Sample Paper – 01
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 fibroin?
2. The term to describe vascular bundles in which phloem lies at the centre surrounded by xylem.
3. What is meant by 'in vitro'?
4. Name two accessory digestive organs in humans.
5. What type of modification of root is found in a) Banyan tree b) Mangrove trees?

Section – B

6. Define the terms isotonic and solute potential?
7. What is mesosome in a prokaryotic cell? Mention any two functions it performs.
8. Bring out the differences between the stele of dicot root and monocot root.
9. (i) Name two red algae from where agar is obtained.
   (ii) What is alternation of generations?

Or

What is meant by a heterosporous fern? Give two examples?

Section – C

10. Describe the structure of actin.
11. Describe competitive inhibition of enzyme activity with an example.
12. Draw a labelled diagram of the mouth parts of cockroach.

Or

Draw a labelled diagram of structure of monocot seed.

13. Describe the quaternary structure of proteins.
14. Differentiate between rods and cones.
15. Differentiate C3 and C4 pathways of photosynthesis.
16. Mention two important functions and one deficiency symptom of potassium in plants.
17. Schematically represent haplo-diplontic life cycle.
18. How ATP is synthesized in the electron transport particles of the mitochondria?
19. What is meiosis? Bring out its significance.
20. Draw a labelled diagram of human respiratory system.
21. Sunita is the class moniter of class-11. On day after few periods of teaching she observed that class room is littered with many small pieces of papers. Next day she delivered a speech in morning assembly "if a paper is torn a branch of tree is being destroyed."
    (a) What values do you find in Sunita?
    (b) Do you agree with the statement of Sunita?
    (c) What should be done to prevent plants?

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. The protein component of silk fibre derived from silkworms and spiders which form threads to create webs and cocoons.
2. Amphivasal.
3. It means in an artificial environment such as test tube.
4. Salivary glands, liver and gall bladder. (Any two).
5. a) Banyan tree – Prop trees, b) Mangrove trees – Pneumatophores.

Section-B

6. 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.
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.

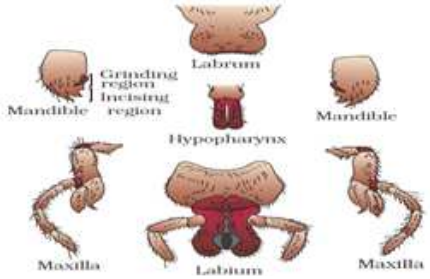
   Or

   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.
8. Plasticity refers to the ability of plants to follow different pathways in response to environment or phase of life to form different kinds of structures.
   (i) Heterophylly in certain plants is an example of plasticity.
   (ii) In such plants the leaves of juvenile plants are different in shape from those of adult plants. e.g cotton, larkspur, Eucalyptus etc.
9. 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.

Section-C

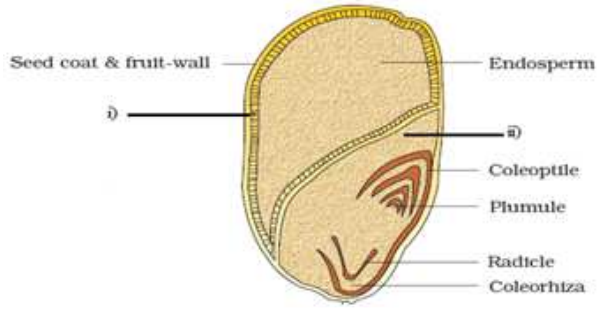
10. Actin filament contain three proteins namely, actin (F-actins and G-actins), tropomyosin and troponin. Each actin filament consists of two F-actins which are helically wound to each other. Each F-actin is a polymer of globular actin. Two filaments of tropomyosin also run close to F-actins throughout their length. Troponine is a complex protein found at regular intervals on the tropomyosin. In the reacting state, a subunit of troponine masks the actin-binding site of myosin.

11. It is the phenomenon in which a substance closely resembling the substrate in its molecular structure competes with it for the active site on the enzyme. Eg – Malonate resembles succinate in its structure and inhibits the action of succinate dehydrogenase. Competitive inhibition is used in the control of bacterial pathogens.
12. **Mouth parts of cockroach-**



Or

Structure of monocot seed-



13. When a protein has many subunits (polypeptide chains), each having a primary, secondary or Tertiary structure of its own, the protein is said to be in its quaternary structure. For example- Myoglobin, insulin and haemoglobin.
14.

Rods	Cones
These are meant for vision in dim light.	These are meant for vision in bright light.
They do not have the ability to make coloured image.	They have the ability to make coloured image.
These contain the visual pigment rhodospin.	These contain the pigment iodopsin.

15.

C3 pathway	C4 pathway
The primary acceptor of RuBP.	The primary acceptor is PEP.
The first product is phosphoglyceric acid.	The first product is oxaloacetic acid.
The enzume is sensitive to high temperature and oxygen.	The ezyme is not much affected by oxygen concentration.
The pathway becomes saturated at higher concetration of carbon dioxide.	The pathway becomes saturated at a lower concentration of carbon dioxide.

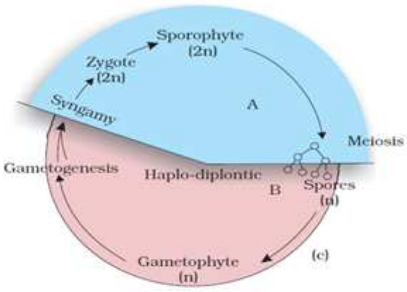
16. **Functions of potassium**
    (a) In opening and closing of stomata.

(b) Activates a number of enzymes.
(c) Involved in protein synthesis.
(d) Maintains turgidity of cells.
(e) Maintains anion-cation balance of cells.

Symptoms of potassium deficiency

(a) Interveinalchlorosis.
(b) Scorched leaf tips.
(c) Shorter internodes.

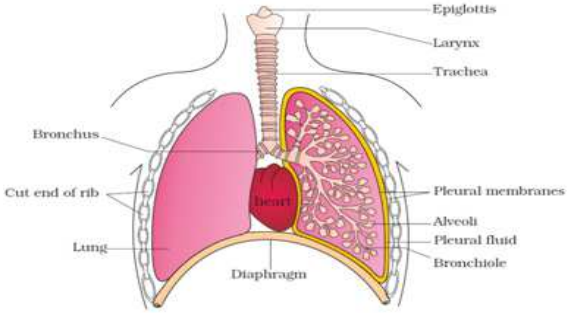
17.



18. ATP is synthesized with the help of complex V (ATP synthase). Complex V consists of F_0 – F_1 components. Fo is an integral membrane protein complex that act as the channel through which the proteins pass across the membrane into the matrix. The passage of protons through the channel is coupled to the catalytic site of F_1 component and one molecule of ATP is synthesized for every $2H^+$ passing through F_0.
19. It is a type of cell division in which the number of chromosomes is reduced to half in the daughter cells.

    Significance

    (a) It ensures the maintenance of a constant chromosome number, characteristic of a species.
    (b) The crossing over results in variations of genetic characters in the progeny; variation is necessary for survival of species and it is the raw material for evolution.
20. Human respiratory system :-

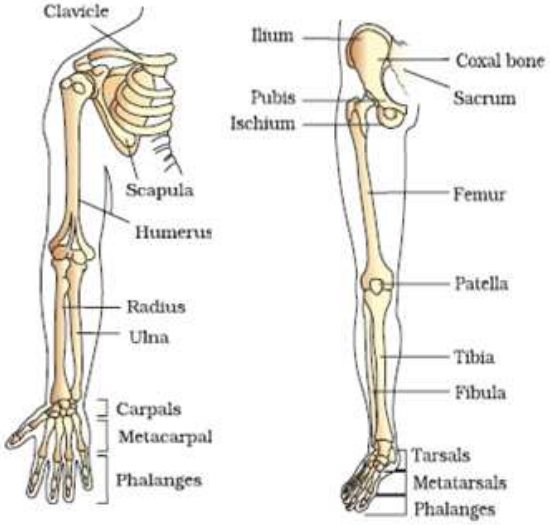


21. (a) Sunita is very sensitive about the environment. She wants to conserve the plants which are essential for survival of all living beings including human beings.
    (b) Yes, I am completely agree with the statement of Sunita. Most of papers are produced by using the plants parts.

(c) Plants are important for us for respiration, food , medicine, shelter, clothes, fruits and so many things. It is used by us from birth to death in different form. Plants maintain the gaseous balance in nature also.

Section-D

22. Pectoral and Pelvic girdle bones help inthe articulation of the upper and the lower limbsrespectively with the axial skeleton. Eachgirdle is formed of two halves. Each half ofpectoral girdle consists of a clavicle and ascapula. Scapula is a largetriangular flat bone situated in the dorsal partof the thorax between the second and theseventh ribs. The dorsal, flat, triangular bodyof scapula has a slightly elevated ridge calledthe spine which projects as a flat, expandedprocess called the acromion. The clavicleparticulates with this. Below the acromion is adepression called the glenoid cavity whicharticulates with the head of the humerus toform the shoulder joint. Each clavicle is a longslender bone with two curvatures. This boneis commonly called the collar bone.
Pelvic girdle consists of two coxal bones. Each coxal bone is formed bythe fusion of three bones – ilium, ischium andpubis. At the point of fusion of the above bonesis a cavity calledacetabulum to which the thighbone articulates. The two halves of the pelvicgirdle meet ventrally to form the pubicsymphysis containing fibrous cartilage.



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 cellsturgid.
An actively photosynthesizing plant has an insatiable need for water.Photosynthesis is limited by available water which can be swiftly depletedby transpiration. The humidity of rainforests is largely due to this vastcycling 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 thestrategies for maximising the availability of CO_2 while minimising waterloss. 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_3plant for the same amount of CO_2 fixed.

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

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. Proteins carry out many functions in living organisms, some transportnutrients across cell membrane, some fight infectious organisms, some are hormones, some are enzymes, etc. Collagen is the most abundant protein in animal world and Ribulosebisphosphate 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 CO_2 into a stable organicintermediate. Carboxylation is the most crucial step of the Calvin cyclewhere CO_2 is utilised for the carboxylation of RuBP. This reaction iscatalysed by the enzyme RuBP carboxylase which results in the formationof two molecules of 3-PGA. Since this enzyme also has an oxygenationactivity it would be more correct to call it RuBP carboxylase-oxygenaseor RuBisCO.

Reduction– These are a series of reactions that lead to the formationof glucose. The steps involve utilisation of 2 molecules of ATP forphosphorylation and two of NADPH for

reduction per CO_2 moleculefixed. The fixation of six molecules of CO_2 and 6 turns of the cycle arerequired for the removal of one molecule of glucose from the pathway.

Regeneration– Regeneration of the CO_2 acceptor molecule RuBP iscrucial if the cycle is to continue uninterrupted. The regenerationsteps require one ATP for phosphorylation to form RuBP.

Hence for every CO_2 molecule entering the Calvin cycle, 3 moleculesof ATP and 2 of NADPH are required. It is probably to meet this differencein number of ATP and NADPH used in the dark reaction that the cyclicphosphorylation takes place

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