

## Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 3 Hours

Maximum Marks: 70

### General Instructions

- (i) This question paper contains **27 questions**. All questions are compulsory.
- (ii) Section A: Questions 1 to 5 carry 1 mark each.
- (iii) Section B: Questions 6 to 12 carry 2 marks each.
- (iv) Section C: Questions 13 to 21 carry 3 marks each.
- (v) Section D: Questions 22 to 24 carry 3 marks each.
- (vi) Section E: Questions 25 to 27 carry 5 marks each.
- (vii) Attempt one alternative where an internal choice is provided. Follow the instructions within each question.
- (viii) Draw neat, properly labelled diagrams wherever necessary.

## Section A

1. Nematode specific genes were introduced into the tobacco host plant by using the vector

- |             |                   |
|-------------|-------------------|
| (A) Plasmid | (B) Bacteriophage |
| (C) pBR322  | (D) Agrobacterium |

2. The principle of vaccination is based on the property of

- |                 |                                                  |
|-----------------|--------------------------------------------------|
| (A) Specificity | (B) Diversity                                    |
| (C) Memory      | (D) Discrimination between 'self' and 'non-self' |

OR

2. Opioids act as

- |                        |                  |
|------------------------|------------------|
| (A) Depressants        | (B) Pain killers |
| (C) Euphoria providers | (D) Stimulants   |

3. After spermiogenesis, the sperm heads get embedded in which of the following cells?

- |                         |                     |
|-------------------------|---------------------|
| (A) Leydig cells        | (B) Sertoli cells   |
| (C) Germinal epithelium | (D) Seminal vesicle |

4. Introduction of an alien DNA into a plant host cell is achieved by making them

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| (A) Competent with bivalent ions | (B) Using microinjections         |
| (C) Using gene gun               | (D) Using lysozymes and chitinase |

5. One of the ex situ conservation methods for endangered species is

- |                        |                          |
|------------------------|--------------------------|
| (A) Biosphere reserves | (B) National parks       |
| (C) Cryopreservation   | (D) Wildlife sanctuaries |

OR

5. Ozone gas is continuously formed in the stratosphere by

- |                                           |                                          |
|-------------------------------------------|------------------------------------------|
| (A) Action of UV rays on nascent oxygen   | (B) Reaction of oxygen with water vapour |
| (C) Action of UV rays on molecular oxygen | (D) Action of UV rays on water vapour    |

## Section B

6. Name and explain the technique that can be used in developing improved crop varieties in plants bearing female flowers only.

OR

6. When are the non-flowering plants said to be homothallic and monoecious; and heterothallic and dioecious? Give an example of each.

7. (a) Explain the cause responsible in a human to have sex chromosomes as 'XXY' instead of 'XX' or 'XY'.  
(b) List any two ways such individuals are different from the normal being.

8. Spirulina is a rich source of proteins. Mention the two ways by which large scale culturing of these microbes is possible.

9. How does EcoRI specifically act on DNA molecule? Explain.

10. Name any two autotrophic microbes and state how they serve as biofertilizers.

11. How is the study of fossils an evidence of evolution of life forms which have taken place on the Earth? Explain giving two reasons.

12. How is the normal human body temperature of 37°C maintained during (i) Summer, and (ii) Winter? Explain.

## Section C

**13.** (a) Write the scientific name of methanogen bacteria. Where are these bacteria generally found? Explain their role in biogas production.  
(b) Name the components of biogas.

**14.** Explain double fertilization in an angiosperm.

**15.** Differentiate between the pattern of inheritance in humans of the blood diseases, haemophilia and thalassemia.

**16.** (a) Compare the mechanism of sex determination in humans with that of honey bees, with respect to chromosome number.  
(b) How is the gamete formation comparable in the above two cases?

**17.** Differentiate between Dominance, Incomplete dominance and Co-dominance with the help of a suitable example of each.

**18.** Mention the chemical nature of an antibody and name the type of cells they are produced by. Write the difference between active and passive immune responses on the basis of antibodies.

OR

**18.** Name the cells that act as HIV factory in humans when infected by HIV. Explain the events that occur in these infected cells.

**19.** Explain the solutions found by Ahmed Khan, a Bengaluru based plastic sack manufacturer, after realising the problems created by plastic wastes.

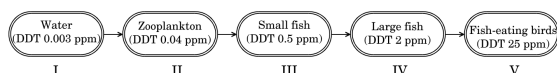
**20.** Explain the effect of the sewage discharges on the characteristic (quality) of a river.

**21.** "Cotton bollworms enjoy feeding on cotton plants, but get killed when feed on Bt cotton plant." Justify the statement.

OR

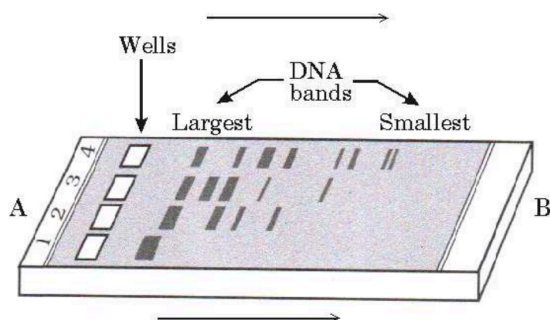
**21.** (a) Mention the cause of ADA deficiency in humans.  
(b) How is gene therapy carried out to treat the patients suffering from this disease?  
(c) State the possibility of a permanent cure of this disease.

22. Indiscriminate use of chemicals, pesticides and weedicides by humans are polluting our water bodies, which in turn are harming the living organisms. Study the flow chart and answer the questions based on it.



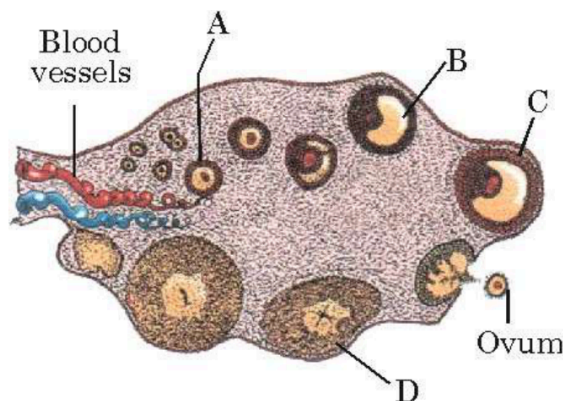
- Why does the concentration of DDT seem to be considerably high in the top consumer?
- How would the organisms at the highest level be affected?
- Name the phenomenon observed.

23. Given below is the diagram representing the observations made for separating DNA fragments by Gel electrophoresis technique. Observe the illustration and answer the questions that follow:



- Why are the DNA fragments seen to be moving in the direction A → B?
- Write the medium used on which DNA fragments separate.
- Mention how the separated DNA fragments can be visualised for further technical use.

24. Study the transverse section of human ovary given below and answer the questions that follow:



- Name the hormone that helps in the growth of A → B → C.
- Name the hormone secreted by A and B.
- State the role of the hormone produced by D.

## Section E

25. (a) Name the type of DNA that forms the basis of DNA fingerprinting and mention two features of this DNA.  
(b) Write the steps carried out in the process of DNA fingerprinting technique, and mention its application.

OR

25. Explain the role of different genes in a lac operon, when in a 'Switched On' state.

26. (a) According to ecologists, tropical regions in the world account for greater biological diversity. Justify.  
(b) Why are habitat loss and alien species invasion considered as the causes of biodiversity loss? Explain with the help of an example of each.

OR

26. (a) What is an ecological succession?  
(b) Differentiate between primary and secondary succession. Why is secondary succession faster than primary succession? Explain with suitable examples.  
(c) What are pioneer species? Give examples of pioneer species in Xerarch and Hydrarch successions respectively.

27. Where does fertilization occur in the oviduct of a human female? Describe the process of fertilization.

OR

27. (a) Where does microsporogenesis occur in an angiosperm? Describe the process of microsporogenesis.  
(b) Draw a labelled diagram of the two-celled male gametophyte of an angiosperm. How is the three-celled male gametophyte different from it?

- End of Question Paper -