2023

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 4, select most appropriate one from the given alternatives A, B, C and D and rewrite the same.

1. Polyembryony commonly occurs in – 1

   A. Tomato

   B. Potato

   C. Banana

   D. Citrus

2. Which of the following represents a test cross ? 1

   A. Tt × TT

   B. Tt × Tt

   C. Tt × tt

   D. TT × TT

3. Select the diseases caused by virus from the following pair – 1

A. Typhoid, Pneumonia

B. Dengue, Chikungunya

C. Ringworm, Mumps

D. AIDS, Syphilis

4. Cultural eutrophication occurs due to – 1

A. Increase in amount of carbon dioxide in water

B. Disposal of waste rich in nitrates and phosphates

C. Increase in concentration of DDT and mercury in water

D. Disposal of unsafe radioactive wastes

Question Nos. ***5*** *to* ***14*** *are very short answer type questions carrying* ***1*** *mark each.*

5. What is foetal ejection reflex ? 1

6. Define bioinformatics. 1

7. How many different types of genetically different gametes will be produced by a heterozygous plant having genotype AaBbCcDd ? 1

8. Male honeybees have 16 chromosomes instead of having normal 32 chromosomes. Give reason. 1

9. State the main cause of allergy. 1

10. How is the use of '*Sonalika*' variety of wheat helpful in increasing the yield ? 1

11. Mention the role of primers in recombinant DNA technology. 1

12. How can we prevent biopiracy ? 1

13. Name the ecosystem where sunlight is not the source of energy. 1

14. Differentiate between habitat and niche by giving one point. 1

Question Nos. ***15*** *to* ***24*** *are short answer type II questions carrying* ***2*** *marks each.*

15. Mention two important events that occur during embryogenesis by the developing zygote in an organism. 2

16. "Human placenta acts as the structural and functional unit between the foetus and maternal body." Justify. 2

17. Why is *Drosophila* used extensively for genetic studies? Give two points. 2

18. Differentiate between continuous and discontinuous synthesis of DNA in the replication of DNA by giving two points. 2

19. "Pedigree analysis of humans can be useful". Analyse the statement in two points. 2

20. What is 'withdrawal syndrome'? Mention one symptom characterized by it. 2

21. Explain with an example the 'palindromic nucleotide sequence' in the formation of recombinant DNA. 2

22. Define age pyramid. What will be the shape of a pyramid when population is declining? 2

23. Distinguish between predation and parasitism by giving two points. 2

24. Illustrate two harmful effects of ultraviolet radiation on living organisms. 2

*Question Nos. **25** to **31** are short answer type I questions carrying **3** marks each.*

25. How does the process of natural selection affect Hardy-Weinberg equilibrium? Explain any other two factors that disturb the equilibrium. 3

26. Distinguish between Humoral immunity and cell mediated immunity by giving three points. 3

27. Explain three important points needed for successful beekeeping in India. 3

28. "Baculoviruses are good example of bio-control agents." Justify by giving three reasons. 3

29. Why is the introduction of genetically engineered lymphocytes in an ADA deficiency patient not a permanent one ? Suggest a possible permanent cure. 3

30. "Transgenic animals have proved to be beneficial in many ways." Comment by giving suitable points. 3

31. Draw a neat diagram of the sectional view of seminiferous tubules of human male and label the following : 3

(i) Spermatogonium

(ii) Spermatid

*Question Nos. **32** to **34** are Essay type questions carrying 5 marks each.*

32. Explain the post fertilisation events leading to seed formation in a typical dicotyledonous plant. 5

OR

Explain the process of fertilisation in human female and trace the post-fertilisation events up to implantation of the embryo. 5

33. In pea, a cross is made between tall plant and yellow seeds (TtYy) and tall plant with green seeds (Ttyy). Predict the phenotypic and genotypic ratios from the cross. 5

OR

In a disputed paternity case, a test was done to determine the biological father of a child whose blood group is 'A'. The mother's blood group is 'B'. The first claimant has a blood group 'O'. The second claimant has blood group 'AB'. Predict the true biological father of the child with the help of cross. 5

34. "Biodiversity plays a major role in many ecosystem services". Analyse the statement with suitable points. 5

OR

"The size of a population for any species is not static". Justify the statement with specific reference to fluctuation in the population density of a region over a period of time. 5