CBSE SAMPLE PAPER –04 (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. Define kinetochore.
2. Give the overall reaction of photosynthesis.
3. What is meant by compensation point?
4. What is the meaning of double circulation?
5. Why blood plasma is pale yellow in colour?

Section – B

6. What is the role of HCl in protein digestion?

7. What are the stilt roots? Give two examples.

8. Define guttation, hydathodes and transpiration.

9. What is Glycolysis? Name two monosaccharide which readily enter the glycolytic pathway.

Or

Differentiate cytokinesis in plant cell and cytokinesis in animal cell.

Section – C

10. Draw the structure showing secondary structure of DNA.

11. How do you perceive the colour of an object?

12. Draw a labelled diagram of closed circulatory system of earthworm.

Or

Draw labelled diagram of T.S. of dicot root.

13. Differentiate male and female Ascaris.

14. Explain the different categories of animals based on the presence or absence of coelom.

15. Write difference between antiport and symport?

16. What is night blindness? What lacks in the eye in this condition? Give one remedy.

17. Name the watery fluid secreted from Brunner's gland in the duodenum. Mention any two characteristics. Give its role inside duodenum.

18. List various functions of epithelial tissue.

19. Draw a labelled diagram of any four types of placentation.

20. Differentiate cyclic photophosphorylation and non-cyclic photophosphorylation.

21. **Rakesh and Karim lives in colony. One day Rakesh cut his hand with kitchen knife while making some project work. He observed that bleeding is not getting stopped in spite of using antiseptic lotion for very long period of time. He called Karim and told the case about the not stopping of blood. He at once took him to a clinic where doctor diagnosis that it is a genetic disease.**

a. What values do you find in Karim?

b. Name the disease to which ?Rakesh is suffering from?

c. Is this disease be treated using medicine permanently? Why or why not?

Section – D

22. Write a short note on pectoral and pelvic girdle with the help of diagram.

Or

"Transpiration and photosynthesis – a compromise". Comment.

23. Write a note on proteins. Name some important proteins found in humans. Give their functions.

Or

Describe briefly the chemical steps in Calvin cycle.

Section-E (OTBA) Questions

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

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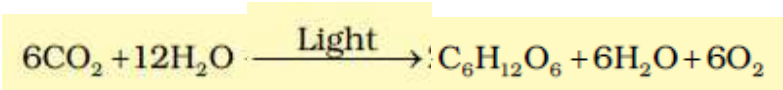
ANSWERS

Section-A

1. A structure at the centromere to which the spindle fibres are attached is called kinetochore.
2. 

3. The light intensity at which the rate of respiration by photosynthetic cell or organ equals its rate of photosynthesis is called compensation point.
4. The double circulatory system of blood flow refers to the separate systems of pulmonary circulation and systemic circulation in amphibians, birds and mammals.
5. Due to presence of bilirubin.

Section-B

6.

a) It maintains a strongly acidic pH of about 1 – 2 in the stomach.

b) It converts inactive pepsinogen to pepsin.

c) It denatures many food proteins. This helps in pepsin action.

d) It kills bacteria.

7. The stilt roots are adventitious roots which arise in clusters from the basal nodes just above the ground providing support to the plants. Examples – maize and sugarcane.

8. Transpiration is the loss of surplus water in the form of water vapour from the aerial surface of plants.

Guttation is the loss of water in the form of water droplets.

When guttation takes place from venial ends called hydathodes.

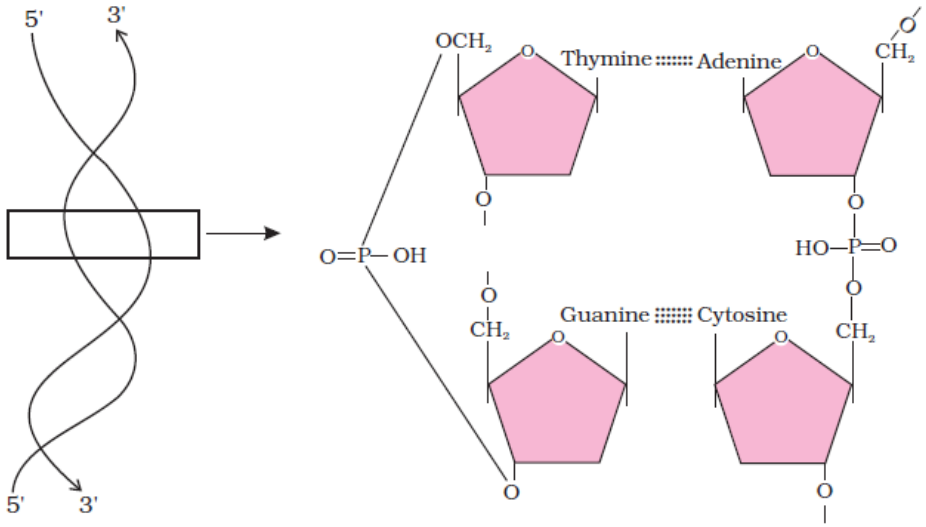
9. It is the process in which one molecule of glucose is broken down into two molecules of pyruvic acid. Glucose and fructose enter the glycolytic pathway.

Or

Cytokinesis in plant cell	Cytokinesis in animal cell
It occurs by the formation of cell plate.	It takes place by furrowing or cleavage.
Cell plate grows centrifugally.	Cleave progresses centripetally.
Cell plate is formed between the new nuclei and then expands outward to join with the old membranes.	A cleavage is formed around the middle.

Section-C

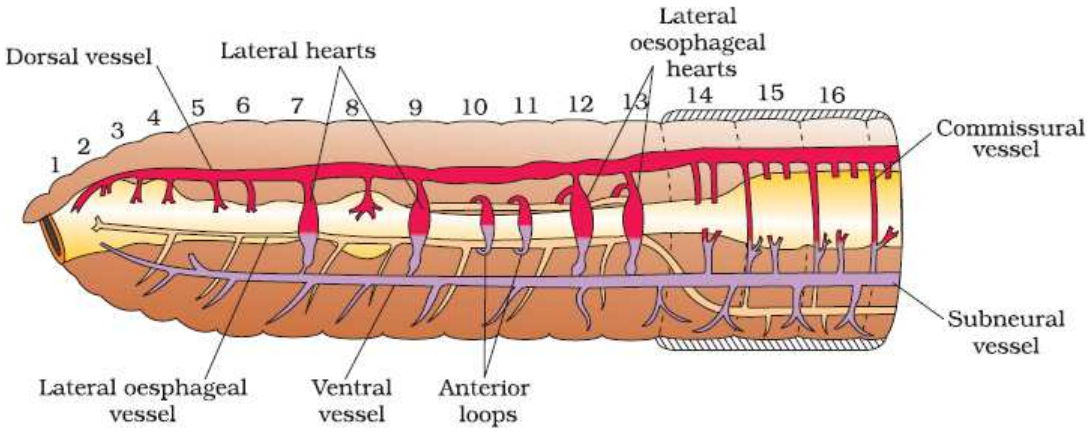
10. Structure of DNA



11. Light is perceived by the photopigments in the receptors. Light induced dissociation of iodopsin in the cone cells changes the structure of opsin. The potential differences are caused

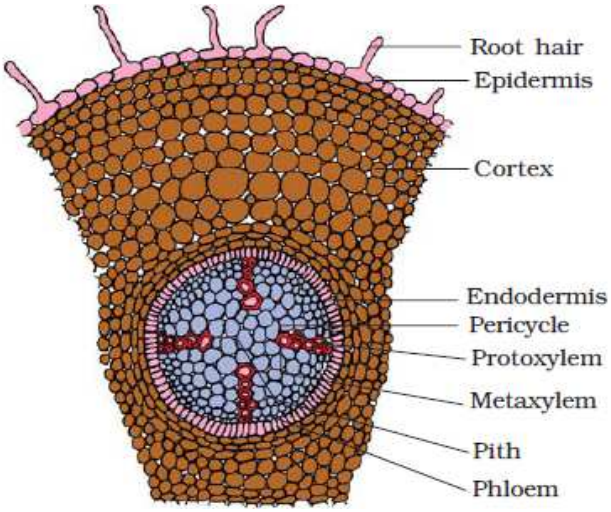
in the photoreceptor cells. This produces a signal that generates action potential in the ganglion cells through bipolar cells. They are transmitted to the optic nerves to the visual cortex of the brain and image formed is recognized.

12. Circulatory system of earthworm:-



Or

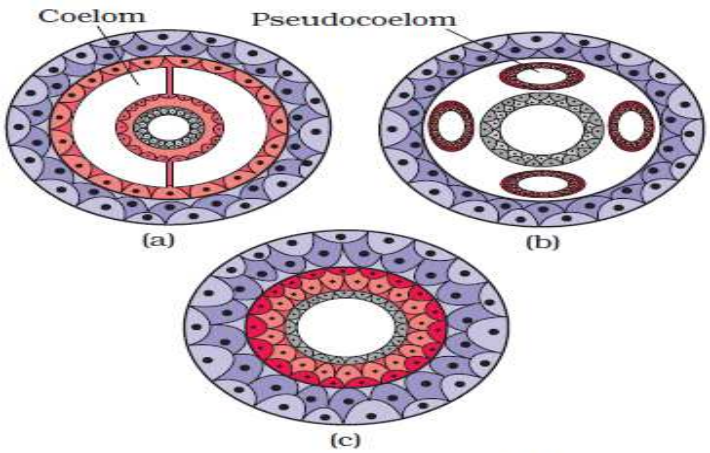
T.S of dicots root:-



13.

Male Ascaris	Female Ascaris
a) Smaller than female about 15-30 cm long.	a) Longer than male about 20-40 cm long.
b) Opening at posterior end is cloacal aperture.	b) Opening at posterior end is cloacal anus.
c) Two penial spicules project from the cloacal aperture.	c) There are no penial spicules.
d) In copulation, the male coils itself around the female.	d) In copulation, the female remains straight.

14. Presence or absence of a cavity between the body wall and the gut wall is very important in classification. The body cavity, which is lined by mesoderm, is called coelom. Animals possessing coelom are called coelomates, e.g.,annelids, molluscs, arthropods, echinoderms, hemichordates and chordates. In some animals, the body cavity is not lined by mesoderm; instead, the mesoderm is present as scattered pouches in between the ectoderm and endoderm. Such a body cavity is called pseudocoelom and the animals possessing them are called pseudocoelomates, e.g., aschelminthes. The animals in which the body cavity is absent are called acoelomates, e.g., platyhelminthes.



Diagrammatic sectional view of :
(a) Coelomate (b) Pseudocoelomate
(c) Acoelomate

15. Some carrier or transport proteins allow diffusion only if two types of molecules move together. When the transported molecule and the co-transported molecule move in the same direction, the process is called symport.

When the two molecules move across the membrane in opposite directions, the process is called antiport. When a molecule moves across a membrane independent of other molecules, the process is called uniport.

16. Night blindness is a vitamin A deficiency characterized by poor vision in dim light. It occurs due to lack of rhodopsin in the rod cells of the retina. It can be remedied by having food materials rich in vitamin A like carrot, papaya etc.

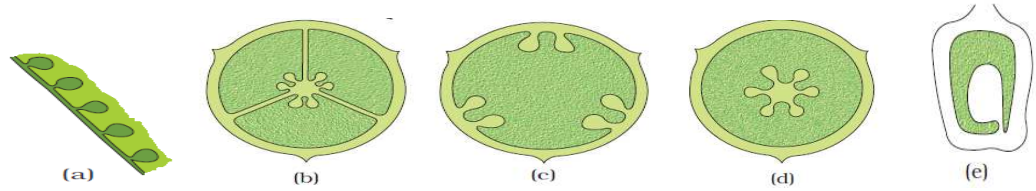
17. The Brunner's gland secretes mucoid fluid. It has the following characteristics:-

a) It is viscous and enzyme-free
b) It is alkaline.
c) It enables duodenum to withstand the acid chyme and protects its wall from getting digested.

18. 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.
e) Excretion – The epithelial tissue in kidney excretes waste products from the body and reabsorbs needed materials from the urine.

19. Types of placentation:-



20.

Cyclic photophosphorylation	Non-cyclic photophosphorylation
The electrons emitted by PSI come back to same PSI chlorophyll.	The electrons emitted by PSII do not come back to same PSII.
It involves PSI.	It involves PSII.
It forms 2 ATP molecules.	It forms one ATP molecules.
No photolysis or NADPH occurs.	There is photolysis of water and production of NADPH.
Oxygen is not liberated.	Oxygen is liberated.

21.

a. Karim was caring to other and shown his intelligence at time of need.

b. Rakesh was suffering from a disease called hemophilia.

c. No, this disease cannot be cured by using medicine permanently, because this disease is inherited genetically from parents. This disease occurs due to alteration of a sex chromosome of father or mother.

Section-D

22. Pectoral and Pelvic girdle bones help in the articulation of the upper and the lower limbs respectively with the axial skeleton. Each girdle is formed of two halves. Each half of pectoral girdle consists of a clavicle and a scapula. Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs. The dorsal, flat, triangular body of scapula has a slightly elevated ridge called the spine which projects as a flat, expanded process called the acromion. The clavicle articulates with this. Below the acromion is a depression called the glenoid cavity which articulates with the head of the humerus to form the shoulder joint. Each clavicle is a long slender bone with two curvatures. This bone is commonly called the collar bone.

Pelvic girdle consists of two coxal bones. Each coxal bone is formed by the fusion of three bones – ilium, ischium and pubis. At the point of fusion of the above bones is a cavity called acetabulum to which the thigh bone articulates. The two halves of the pelvic girdle meet ventrally to form the pubic symphysis containing fibrous cartilage.

Or

Transpiration has more than one purpose such as: -

• It creates transpiration pull for absorption and transport of plants.

• It supplies water for photosynthesis.

• It transports minerals from the soil to all parts of the plant.

• It cools leaf surfaces, sometimes 10 to 15 degrees, by evaporative cooling.

• It maintains the shape and structure of the plants by keeping cells turgid.

An actively photosynthesizing plant has an insatiable need for water. Photosynthesis is limited by available water which can be swiftly depleted by transpiration. The humidity of rainforests is largely due to this vast cycling of water from root to leaf to atmosphere and back to the soil.

The evolution of the C_4 photosynthetic system is probably one of the strategies for maximising the availability of CO_2 while minimising water loss. C_4 plants are twice as efficient as C_3 plants in terms of fixing carbon (making sugar). However, a C_4 plant loses only half as much water as a C_3 plant for the same amount of CO_2 fixed.

23. Proteins are polypeptides. They are linear chains of amino acids linked by peptide bonds. Each protein is a polymer of amino acids. As there are 21 types of amino acids (e.g., alanine, cysteine, proline, tryptophan, lysine, etc.), a protein is a heteropolymer and not a homopolymer. A homopolymer has only one type of monomer repeating 'n' number of times. Certain amino acids are essential for our health and they have to be supplied through our diet. Hence, dietary proteins are the source of essential amino acids. Therefore, amino acids can be essential or non-essential. The latter are those which our body can make, while we get essential amino acids through our diet/food.

Some Proteins and their Functions

Protein	Functions
Collagen	Intercellular ground substance
Trypsin	Enzyme
Insulin	Hormone
Antibody	Fights infectious agents
Receptor	Sensory reception (smell, taste, hormone, etc.)
GLUT-4	Enables glucose transport into cells

Proteins carry out many functions in living organisms, some transport nutrients across cell membrane, some fight infectious organisms, some are hormones, some are enzymes, etc. Collagen is the most abundant protein in animal world and Ribulose bisphosphate Carboxylase-Oxygenase (RUBISCO) is the most abundant protein in the whole of the biosphere.

Or

Calvin and his co-workers then worked out the whole pathway and showed that the pathway operated in a cyclic manner; the RuBP was regenerated. Let us now see how the Calvin pathway operates and where the sugar is synthesised. Let us at the outset understand very clearly that the Calvin pathway occurs in all photosynthetic plants; it does not matter whether they have C3 or C4 (or any other) pathways.

There are three stages in Calvin cycle: carboxylation, reduction and regeneration.

Carboxylation – Carboxylation is the fixation of CO2 into a stable organic intermediate. Carboxylation is the most crucial step of the Calvin cycle where CO2 is utilised for the carboxylation of RuBP. This reaction is catalysed by the enzyme RuBP carboxylase which results in the formation of two molecules of 3-PGA. Since this enzyme also has an oxygenation activity it would be more correct to call it RuBP carboxylase-oxygenase or RuBisCO.

Reduction – These are a series of reactions that lead to the formation of glucose. The steps involve utilisation of 2 molecules of ATP for phosphorylation and two of NADPH for reduction per CO2 molecule fixed. The fixation of six molecules of CO2 and 6 turns of the cycle are required for the removal of one molecule of glucose from the pathway.

Regeneration – Regeneration of the CO2 acceptor molecule RuBP is crucial if the cycle is to continue uninterrupted. The regeneration steps require one ATP for phosphorylation to form RuBP.

Hence for every CO2 molecule entering the Calvin cycle, 3 molecules of ATP and 2 of NADPH are required. It is probably to meet this difference in number of ATP and NADPH used in the dark reaction that the cyclic phosphorylation takes place

In	Out
Six CO_2	One glucose
18 ATP	18 ADP
12 NADPH	12 NADP