

2024
BIOLOGY
(Theory)
Full Marks : 70
Pass Marks : 21
Time : Three hours

All the questions are compulsory.

The figures in the right margin indicate full marks for the questions.

For Question Nos. 1 to 7, select the most appropriate one from the given alternatives A, B, C and D and rewrite the same.

1. Methanogens feed on 1
 - A. Lignin
 - B. Chitin
 - C. Proteins
 - D. Cellulosic material

2. Endemic plants are those which are 1
 - A. Found in arctic region
 - B. Cosmopolitan in distribution
 - C. Confined to a certain area
 - D. Gregarious in habit

3. How many nuclei are involved in the entire process of double fertilization? 1
 - A. Two
 - B. Three
 - C. Four
 - D. Five

4. Classify the phenomenon where a single gene can exhibit multiple phenotypic expression. 1
- A. Epistasis
 - B. Pleiotropy
 - C. Translocation
 - D. Transduction
5. Hardy-Weinberg equilibrium is known to be affected by gene-flow, genetic drift, mutation, gene recombination and 1
- A. Natural selection
 - B. Over production
 - C. Limiting factors
 - D. Saltation
6. The end fragments of DNA molecules after cutting with an enzyme are sticky due to 1
- A. Free methylation
 - B. Endonuclease
 - C. Unpaired bases
 - D. Calcium ions
7. Predict the pyramid of biomass of a sea ecosystem. 1
- A. Upright
 - B. Inverted
 - C. Skewed
 - D. Distorted

Question Nos. 8 to 17 are very short answer type questions carrying 1 mark each.

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| 8. Define trophoblast. | 1 |
| 9. What are bioreactors? | 1 |
| 10. What is the difference between false and true fruits? | 1 |
| 11. How incomplete dominance differs from co-dominance? | 1 |
| 12. Write one point of difference between active immunity and passive immunity. | 1 |
| 13. Identify the enzyme which can break fungal cell wall to remove DNA. | 1 |
| 14. How does an orchid plant grow on a mango branch? | 1 |
| 15. Give one point of difference between primary and secondary productivity. | 1 |
| 16. "The doctors recommended breast feeding during the initial period of infant growth". Analyse. | 1 |
| 17. Why there is a large pressure to switch-on to the use of bio-fertilizer in our modern agriculture? | 1 |

Question Nos. 18 to 27 are short answer type II questions carrying 2 mark each.

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| 18. Describe the two steps in sewage treatment. | 2 |
| 19. How the pollen grains are formed from pollen mother cells? | 2 |
| 20. Differentiate between divergent and convergent evolution by giving one example each. | 2 |
| 21. In what way microbes are used for the production of bioactive molecules. | 2 |

22. How recombinant DNA can be introduced to the host cell without a vector? 2
23. How will you describe the patterns of biodiversity? 2
24. "Why the world population increases so rapidly in the last few centuries? Give two reasons. 2
25. "Transformation of normal cells into cancerous neoplastic cells may be induced by physical and chemical agents called carcinogens". Analyse the statement. 2
26. "The growth of a population with time can be interpreted by growth models". Justify this statement. 2
27. "The rate of species extinction accelerates due to human activities". Analyse the statement by giving two examples. 2

Question Nos. 28 to 33 are short answer type I questions carrying 3 marks each.

28. Write three characteristic features of Histone protein. 3

OR

Write three salient features of genetic code. 3

29. Illustrate three mechanisms of evolution based on the Hugo de Vries work on evening primrose. 3

OR

Why Darwin's finches are regarded as the best examples of adaptive radiation? 3

30. How RNA interference prevents infection to roots of tobacco plants by *Meloidogyne incognitia*? 3

OR

How toxic insecticidal protein produced by

Bacillus thuringiensis does not killed the bacteria

but kills the insect? Explain.

3

31. "Depending on the source of pollen, pollination can be divided into three types". Analyse the statement.

3

OR

"The secretion of gonadotropins is essential

for ovulation". Analyse this statement.

3

32. Demonstrate three practical applications of PCR for early diagnosis and treatment of diseases.

3

OR

Demonstrate the three features that are required to facilitate cloning into a vector.

3

33. Draw a neat diagrammatic structure of a typical anatropous ovule and label embryo sac and micropyle.

3

OR

Draw a neat diagrammatic structure of a human sperm and label acrosome and mitochondria.

3

Question Nos. 34 to 36 are Essay type questions carrying 5 marks each.

34. Define population. What are the four population attributes?

5

OR

- State five factors which can influence decomposition. 5
35. How the human diseases caused by pathogen
can be prevented? Give five points. 5

OR

- Illustrate five household products in which microbes
or products derived are in use. 5
36. Demonstrate five important goals of Human Genome Project. 5

OR

- Predict five genetic disorders determined by alternation
or mutation in the single gene. 5
