CBSE SAMPLE PAPER – 13 (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 is reflex action?
2. Name the four types of human adult teeth.
3. Where is parapodia seen? What is its function?
4. What is an inhibitor?
5. Define translocation.

Section – B

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

8. What are (i) Viroids and (ii) phycobionts?

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

Or

Differentiate between essential amino acids and non-essential amino acids.

Section – C

10. What are tap root system and fibrous root system? Give an example for each.

11. Explain cell theory.

12. Write a note on primary and secondary structure of proteins with a neat sketch.

13. What are the key features of metaphase and prophase?

14. Draw a well labelled diagram of head region of a cockroach.

Or

Draw a labelled diagram of structure of neuron.

15. Bring out the role of haemoglobin in the transport of respiratory gases.

16. How is a nerve impulse conducted along a non- myelinated nerve fibre

17. Write a short note on euglenoids with the structure of Euglena.

18. Explain briefly about the phloem parenchyma and phloem fibres.

19. Draw a graph to explain the concept of activation of energy.

20. Explain the role of calcium to plants.

21. **Alok was young intelligent boy. When he applied for driving license, the authority official rejects their application on medical ground as he was not able to distinguish between red and green colours. He tried to bribe the inpector of authority but he rejected the same.**

a. What values do you find in authority inspector?

b. What name is given to this kind of disease?

c. Is this disease can be treated using medicine, why or why not ?

Section – D

22. Explain in detail about Solanaceae.

Or

Give the physiological effects of Gibberellins and Cytokinins

23. What are the factors that affect photosynthesis?

Or

What are the disorders of muscular and skeletal system?

Section-E (OTBA) Questions

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

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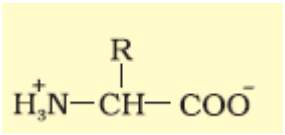
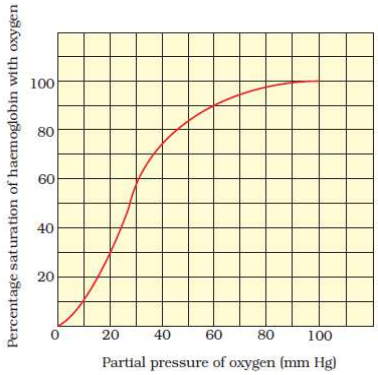
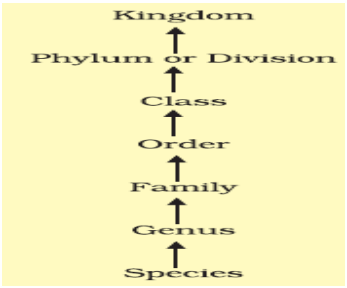
ANSWERS

Section-A

1. In some animals, the body is externally and internally divided into segments with a serial repetition of at least some organs is called metamerism. Eg – Earthworm.

2. 

3. 

4. 

5. Reptiles, birds, land snails and insects excrete nitrogenous wastes as uric acid in the form of pellet or paste with a minimum loss of water and are called uricotelic animals.

Section-B

6. The solution is said to be isotonic if it balances the osmotic pressure of the cytoplasm. i.e., it has the same solute concentration.

7. Mesosomes are the extensions of the plasma membrane into the cell especially in prokaryotes. They may be in the form of (i) vesicles (ii) tubules and (iii) lamellae.

Functions:

a) They are involved in cell wall formation during cell division.

b) They help in DNA replication and its distribution to daughter cells.

8.

Dicot Root	Monocot Root
Vascular bundles are usually tetrarch.	Vascular bundles are polyarch
Pericycle is involved in secondary growth and is not lignified.	Pericycle becomes lignified, since it is not involved in secondary growth.

9.

i) Gelidium, Gracilaria.

ii) It is the phenomenon in which there is alternation between the gametophytic haploid phase and the sporophyte / diploid phase of the life cycle.

Or

Heterosporous ferns are ferns that produce two types of spores, namely microspores and megaspores. Examples – Marsilea, Salvinia.

Section-C

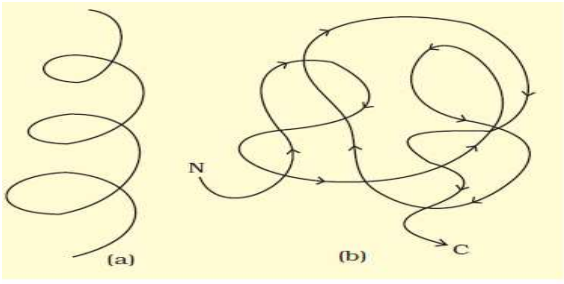
10. The primary roots and its branches constitute the tap root system. Example – Mustard Plant. In monocot plants, the primary root is short lived and is replaced by a large number of roots. These roots originate from the base of the stem and constitute the fibrous root system. Example - Wheat plant.

11. Cell theory defines as:

(i) All living organisms are composed of cells and products of cells.

(ii) All cells arise from pre-existing cells.

12. In proteins, only right handed helices are observed. Other regions of the protein thread are folded into other forms in what is called the secondary structure. In addition, the long protein chain is also folded upon itself like a hollow woollen ball, giving rise to the tertiary structure**.** 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

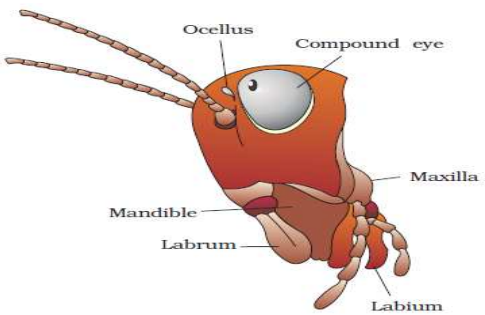
13. The key features of metaphase are:

- Spindle fibres attach to kinetochores of chromosomes.
- Chromosomes are moved to spindle equator and get aligned along metaphase plate through spindle fibres to both poles.

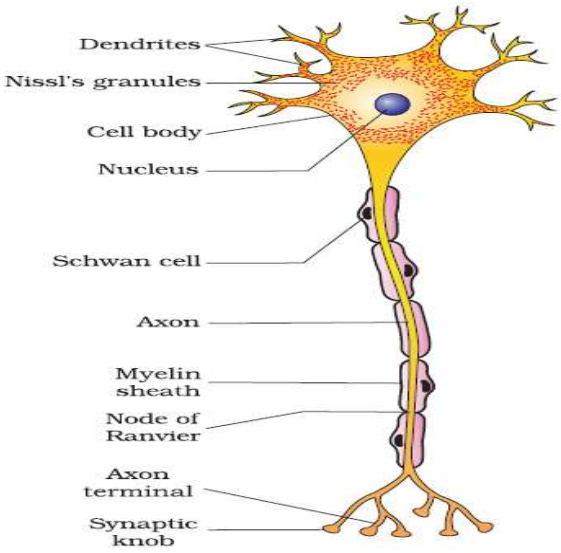
The completion of prophase can thus be marked by the following characteristic events:

- Chromosomal material condenses to form compact mitotic chromosomes. Chromosomes are seen to be composed of two chromatids attached together at the centromere.
- Initiation of the assembly of mitotic spindle, the microtubules, the proteinaceous components of the cell cytoplasm help in the process.

14.



Or



15. The role of haemoglobin in the transport of respiratory gases.

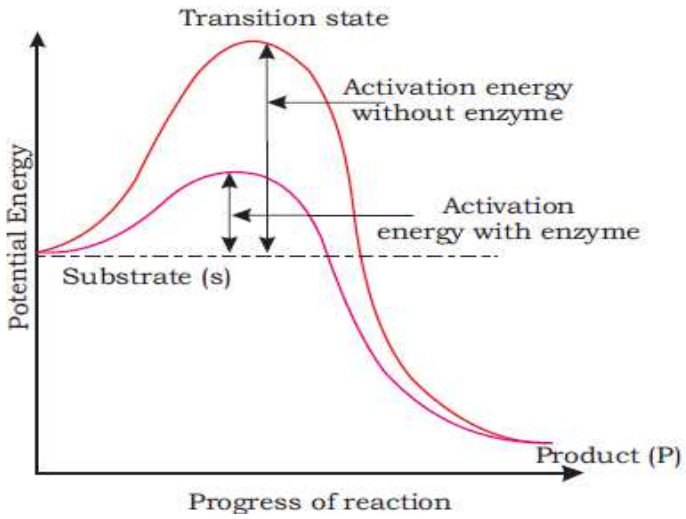
Oxygen is transported as oxyhaemoglobin in the erythrocytes. Oxygen binds to the Fe^{2+} part of haem and is carried as oxyhaemoglobin. Each molecule of haemoglobin can transported a maximum of four molecules of oxygen. Carbon dioxide is transported as carbaminohaemoglobin. CO_2 combines with the amino radical of globin part of haemoglobin. About 23% of CO_2 is transported in this form.

16. 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.

17. Instead of a cell wall, they have a protein rich layer called pellicle which makes their body flexible. They have two flagella, a short and a long one. Though they are photosynthetic in the presence of sunlight, when deprived of sunlight they behave like heterotrophs by predating on other smaller organisms. Interestingly, the pigments of euglenoids are identical to those present in higher plants. Example: Euglena.

18. Phloem parenchyma is 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. Phloem fibres (bast fibres) 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.

19.



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) The authority inspector was honest and responsible to socity.

b) This type is disease is called colour blindness.

c) The colour blindness is a genetic disease, hence it cannot be treated by medicine.

Section-D

21. It is a large family, commonly called as the 'potato family'. It is widely distributed in tropics, subtropics and even temperate zones.

Vegetative Characters: Plants mostly, herbs, shrubs and small trees

Stem: herbaceous rarely woody, aerial; erect, cylindrical, branched, solid or hollow, hairy or glabrous, underground stem in potato (Solanum tuberosum)

Leaves: alternate, simple, rarely pinnately compound, exstipulate; venation reticulate

Floral Characters

Inflorescence: Solitary, axillary or cymose as in Solanum

Flower: bisexual, actinomorphic

Calyx: sepals five, united, persistent, valvate aestivation

Corolla: petals five, united; valvate aestivation

Androecium: stamens five, epipetalous

Gynoecium: bicarpellary, syncarpous; ovary superior, bilocular, placenta swollen with many ovules

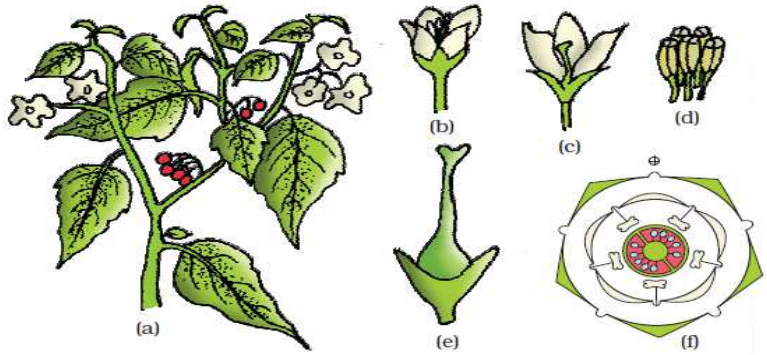
Fruits: berry or capsule

Seeds: many, endospermous

Floral Formula: $\oplus \, ♀♂ \, K_{(5)} \, \overset{\frown}{C_{(5)}} \, A_{(5)} \, \underline{G}_{(2)}$

Economic Importance

Many plants belonging to this family are source of food (tomato, brinjal, potato), spice (chilli); medicine (belladonna, *ashwagandha*); fumigatory (tobacco); ornamentals (petunia).



Solanum nigrum (makoi) plant : (a) Flowering twig (b) Flower (c) L.S. of flower (d) Stamens (e) Carpel (f) Floral diagram

Or

Gibberellins are another kind of promoter PGR. There are more than 100 gibberellins reported from widely different organisms such as fungi and higher plants. They are denoted as GA1, GA2, GA3 and so on. However, Gibberellic acid (GA3) was one of the first gibberellins to be discovered and remains the most intensively studied form. All gas are acidic. They produce a wide range of physiological responses in the plants. Their ability to cause an increase in length of axis is used to increase the length of grapes stalks. Gibberellins, cause fruits like apple to elongate and improve its shape. They also delay senescence. Thus, the fruits can be left on the tree longer so as to extend the market period. GA3 is used to speed up the malting process in brewing industry. Sugarcane stores carbohydrate as sugar in their stems. Spraying sugarcane crop with gibberellins increases the length of the stem, thus increasing the yield by as much as 20 tonnes per acre. Spraying juvenile conifers with GAs hastens the maturity period, thus leading to early seed production. Gibberellin also promotes bolting (internode elongation just prior to flowering) in beet, cabbages and many plants with rosette habit.

Cytokinins have specific effects on cytokinesis, and were discovered as kinetin (a modified form of adenine, a purine) from the autoclaved herring sperm DNA. Kinetin does not occur naturally in plants. Search for natural substances with cytokinin-like activities led to the isolation of zeatin from corn-kernels and coconut milk. Since the discovery of zeatin, several naturally occurring cytokinins, and some synthetic compounds with cell division promoting activity, have been identified. Natural cytokinins are synthesized in regions where rapid cell division occurs, for example, root apices, developing shoot buds, young fruits etc. It helps to produce new leaves, chloroplasts in leaves, lateral shoot growth and adventitious shoot formation. Cytokinins help overcome the apical dominance. They promote nutrient mobilisation which helps in the delay of leaf senescence.

22. The following factors affect photosynthesis:-

Light

There is a linear relationship between incident light and CO_2 fixation rates at low light intensities. At higher light intensities, gradually the rate does not show further

increase as other factors become limiting. The light saturation occurs at 10 per cent of the full sunlight. Hence, except for plants in shade or in dense forests, light is rarely a limiting factor in nature. Increase in incident light beyond a point causes the breakdown of chlorophyll and a decrease in photosynthesis.

Carbon dioxide

Carbon dioxide is the major limiting factor for photosynthesis. The concentration of CO_2 is very low in the atmosphere (between 0.03 and 0.04 per cent). Increase in concentration upto 0.05 per cent can cause an increase in CO_2 fixation rates; beyond this the levels can become damaging over longer periods. The C3 and C4 plants respond differently to CO_2 concentrations. At low light conditions neither group responds to high CO_2 conditions. At high light intensities, both C3 and C4 plants show increase in the rates of photosynthesis. The fact that C3 plants respond to higher CO_2 concentration by showing increased rates of photosynthesis leading to higher productivity has been used for some greenhouse crops such as tomatoes and bell pepper. They are allowed to grow in carbon dioxide enriched atmosphere that leads to higher yields.

Temperature

The dark reactions being enzymatic are temperature controlled. Though the light reactions are also temperature sensitive they are affected to a much lesser extent. The C4 plants respond to higher temperatures and show higher rate of photosynthesis while C3 plants have a much lower temperature optimum. The temperature optimum for photosynthesis of different plants also depends on the habitat that they are adapted to. Tropical plants have a higher temperature optimum than the plants adapted to temperate climates.

Water

Even though water is one of the reactants in the light reaction, the effect of water as a factor is more through its effect on the plant, rather than directly on photosynthesis. Water stress causes the stomata to close hence reducing the CO_2 availability. Besides, water stress also makes leaves wilt, thus, reducing the surface area of the leaves and their metabolic activity as well.

Or

Myasthenia gravis: Auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

Muscular dystrophy: Progressive degeneration of skeletal muscle mostly due to genetic disorder.

Tetany: Rapid spasms (wild contractions) in muscle due to low Ca++ in body fluid.

Arthritis: Inflammation of joints.

Osteoporosis: Age-related disorder characterized by decreased bone mass and increased chances of fractures. Decreased levels of estrogen are a common cause.

Gout: Inflammation of joints due to accumulation of uric acid crystals.