

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. It is observed that, the species diversity decreases as we

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|-------------------------------------|--|
| (A) move away from equator to poles | (B) move towards equator from poles |
| (C) move along the equator | (D) move from deserts to rain-forests. |

OR

1. CNG is preferred as a fuel over diesel for public transport because

- (i) it is cost effective.
- (ii) it burns almost completely.
- (iii) it can be recycled.
- (iv) it burns only partially.

Choose the correct combination.

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|--------------------|--------------------|
| (A) (i) and (ii) | (B) (i) and (iii) |
| (C) (ii) and (iii) | (D) (iii) and (iv) |

2. Choose the chromosome, in a human, that possesses least number of genes.

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|---------------------|------------------|
| (A) 21st Chromosome | (B) Autosome |
| (C) X-Chromosome | (D) Y-Chromosome |

3. The practice of mating unrelated animals within the same breed, but with no common ancestor on either side of the pedigree for 4-6 generation is known as

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|--------------------|------------------|
| (A) out-breeding | (B) out-crossing |
| (C) cross-breeding | (D) in-breeding |

OR

3. Bacteria present in rumen of a cattle digest cellulose to produce

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|---------------------|-------------|
| (A) Polysaccharides | (B) Sucrose |
| (C) Ethanol | (D) Methane |

4. The autosomal disorder/disease in humans is

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|----------------------|-----------------------|
| (A) Colour blindness | (B) Thalassemia |
| (C) Haemophilia | (D) Turner's Syndrome |

5. Marchantia is a

- | | |
|----------------------|-----------------------|
| (A) Monoecious plant | (B) Homothallic plant |
| (C) Dioecious plant | (D) Bisexual plant |

Section B

6. (a) How many primary producers do you think would be needed to support six tertiary consumers in a grassland ecosystem?

(b) Draw a grassland pyramid to substantiate your answer.

7. What do 'standing crop' and 'standing state' refer to?

8. Name any two most common bio-reactors and mention their importance in biotechnology.

9. Describe the process of Pollination in Vallisneria.

10. Two children one with blood group 'AB' and other with blood group 'O' are born to parents, where the father has blood group 'A' and the mother has blood group 'B'. Work out a cross to show how is it possible?

11. Name the types of acquired immune responses, and the special types of lymphocytes involved in providing them.

OR

11. Name two organisms belonging to two different kingdoms, that are commonly used as biofertilizers, and how?

12. Write the basis of naming the restriction endonuclease EcoR-I.

Section C

13. Write two major causes of deforestation. Explain the role of re-forestation in maintaining ecological balance.

14. How would you differentiate between gross primary productivity from net primary productivity, and secondary productivity of an ecosystem.

OR

14. (a) Explain the concept of endemism.
(b) Name four regions in and around our country that are considered hot-spots.

15. Compare the symptoms of ascariasis, amoebiasis and elephantitis.

16. (a) Write the difference between the pro insulin and mature insulin.
(b) How did American company Eli Lilly produce human insulin using rDNA technique?

17. Explain the discovery made by Hershey and Chase using radioactive sulphur and phosphorus in their experiment.

OR

17. Describe the experiment where Mathew Meselson and Franklin Stahl used heavy isotope of Nitrogen.

18. Explain convergent evolution with the help of two examples, one from plants and the other from the animals.

19. Explain the role of pituitary and ovarian hormones in the menstrual cycle of human females.

20. Study the table given below. Identify A, B, C, D, E and F in the table.

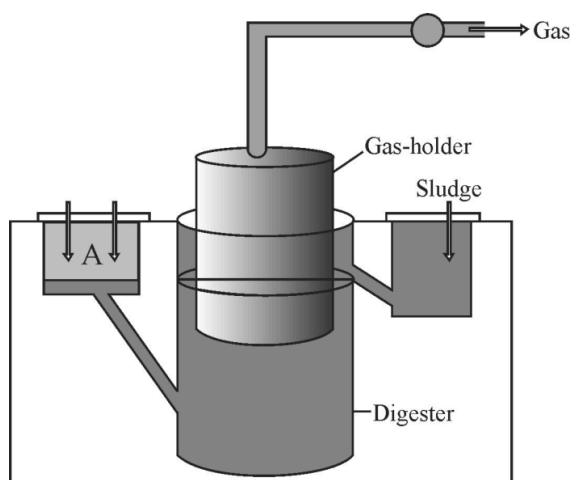
Name of the Drug	Scientific name of source plant	Effect on human organ/system
Opioids	A	B
C	Cannabis sativa	D
Cocaine	E	F

21. (a) List the four major causes of increasing population in our country that you would like to speak on to your fellow students.

(b) Write any two steps that you would stress upon to control the population explosion.

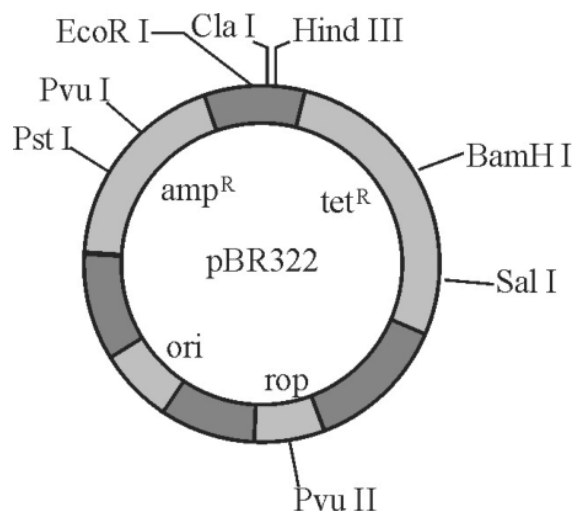
Section D

22. Study the picture of biogas plant given below and answer the questions that follow:



- (a) Name the components gaining entry from A into the chamber.
- (b) Mention the group of bacteria and the condition in which they act on the component that entered from A in the digester.
- (c) Name the components that get collected in gas holder.

23. Observe the diagram shown below of pBR 322. Answer the questions that follow:



- (a) What is pBR322?
- (b) Write the role of 'rop'.
- (c) State the significance of 'amp^R' and 'tet^R'.

24. Hardy-Weinberg Principle is stated in the following algebraic equation: $P^2 + 2Pq + q^2 = 1$.

- (a) State what do 'P' and 'q' denote in the equation.
- (b) State Hardy-Weinberg principle as indicated in the equation.
- (c) What would you interpret if the value of '1' in the equation gets deviated?

Section E

25. A group of F_1 pea plants produce round and yellow seeds. However, when selfed their offsprings provided a 9:3:3:1 phenotypic ratio for seed shape and colour, with some seeds being wrinkled and green and others wrinkled and yellow.

(a) Explain with the help of a Punnett square their phenotypes, genotypes and respective given phenotypic ratios of F_2 -population.

(b) State Mendel's law that can be deduced only from such a cross.

OR

25. (a) Describe the structure of a 'transcription Unit'.

(b) Explain the basis of defining the two DNA strands of a structural gene in a transcription unit.

26. (a) How do normal cells become cancerous?

(b) Cancer can be treated successfully only if detected at an early stage. How do the following help in detecting cancer?

(i) Biopsy

(ii) Histopathology

(iii) MRI

(c) Name any two methods that can possibly cure cancer.

OR

26. (a) State what is hidden hunger.

(b) Name the crop breeding phenomenon and state its objective that has helped in overcoming hidden hunger.

(c) IARI has helped in improving some vegetable crops in this respect. Explain with the help of two examples.

27. Trace the development of a 2-celled pollen grain of an angiosperm within an anther. Draw a labelled diagram to substantiate your answer.

OR

27. Where does fertilisation occur in the oviduct of a human female? Explain the embryonic development from fertilised ovum upto its implantation.

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