Sample Paper –04
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 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. Give two examples as to how ABA acts as a stress hormone in plants.
7. Differentiate fascicular cambium from cork cambium.

Or

Justify that all underground parts of a plant are not always roots.

8. Mention the differences between Gram positive ad Gram negative bacteria.
9. What are aqueous humor and vitreous humor? Mention their functions?

Section – C

10. Bring out the role of haemoglobin in the transport of respiratory gases.
11. How is a nerve impulse conducted along a non- myelinated nerve fibre
12. Draw the different types of aestivation.
13. Explain briefly about the phloem parenchyma and phloem fibres.
14. Draw a graph to explain the concept of activation of energy.
15. What are tap root system and fibrous root system? Give an example for each.
16. Explain cell theory.
17. Write a note on primary and secondary structure of proteins with a neat sketch.

18. What are the key features of metaphase and prophase?
19. Draw a well labelled diagram of head region of a cockroach.

Or

Draw a labelled diagram of structure of neuron.

20. Explain the role of calcium to plants.
21. Rashmi was a social worker in rural area. One day she met a lady. The lady discussed her problem about forceful termination of her Foetus for many times due to female child. Next day, Rashmi meets the parents in laws of the lady and explained about the importance of girl child. Next time the lady was not forced to undergo termination.
    (a) What values do you find in Rashmi?
    (b) Which procedure is used to know the sex of Foetus?
    (c) How this practice is unlawful?

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 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. (a) ABA induces dormancy in seeds and helps them to withstand desiccation and other unfavourable factors.
   (b) It stimulates the closure of stomain under intense solar radiation and drought and increase the tolerance of plants to water scarcity and various other stresses; so it is called as stress hormone.
7.

Fascicular Cambium	Cork Cambium
It is the meristem in the stellar region, inside the vascular bundles.	It is the meristem outside the stellar region.
It produces secondary vascular tissues.	It produces secondary protective and storage tissues.
It is a primary meristem formed from procambium.	It is a secondary meristem, formed from the peripheral layers of cortex.

Or

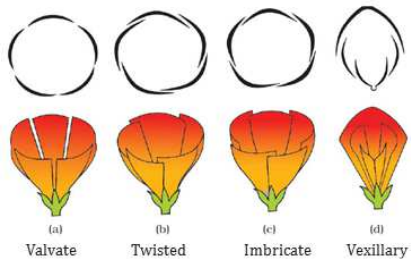
Some plants like potato, ginger, onion and colocasia have underground stems. Underground stems show nodes and internodes. They also have terminal buds and axillary buds so they cannot be called as root.

8.

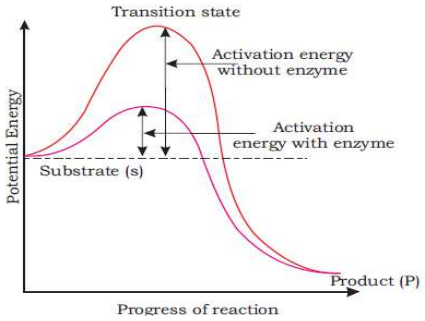
Gram Positive Bacteria	Gram Negative Bacteria
These bacteria retain a purple/blue colour after washing with alcohol.	These bacteria do not retain any colour after washing with alcohol.
Cell wall is thick, about 20 – 80 nm in thickness.	Cell wall is thin about 8 – 12nm in thickness.
Peptidoglycan is about 70 – 80% of the cell wall.	Petidoglycan is about 20 – 30% of the cell wall.

9. Aqueous humor is found in the anterior chamber of the eye. i.e between cornea and the lens. It supports the lens and cause refraction for image formation on retina.
   Vitreous humor is found in the space between the lens and the retina. It supports the lens and help in maintaining the shape and size of eye ball.

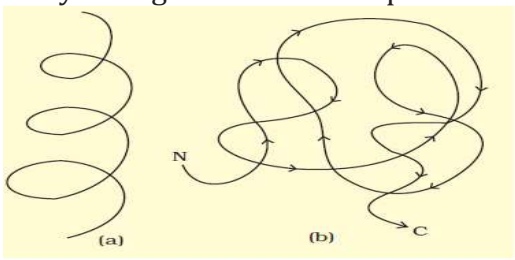
Section-C

10. The role of haemoglobin in the transport of respiratory gases.
    Oxygen is transported as oxyhaemoglobin in the erythrocytes. Oxygen binds to the Fe^{2+} part of haem and is carried as oxyhaemoglobin. Each molecule of haemoglobin can transported a maximum of four molecules of oxygen. Carbon dioxide is transported as carbaminohaemoglobin. CO_2 combines with the amino radical of globin part of haemoglobin. About 23% of CO_2 is transported in this form.
11. In a resting nerve fibre the axoplasm is electronegative and the exterior is electropositive. This state of the resting membrane is called polarized state. When a threshold stimulus is applied, the resting membrane potential undergoes a change to become action potential, where the interior or axoplasm becomes electropositive and the outside is electronegative. Consequent to depolarization, cations diffuse through the cytoplasm from the electropositive depolarized part of the membrane to the electronegative polarized part. This flow of ions depolarizes the next region diffuse through the ECF to the electronegative region on the outer side.
12. 

13. Phloemparenchymais made up of elongated, tapering cylindrical cells which have dense cytoplasm and nucleus. The cell wall is composed of cellulose and has pits through which plasmodesmatal connections exist between the cells. The phloem parenchyma stores food material and other substances like resins, latex and mucilage. Phloem parenchyma is absent in most of the monocotyledons. Phloemfibres(bastfibres) are made up of Sclerenchymatous cells. These are generally absent in the primary phloem but are found in the secondary phloem. These are much elongated, unbranched and have pointed, needle like apices. The cell wall of phloem fibres is quite thick. At maturity, these fibres lose their protoplasm and become dead. Phloem fibres of jute, flax and hemp are used commercially.
14.

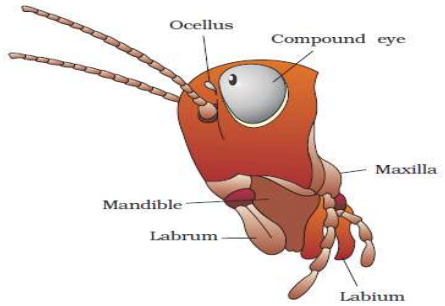


15. The primary roots and its branches constitute the tap root system. Example – Mustard Plant. In monocot plants, the primary root is short lived and is replaced by a large number of roots. These roots originate from the base of the stem and constitute the fibrous root system. Example - Wheat plant.
16. Cell theory defines as:
    (i) All living organisms are composed of cells and products of cells.
    (ii) All cells arise from pre-existing cells.
17. In proteins, only right handed helices are observed. Other regions of the protein thread are folded into other forms in what is called the secondarystructure. In addition, the long protein chain is also folded upon itself like a hollow woollen ball, giving rise to the tertiarystructure**.** This gives us a 3D view of a protein. Tertiary structure is necessary for the many biological activities of proteins.

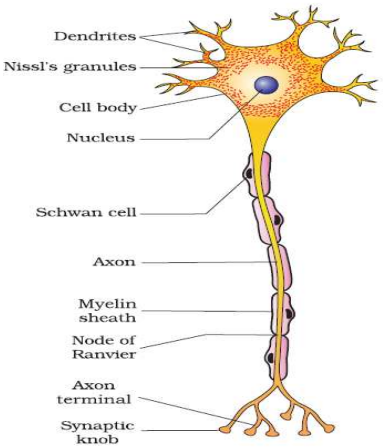


Cartoon showing : (a) A secondary structure and (b) A tertiary structure of proteins

18. The key features of metaphase are:
    (i) Spindle fibres attach to kinetochores of chromosomes.
    (ii) Chromosomes are moved to spindle equator and get aligned along metaphase plate through spindle fibres to both poles.
    (iii) The completion of prophase can thus be marked by the following characteristic events:
    (iv) Chromosomal material condenses to form compact mitotic chromosomes. Chromosomes are seen to be composed of two chromatids attached together at the centromere.
    (v) Initiation of the assembly of mitotic spindle, the microtubules, the proteinaceous components of the cell cytoplasm help in the process.
19.



Or

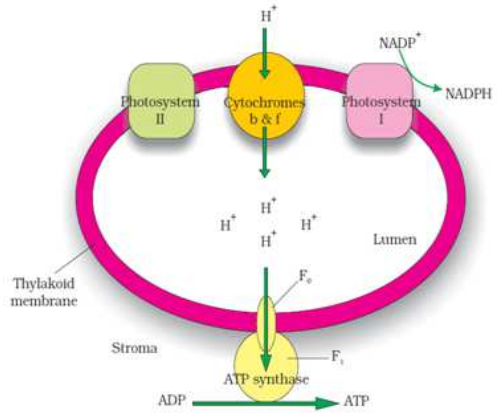


20. Plant absorbs calcium from the soil in the form of calcium ions (Ca^{2+}). Calcium is required by meristematic and differentiating tissues. During cell division it is used in the synthesis of cell wall, particularly as calcium pectate in the middle lamella. It is also needed during the formation of mitotic spindle. It accumulates in older leaves. It is involved in the normal functioning of the cell membranes. It activates certain enzymes and plays an important role in regulating metabolic activities.
21. (a) Rashmi was a social worker and bounded to her duty about the society.
    (b) The most common method used to determine the sex of undelivered child is ultrasound technique.
    (c) The Determination of sex of Foetus is unlawful practice as this enable the parents to select the sex of the baby that may cause the termination in search of boy.

Section-D

22. Chemiosmotic Hypothesis

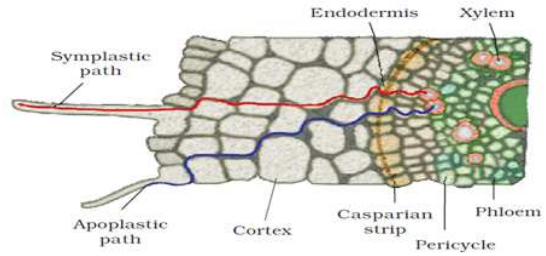
    It was put forward to explain the mechanism of ATP synthesis. ATP synthesis is linked to the development of a proton gradient across the membranes of thylakoids. When electrons are transported through ETS, the protons get accumulated inside the thylakoids membrane. These protons are passed across the 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.

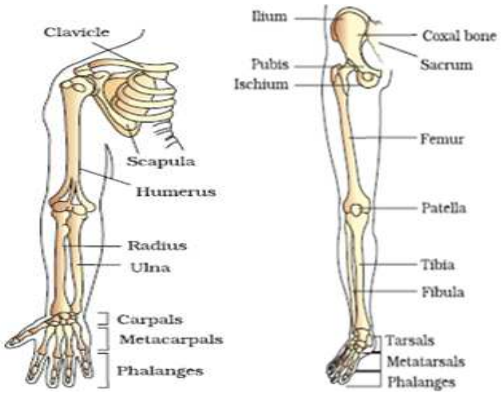
Or

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:

(a) 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.

(b) 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.

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