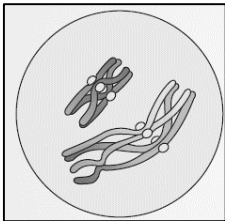


General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory.
- (iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
- (iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION – A

1. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is 1
 - a) Monocots b) Dicots
 - c) Pteridophytes d) Gymnosperms
2. Regulation of opening and closing of stomata is due to 1
 - a) respiration of guard cells.
 - b) hormonal changes in the guard cells.
 - c) changes in the turgor pressure of guard cells.
 - d) cytoplasmic streaming.
3. All living organisms are linked to one another because 1
 - a) they have common genetic material of the same type.
 - b) they share common genetic material but to varying degrees.
 - c) all have common cellular organization.
 - d) all of the above.
4. Unicellular eukaryotes are included in 1
 - a) Protista b) Fungi c) Archaea d) Monera
5. The given figure is the representation of a certain event at a particular stage of a type of cell division. Which is this stage? 1
 - a) Prophase II during meiosis
 - b) Prophase I during meiosis
 - c) Prophase of mitosis
 - d) Both prophase and metaphase of mitosis
6. Choanocytes are specialized cell of which of the following group of animals? 1
 - a) Coelenterata b) Annelida
 - c) Porifera d) Chordates
7. Heterophyly in cotton is an example of 1
 - a) dedifferentiation b) plasticity
 - c) leaf expansion d) senescence
8. The subunits of prokaryotic ribosomes are 1
 - a) 50S + 30S b) 60S + 40S
 - c) 40S + 30S d) 60S + 50S
9. Synthesis of one glucose molecule through C3 pathway require 1
 - a) 18 ATP, 12 NADPH b) 12 ATP, 12 NADPH
 - c) 30 ATP, 18 NADPH d) 30 ATP, 12 NADPH

10. Respiratory process is regulated by certain specialized centres in the brain. Which one of the following centres can reduce the inspiratory duration upon stimulation? 1
- a) Medullary inspiratory centre b) Pneumotoxic centre
c) Apneustic centre d) Chemo sensitive centre
11. In which type of growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures? 1
- a) geometric b) redifferentiation
c) arithmetic d) none of the above
12. When CO₂ concentration in blood increases, breathing becomes 1
- a) shallower and slow b) there is no effect on breathing
c) slow and deep d) faster and deeper

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:

- a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false.
d) A is False but R is true.
13. Assertion: Diatoms are the chief producers in the oceans. 1
Reason: Diatoms causes red tides.
14. Assertion: *Gelidium* and *Gracilaria* are of great importance. 1
Reason: These are brown algae.
15. Assertion: Linnaeus is regarded as the father of taxonomy. 1
Reason: He gave a scheme of classification which, with a few addition is still used.
16. Assertion: In some plants growing in swampy areas, pneumatophores are present. 1
Reason: Such roots help to get oxygen for respiration.

Section – B

17. What are zwitter ions? Give a structural representation to describe it. 2
18. Name a hormone which : 2
- a) increase yield of sugarcane. b) promote lateral shoot growth
c) cause sprouting of potato tuber d) inhibit seed germination
19. State the significance of JGA in kidney function? 2
20. How are open vascular bundles differ from closed vascular bundles? Explain with diagram. (OR) 2
Explain in brief the anatomy of Isobilateral leaf.
21. Distinguish between: 2
- a) afferent neurons and efferent neurons.
b) impulse conduction in a myelinated nerve fibre and unmyelinated nerve fibre.

Section – C

22. Define the following terms with example: 3
- a) actinomorphic b) superior ovary c) perigynous flower
23. Seema is having blood group A- while her husband has blood group O+ . Their first child is having blood group A+ . Her second child was born with severe anemia and jaundice. What could be the reason? How this situation could have been avoided? 3

24. Describe the events taking place during interphase.

(OR)

a) Name the stage of cell cycle at which one of the following events occur:

- (i) Chromosomes are moved to spindle equator.
- (ii) Centromere splits and chromatids separate.

b) How does cytokinesis in plant cells differ from that in animal cells?

3

25. Fill up the blank spaces appropriately.

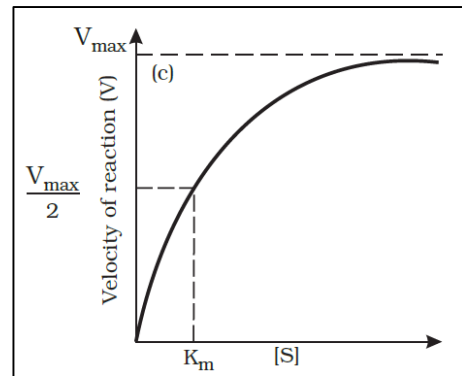
3

Phylum/ Class	Excretory Organ	Circulatory Organ	Respiratory Organ
Arthropoda	A	B	Lungs/ Gills/ Tracheal system
C	Nephridia	Closed	Skin/ Parapodia
D	Metanephridia	Open	E
Amphibia	F	Closed	Lungs

26. Study the graph and answer the questions:

3

- i) What is graph depicting?
- ii) Why does the reaction after reaching maximum velocity do not further exceed after increasing substrate concentration?
- iii) Give one example of competitive inhibition.



27. Explain how during light reaction of photosynthesis, ATP synthesis is a chemiosmotic phenomenon.

3

28. Name the type of tissue found in following:

3

- | | |
|--------------------------------------|----------------------------------|
| A. between muscle and bones | B. on the surface of human skin. |
| C. in the palms and soles. | D. in the wall of the heart. |
| E. in the inner lining of intestine. | F. in the brain and spinal cord. |

Section – D

29. Read the following and answer Q29.1 to Q29.4.

4

Pyruvic acid is the key product of glycolysis. What is the metabolic fate of pyruvate? This 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.

29.1 Define glycolysis.

29.2 What is the end product of alcoholic fermentation?

29.3 How is fermentation different from aerobic respiration?

29.4 Under what conditions, incomplete oxidation of respiratory substrate take place?

(OR)

29.4 How respiratory ratio or respiratory quotient is calculated in case of aerobic respiration?

30. Read the following and answer Q30.1 to Q30.4. 4
- Troponin is a complex of three globular proteins, which are attached approximately $2/3^{\text{rd}}$ distance along each tropomyosin molecule. The troponin complex is believed to attach the tropomyosin to the actin. The strong affinity of troponin for calcium ions is believed to initiate the contraction process. Mechanism of muscle contraction is best explained by the sliding filament theory. Interaction between actin and myosin is the basic cause of muscular contraction. Actin filaments are interdigitated with myosin filaments. The head of the myosin is joined to the actin backbone by a cross bridge forming a hinge joint. From this joint, head cannot tilt in forward and backward directions. This movement is an active process which requires use of ATP.
- 30.1 State the sliding filament theory.
- 30.2 Give the name of enzyme present in myosin head.
- 30.3 Name the site on actin where myosin head will bind to form cross bridge.
- 30.4 Draw the structure of myosin monomer.
- (OR)
- 30.4 Explain the contracting unit of muscle.

Section – E

31. I. How is leafy stage formed in mosses? How is it different from protonema?
 II. Give a brief account of viruses with respect to their structure and nature of genetic material. Also mention two symptoms in plants due to infection caused by viruses.
- (OR)
- I. Gametophyte is a dominant phase in life of a bryophyte. Explain.
 II. Give a comparative account of classes of Kingdom Fungi with respect to mode of reproduction. 5
32. What is a centromere? How does the position of centromere form the basis of classification of chromosomes? Support your answer with a diagram showing the position of centromere on different types of chromosomes.
- (OR)
- I. With the help of labelled diagram explain the "fluid mosaic model" structure of cell membrane.
 II. Both lysosomes and vacuoles are endomembrane structures, yet they differ in terms of their functions. Comment. 5
33. I. Differentiate between zona fasciculata and zona glomerulosa on the basis of hormones secreted.
 II. Explain the mechanism of action of FSH.
- (OR)
- I. George comes on a vacation to India from US. The long journey disturbs his biological system and he suffers from jet lag. What is the cause of his discomfort?
 II. Explain the mechanism of action of Estrogen. 5