Sample Paper –05
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. Where is parapodia seen? What is its function?
2. What is an inhibitor?
3. Expand PPLO.
4. Define genus.
5. What is reflex action?

Section – B

6. How is the gut lining protected from its own secretion of proteases?
7. What are the different ways in which specimens are kept in a museum?

Or

Differentiate between ascus and basidia, apart from the names of the groups producing them.

8. Cell is the basic unit of the life. Discuss.
9. How does water scarcity affect the rate of photosynthesis?

Section – C

10. Differentiate between aerobic respiration and fermentation
11. Difference between Dicot and Monocot Root ?
12. Draw the dorsal, ventral and lateral view of the body of the earthworm showing mouth opening.

Or

Describe the female reproductive system of a cockroach.

13. What is a photosystem? Differentiate between the two types of photosystems in a higher plant.
14. Define the following
    (a) Functional residual capacity.
    (b) Expiratory capacity
    (c) Total lung capacity
15. Name the following
    (a) The smallest known living cells.
    (b) An acellular slime mould.
    (c) A flagellated protozoan.
    (d) A bilaterally symmetrical chrysophytes.
16. Differentiate parenchyma from collenchyma Enumerate the peculiar features that you find in phylum chordata.
17. Show diagrammatically the facilitated diffusion.
18. Draw the floral diagram of liliaceae.
19. What are respiratory substrates? Name the most common respiratory substrate.
20. Differentiate between red algae and green algae.
21. Radhika and Amina are good friends and study in same class. Radhika belongs to a rich family but Amina to a poor family. Radhika was poor in study but Amina was very intelligent. Rahikas used to help him financially with her pocket money and Amina help her in study. Radhika parents do not like Amina but Radhika convinced them.
    (a) What values do you find in Radhika and Amina?
    (b) What are the possible cause of poverty in society?
    (c) Why Radhika's parents not like the friendship of her with Amina?

Section – D

22. Describe glycolysis.

Or

Schematically represent the inter-relationship among metabolic pathways showing respiration mediated breakdown of different organic molecules to carbon dioxide and water.

23. Draw a labelled diagram of digestive system of frog.

Or

Draw a labelled diagram of digestive system of an earthworm.

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. Aquatic annelids like Nereispossess lateral appendages, parapodia, which help in swimming.
2. When the binding of the chemical shuts off enzyme activity, the process is called inhibition and the chemical is called an inhibitor.
3. Pleuro Pneumonia like Organisms.
4. It comprises a group of related species which has more characters in common in comparisonto species of other genera.
5. The entire process of response to a peripheral nervous stimulation, that occurs involuntarily,i.e., without conscious effort or thought and requires the involvement of a part of the central nervous system is called a reflex action.

Section B

6. Proteases are secreted in inactive form and pose no threat to the gut lining. The mucus provides protection to the epithelial lining.
7. (a) The specimens are kept in suitable chemical solutions.
   (b) Plant and animal specimens are also preserved as dry specimens.
   (c) Insects are normally dried and pinned in the insect boxes.
   (d) Larger animals (birds, mammals) are preserved as stuffed specimens.

Or

Ascus	Basidia
Spores are produced endogenously	Spores are produced exogenously
Eight spores are inside an ascus	Four spores are produced by a basidium

8. All organisms are made of cell(s) and its/ their products, so cell is the structural unit of life. The sum total of the coordinated activities cell organelles and each of the different types of cells is responsible for the metabolism / life of an organism; so cell is the basic unit of living organism.
9. When water is the limiting factor, photosynthesis is affected as – the stomata close and entry carbon dioxide is restricted and the cells lose their turgidity and so leaves are not fully exposed to light.

Section C

10.

Aerobic Respiration	Fermentation
It is a process in which glucose is completely broken down into carbon dioxide and water.	It is a process in which glucose is only partially oxidized to some organic compound.
There is a net gain of thirty eight molecules	There is a net gain of only two molecules

of ATP for every molecule of glucose.	of ATP per molecule of glucose.
NADH is oxidized on the electron transport chain and the reaction is very vigorous.	NADH is slowly oxidized to NAD^+

11.

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.

12. (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.

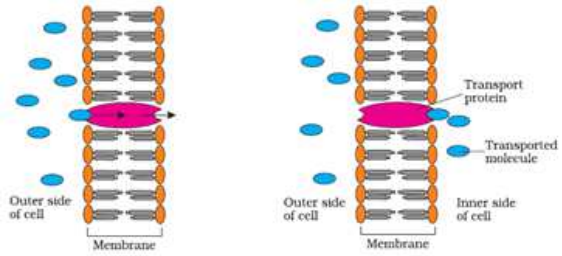
Or

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

13. The solution is said to be isotonic if it balances the osmotic pressure of the cytoplasm. i.e., it has the same solute concentration.
14. 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.
15. (a) Mycoplasma
    (b) Physarum
    (c) Trypanosoma
    (d) Navicula
16.

Parenchyma	Collenchyma
Cell wall is thin	Cell wall shows thickening in the corners.
Its main function is storage of food material	It gives mechanical support and flexibility to growing organs.
The cells retain the power of division.	The cells do not have the power of division.
This is distributed in almost all parts of the plant.	It is distributed in the hypodermis of dicot stem.

17.



18.

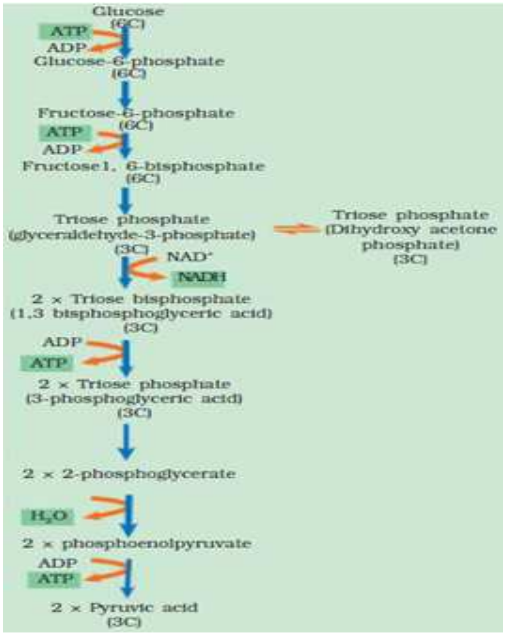
19. Respiratory substrates are those organic compounds, which are oxidized to yield energy. Glucose is the most common respiratory substrate. Beside glucose, amino acids, fats can be also used as respiratory substrate. The maximum energy is produced by fat per unit mass in presence of sufficient oxygen.
20.

Red Algae	Green Algae
They have characteristic pigments. R-phycoerythrin phycocyanin, cholophyll – a and chlorophyll – d.	They have characteristic pigments chlorophyll – a, chlorophyll – b, xanthophylls and carotene.
The reserve food materials are in the form of floridean starch.	The reserve food materials are in the fomr of pyrenoids and oil droplets.
Phycocolloids are present	Phycocolloids are absent.
They live in very deep marine waters	They live in moderate depths.

21. (a) Both Amina and Radhika are true to her friendship and help each other in what they have with them.
    (b) The main reason of poverty in certain section of society is due to more number of children, no education and absence of employment.
    (c) Some persons still have feeling about the high and low caste and religion and think that their child will be adversely affected due to different culture and religion.

Section D

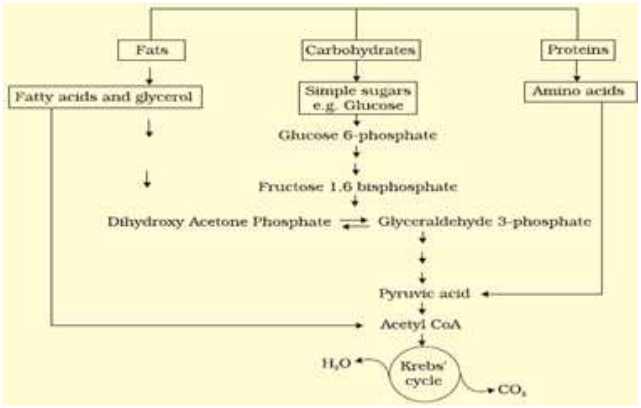
22. The term glycolysis has originated from the Greek words, glycos for sugar and lysis for splitting. The scheme of glycolysis was given by Gustav Embden, Otto Meyerhof, and J. Parnas, and is often referred to as the EMP pathway. In anaerobic organisms, it is the only process in respiration. Glycolysis occurs in the cytoplasm of the cell and is present in all living organisms. In this process, glucose undergoes partial oxidation to form two molecules of pyruvic acid. In plants, this glucose is derived from sucrose, which is the end product of photosynthesis, or from storage carbohydrates. Sucrose is converted into glucose and fructose by the enzyme, invertase, and these two monosaccharides readily enter the glycolytic pathway. Glucose and fructose are phosphorylated to give rise to glucose-6-phosphate by the activity of the enzyme hexokinase. This phosphorylated form of glucose then isomerises to produce fructose-6-phosphate. Subsequent steps of metabolism of glucose and fructose are same. In glycolysis, a chain of ten reactions, under the control of different enzymes takes place to produce pyruvate from glucose.



ATP is utilised at two steps: first in the conversion of glucose into glucose 6-phosphate and second in the conversion of fructose 6-phosphate to fructose 1, 6-diphosphate. The fructose 1, 6-diphosphate is split into dihydroxyacetone phosphate and 3-phosphoglyceraldehyde (PGAL). There is one step where NADH + H+ is formed from NAD+ when 3-phosphoglyceraldehyde (PGAL) is converted to 1, 3-bisphosphoglycerate (DPGA). Two redox-equivalents are removed (in the form of two hydrogen atoms) from PGAL and transferred to a molecule of NAD+. PGAL is oxidised and with inorganic phosphate to get converted into DPGA.

The conversion of DPGA to 3-phosphoglyceric acid (PGA), is also an energy yielding process; this energy is trapped by the formation of ATP. Another ATP is synthesized during the conversion of PEP to pyruvic acid. Pyruvic acid is then the key product of glycolysis. The metabolic fate of pyruvate depends on the cellular need. There are three major ways in which different cells handle pyruvic acid produced by glycolysis. These are lactic acid fermentation, alcoholic fermentation and aerobic respiration. Fermentation takes place under anaerobic conditions in many prokaryotes and unicellular eukaryotes. For the complete oxidation of glucose to CO2 and H2O, however, organisms adopt Krebs' cycle which is also called as aerobic respiration. This requires O2 supply.

Or

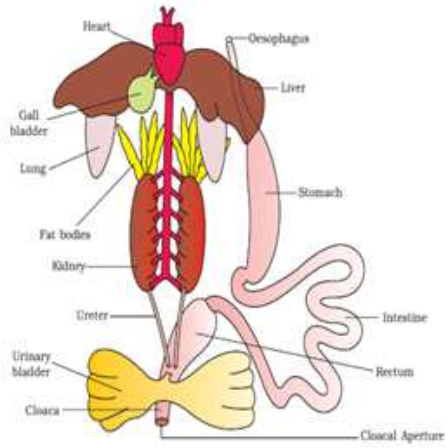


Glucose is the favoured substrate for respiration. All carbohydrates are usually first converted into glucose before they are used for respiration. Other substrates can also be respired, as has been mentioned earlier, but then they do not enter the respiratory pathway at the first step. Fats would need to be broken down into glycerol and fatty acids first. If fatty acids were to be respired they would first be degraded to acetyl CoA and enter the pathway. Glycerol would enter the pathway after being converted to PGAL. The proteins would be degraded by proteases and the individual amino acids (after deamination) depending on their structure would enter the pathway at some stage within the Krebs' cycle or even as pyruvate or acetyl CoA.

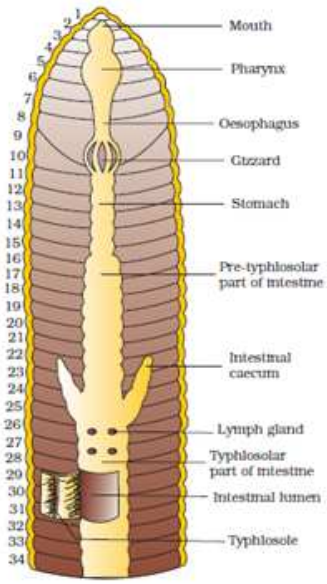
Since respiration involves breakdown of substrates, the respiratory process has traditionally been considered a catabolic process and the respiratory pathway as a catabolic pathway. These compounds would be withdrawn from the respiratory pathway for the synthesis of the said substrates. Hence, fatty acids would be broken down to acetyl CoA before entering the respiratory pathway when it is used as a substrate.

But when the organism needs to synthesise fatty acids, acetyl CoA would be withdrawn from the respiratory pathway for it. Hence, the respiratory pathway comes into the picture both during breakdown and synthesis of fatty acids. Similarly, during breakdown and synthesis of protein too, respiratory intermediates form the link. Breaking down processes within the living organism is catabolism, and synthesis is anabolism. Because the respiratory pathway is involved in both anabolism and catabolism, it would hence be better to consider the respiratory pathway as an amphibolic pathway.

23.



Or


Mouth
Pharynx
Oesophagus
Gizzard
Stomach
Pre-typhlosolar part of intestine
Intestinal caecum
Lymph gland
Typhlosolar part of intestine
Intestinal lumen
Typhlosole