

General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) Question paper comprises five sections – A, B, C, D and E.
- (ii) There are 27 questions in the question paper. All questions are compulsory.
- (iii) Section A – Questions no. 1 to 5 are multiple choice questions, carrying 1 mark each.
- (iv) Section B – Questions no. 6 to 12 are short-answer questions type-I, carrying 2 marks each.
- (v) Section C – Questions no. 13 to 21 are short-answer questions type-II, carrying 3 marks each.
- (vi) Section D – Questions no. 22 to 24 are short-answer questions type-III, carrying 3 marks each.
- (vii) Section E – Questions no. 25 to 27 are long-answer questions, carrying 5 marks each.
- (viii) Answers should be brief and to the point.
- (ix) There is no overall choice in the question paper. However, an internal choice has been provided in two questions of 1 mark, one question of 2 marks, two questions of 3 marks and three questions of 5 marks. Only one of the choices in such questions have to be attempted.
- (x) The diagrams drawn should be neat, proportionate and properly labelled, wherever necessary.
- (xi) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION A

Note : Choose the correct option from the choices given in each of the following questions :

1. 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

2. One of the ex situ conservation methods for endangered species is 1
- (A) Biosphere reserves
 - (B) National parks
 - (C) Cryopreservation
 - (D) Wildlife sanctuaries

OR

Ozone gas is continuously formed in the stratosphere by 1

- (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

3. Intense lactation in mothers acts as a natural contraceptive due to the 1

- (A) Suppression of gonadotropins
- (B) Hypersecretion of gonadotropins
- (C) Suppression of gametic transport
- (D) Suppression of fertilization

4. The principle of vaccination is based on the property of 1

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

OR

Opioids act as 1

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

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

- (A) Plasmid
- (B) Bacteriophage
- (C) pBR 322
- (D) Agrobacterium

SECTION B

6. Spirulina is a rich source of proteins. Mention the two ways by which large scale culturing of these microbes is possible. 2
7. How does EcoRI specifically act on DNA molecule ? Explain. 2
8. (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. 2
9. Name and explain the technique that can be used in developing improved crop varieties in plants bearing female flowers only. 2

OR

- When are the non-flowering plants said to be homothallic and monoecious; and heterothallic and dioecious ? Give an example of each. 2
10. Mention the kind of interaction mycorrhizae exhibit. How is Glomus in mycorrhizal association beneficial to the plants ? 2
11. Given below is the segment of a DNA strand. Write its complementary strand and the RNA strand that can be transcribed from the DNA molecule formed . 2
- 5 TAC CGT GAC GTC 3
12. Name the type of Ecological Pyramid that can exist as upright as well as inverted. Explain how does it happen. 2

SECTION C

13. "Cotton bollworms enjoy feeding on cotton plants , but get killed when feed on Bt cotton plant." Justify the statement. 3

OR

- (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. 3

14. (a) Differentiate between Intrauterine insemination and Intrauterine transfer. 3
- (b) Mention one positive and one negative application of amniocentesis. 3
15. Explain the solutions found by Ahmed Khan, a Bengaluru based plastic sack manufacturer, after realising the problems created by plastic wastes. 3
16. 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. 3

OR

Name the cells that act as HIV factory in humans when infected by HIV. Explain the events that occur in these infected cells. 3

17. (a) Why is the collection of white winged moths and dark winged moths made in England between 1850 – 1920 considered a good example of natural selection ? 3
- (b) "Evolution is based on chance events in nature and chance mutations in organisms." Justify the statement. 3
18. (a) Compare the mechanism of sex determination in humans with that of honey bees, with respect to chromosome number. 3
- (b) How is the gamete formation comparable in the above two cases ? 3
19. Differentiate between the pattern of inheritance in humans of the blood diseases, haemophilia and thalassemia. 3
20. Identify i, ii, iii, iv, v and vi in the following table : 3

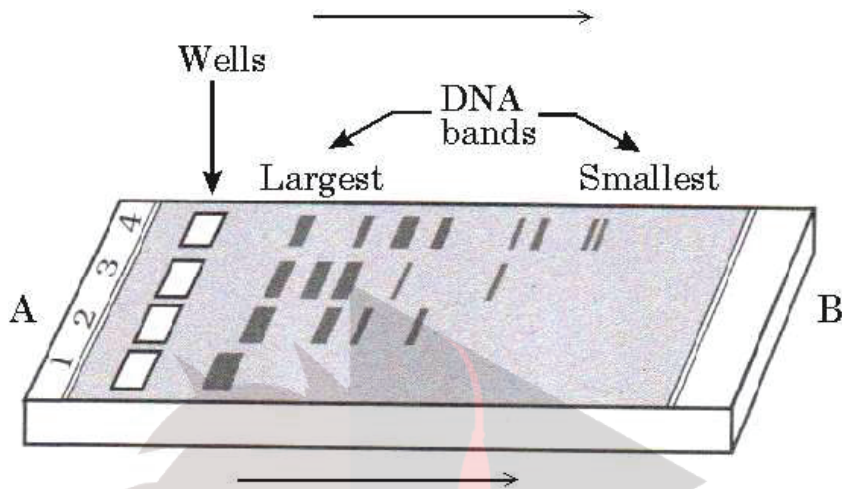
No.	Organism	Bioactive molecules	Use
1	<i>Monascus purpureus</i>	i	ii
2	iii	iv	Antibiotic
3	v	Cyclosporin A	vi

21. (a) Write the scientific name of methanogen bacteria. Where are these bacteria generally found ? Explain their role in biogas production. 3
- (b) Name the components of biogas. 3

SECTION D

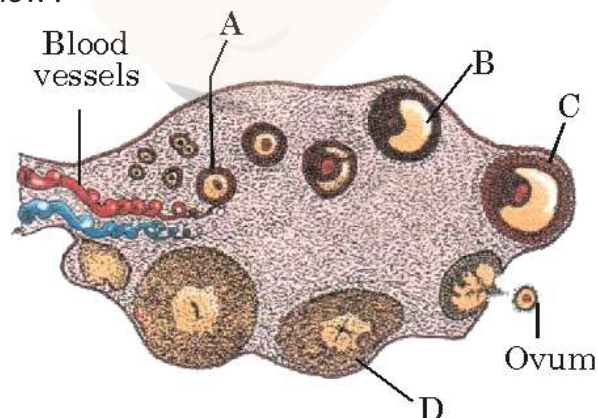
22. Given below is the diagram representing the observations made for separating DNA fragments by Gel electrophoresis technique. Observe the illustration and answer the questions that follow :

3



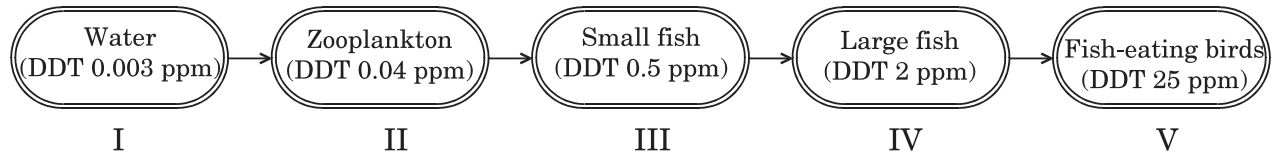
- (a) Why are the DNA fragments seen to be moving in the direction A B?
- (b) Write the medium used on which DNA fragments separate.
- (c) Mention how the separated DNA fragments can be visualised for further technical use.
23. Study the transverse section of human ovary given below and answer the questions that follow :

3



- (a) Name the hormone that helps in the growth of A B C.
- (b) Name the hormone secreted by A and B.
- (c) State the role of the hormone produced by D.

24. 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.



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

3

SECTION E

25. (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.

5

OR

- (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.

5

26. (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.

5

OR

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

5

27. (a) Draw a diagram of a fully developed embryo sac of an angiosperm. Label its chalazal end and any other five parts within the embryo sac.
- (b) Why does the development of an endosperm precede that of the embryo in angiosperm ?
- (c) Number of chromosomes in an onion plant cell is 16. Name the cells of the embryo sac having 16 and 24 chromosomes formed after fertilisation.

5

OR

Describe the events that occur after fertilisation of an ovum till implantation in a human female.

5

