

SAMPLE QUESTION PAPER-E

Section-A

1. These are cells that line the inner cavity of the sponge. 1
2. The lampreys differ from the familiar fishes by the absence of jaws, paired fins and presence of gill pockets in place of gill covers. 1
3. (a) Sarcolemma and (b) Nerve. 1
4. A structure at the centromere to which the spindle fibres are attached is called kinetochore. 1
5. The light intensity at which the rate of respiration by photosynthetic cell or organ equals its rate of photosynthesis is called compensation point. 1

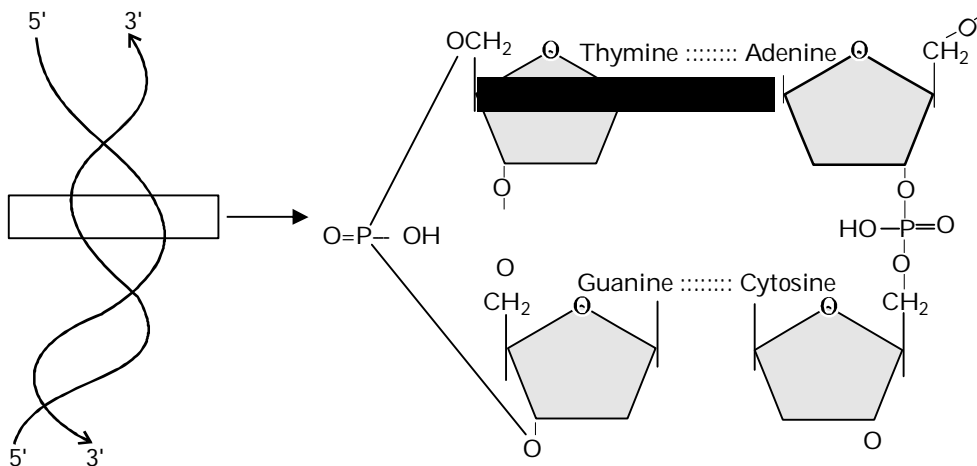
Section-B

6. (i) It maintains a strongly acidic pH of about 1 – 2 in the stomach.
 (ii) It converts inactive pepsinogen to pepsin.
 (iii) It denatures many food proteins. This helps in pepsin action.
 (iv) It kills bacteria. 2
7. The non-protein moiety of a conjugate enzyme is called a cofactor. It makes the protein catalytically active. It is are of three types namely, prosthetic group, coenzyme and metal ions. (Any two) 2

	Calorific value	Physiological value
8.	(i) The value of carbohydrates, proteins and fats are 4.1 kcal/g, 5.65 kcal/g and 9.45 kcal/g respectively. (ii) The amount of heat liberated from complete combustion of 1g food in a bomb calorimeter is its gross calorific value.	The value of carbohydrates, proteins and fats are 4.0 kcal/g, 4.0 kcal/g and 9.0 kcal/g respectively. The actual amount of energy liberated in the human body due to combustion of 1g of food is its physiological value.

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. 2

10.



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

2

Section-C

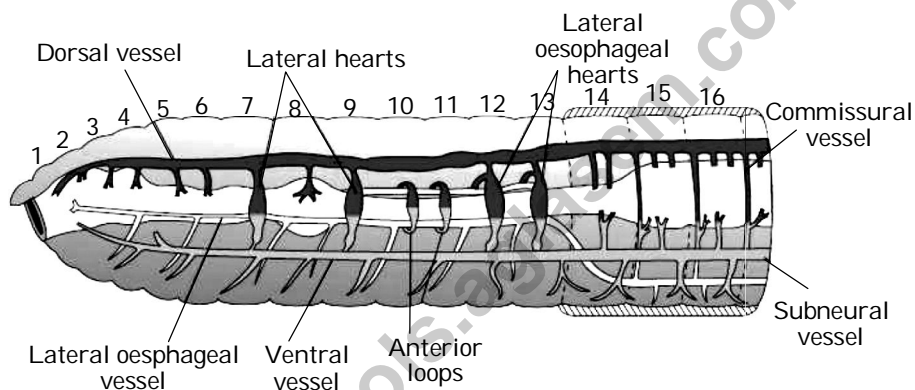
11. Transpiration is the loss of surplus water in the form of water vapours from the aerial surface of plants.

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

Guttation takes place from veinal ends called hydathodes.

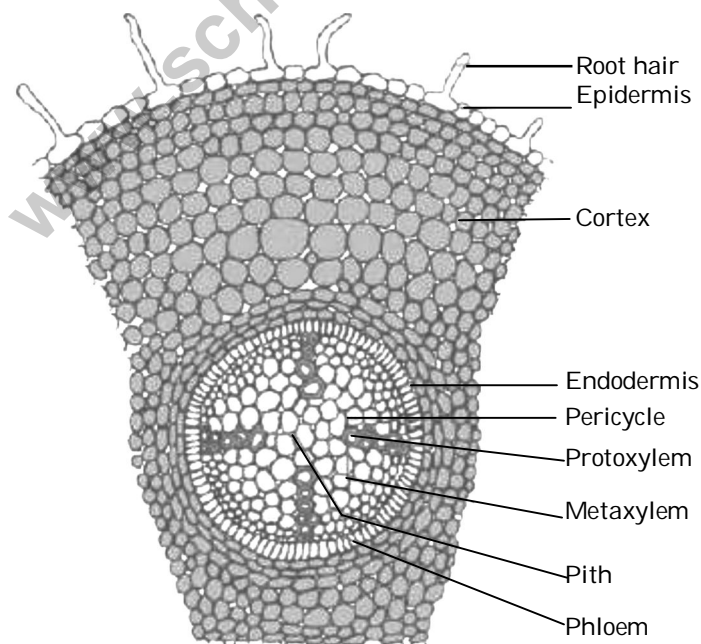
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12.



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13.



T.S. of Dicot Root

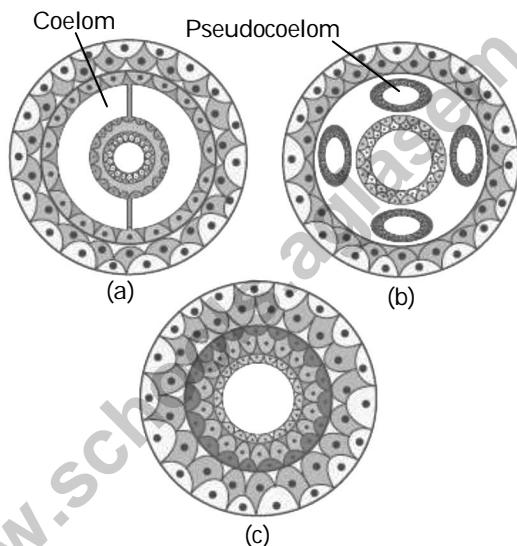
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14. Male Ascaris	Female Ascaris
(i) Smaller than female, about 15-30 cm long. (ii) Opening at posterior end is cloacal aperture. (iii) Two penial spicules project from the cloacal aperture. (iv) In copulation, the male coils itself around the female.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

3

15. 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 acelomates, e.g., platyhelminthes.

3



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

16. The universal rules of nomenclature are :
- (a) Biological names are normally in Latin and written in Italics. They are latinised or derived from Latin irrespective of their origin.
 - (b) First word in a biological name represents genus while the second name denotes species.
 - (c) Both the words when written in hands are separately underlined or printed in Italics to indicate their Latin origin.
 - (d) First word starts with capital letter while the second word starts with small letter. e.g., – *Tamarindus indica*.
 - (e) Name of the author is written in abbreviation after species name in Roman. e.g., – Homo sapiens (Linn).

3

17. 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.

3

18. 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. 3

OR

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

- (i) It is viscous and enzyme-free.
- (ii) It is alkaline.

It enables duodenum to withstand the acid chyme and protects its wall from getting digested. 3

19. 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.
- (f) **Diffusion** – Simple epithelium helps in diffusing gases, liquids, nutrients etc.
- (g) **Transportation** – Ciliated epithelium helps to remove dust particles and foreign bodies. 3

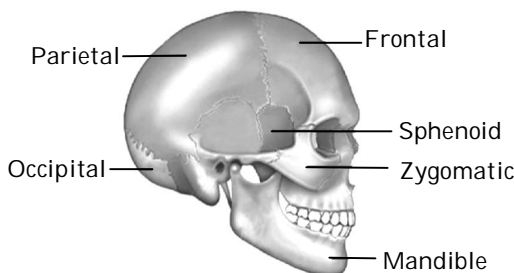
Rods	Cones
(i) These are meant for vision in dim light.	These are meant for vision in bright light.
(ii) They do not have the ability to make coloured image.	They have the ability to make coloured image.
(iii) These contain the visual pigment rhodopsin.	These contain the pigment iodopsin.

(Any three) 3

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

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22.



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23. (i) No.

(ii) Intake of such contaminated milk may cause various health disorders.

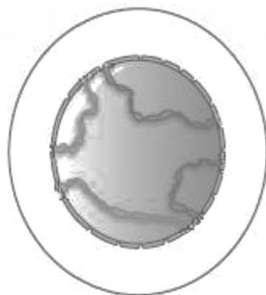
Associated value : The learners will become more vigilant while taking milk or milk products and would prefer to take them from registered outlet like Mother Dairy, DMS etc. **3+1=4**

Section-D

24. 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 xanthophyll). 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. **5**

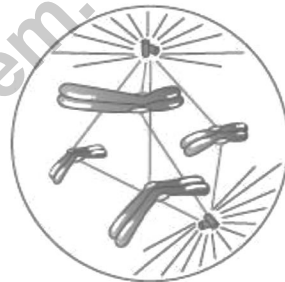
OR



Early Prophase



Late Prophase



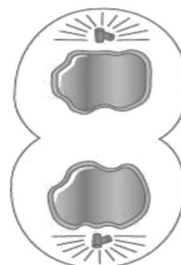
Transition to Metaphase



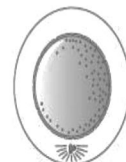
Metaphase



Anaphase



Telophase



Interphase

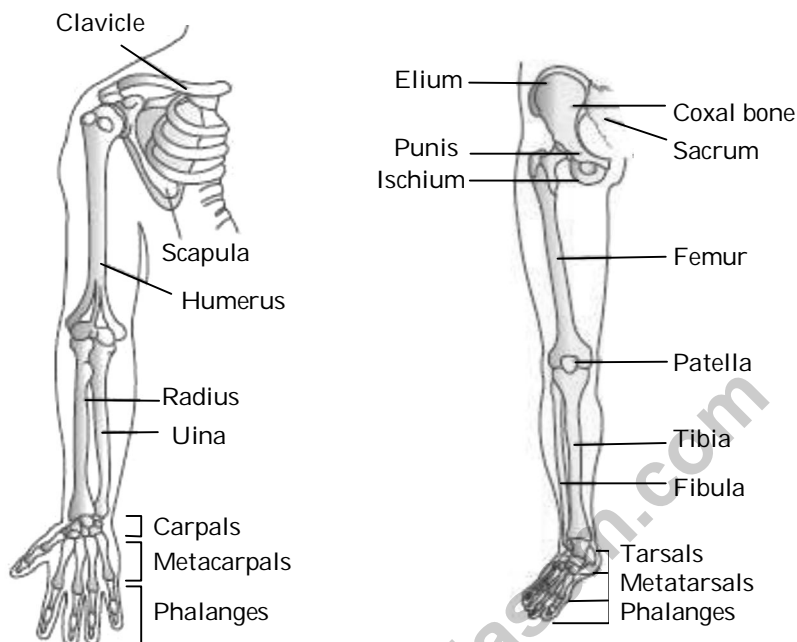
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25. (1) Pectoral and Pelvic girdle bones help in the articulation of the upper and the lower limbs respectively with the axial skeleton. Each girdle is formed of two halves. Each half of pectoral girdle consists of a clavicle and a scapula.

(2) 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.

(3) 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.

- (4) 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.



5

OR

Transpiration has more than one purpose such as :

- (i) It creates transpiration pull for absorption and transport of plants.
- (ii) It supplies water for photosynthesis.
- (iii) It transports minerals from the soil to all parts of the plant.
- (iv) It cools leaf surfaces, sometimes 10 to 15 degrees, by evaporative cooling.
- (v) 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 rain forests 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.

5

- 26.** 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. 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 biphosphate Carboxylase-Oxygenase (RUBISCO) is the most abundant protein in the whole of the biosphere.

Some Proteins and their Functions

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

5

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 C_3 or C_4 (or any other) pathways. There are three stages in Calvin cycle: carboxylation, reduction and regeneration.

(1) Carboxylation – Carboxylation is the fixation of CO_2 into a stable organic intermediate. Carboxylation is the most crucial step of the Calvin cycle where CO_2 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.

(2) 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 CO_2 molecule fixed. The fixation of six molecules of CO_2 and 6 turns of the cycle are required for the removal of one molecule of glucose from the pathway.

(3) Regeneration – Regeneration of the CO_2 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 CO_2 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

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