through the membranes. The water then moves through the symplast and again crosses a membrane to reach the cells of the xylem. The movement of water through the root layers is ultimately symplastic in the endodermis. This is the only way water and other solutes can enter the vascular cylinder.

Once inside the xylem, water is again free to move between cells as well as through them. In young roots, water enters directly into the xylem vessels and/or tracheids. These are non-living conduits and so are parts of the apoplast.



23.

Or

Plastids are double membrane bound organelles of different shapes that are found only in

plant cells and contain pigments and storage products. They are classified into three types namely:

i) Leucoplasts – These are oval, spherical, rod-like colourless plastids which are found in storage organs. Their main function is to store reserve materials like starch, proteins and fats.

ii) Chromoplasts – These are coloured plastids containing yellow, red and orange pigments (carotene and xanthohyll). These are found in petals of flowers and skin of fruits. They attract agents for pollination and dispersal of fruits/seeds.

iii) Chloroplasts – These are green plastids containing mainly chlorophylls and little carotene and xanthophylls. Their main function is photosynthesis and formation of starch.