

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. 'Cry' protein coded by gene Cry IAb controls

- (A) Cotton bollworm (B) Corn borer
(C) Tobacco budworm (D) Mosquito

2. Meselson and Stahl carried out centrifugation in CsCl_2 density gradient to separate :

- (A) DNA from RNA (B) DNA from protein
(C) The normal DNA from ^{15}N -DNA (D) DNA from tRNA

3. Self-pollination is fully ensured if

- (A) the flower is bisexual. (B) the style is longer than the filament.
(C) the flower is cleistogamous. (D) the time of pistil and anther maturity is different.

OR

3. Zoospores are the reproductive units to carry asexual reproduction in

- (A) Chlamydomonas (B) Spirogyra
(C) Yeast (D) Rhizopus

4. Micropropagation can be achieved by

- (A) Self-pollination (B) Asexual reproduction
(C) Tissue culture (D) Vegetative propagation

OR

4. The microbes commonly used in kitchens are

- (A) Lactobacillus and Yeast (B) Penicillium and Yeast
(C) Microspora and E. coli (D) Rhizopus and Lactobacillus

5. The main barrier that prevents the entry of micro-organisms into our body is

- (A) Antibodies (B) Macrophages
(C) Monocytes (D) Skin

Section B

6. Name the genus of baculovirus that acts as a biological control agent in spite of being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job.

OR

6. "Micro-organisms play an important role for the biological treatment of sewage." Justify.

7. It is often observed that the chances of a person suffering from measles in his or her lifetime are low if he or she has suffered from the disease in their early childhood. Justify the statement.

8. Wings of birds and wings of butterflies contribute to locomotion. Explain the type of evolution such organs are a result of.

9. Name and mention the events that occur in the cells when HIV gets into blood after gaining entry into the human body.

10. List the four different human male accessory ducts.

11. State what is out-crossing type of breeding. Mention on what type of cattle this is practised.

12. Given below is one of the strands of a DNA segment :

3' TACGTACGTACGTACG 5'

(a) Write its complementary strand.

(b) Write a possible RNA strand that can be transcribed from the above DNA molecule formed.

Section C

13. Generally it is observed that human males suffer from hemophilia more than that of human females who rarely suffer from it. Explain giving reasons.

OR

13. F_1 progeny of pea plant bearing violet flowers and snapdragon plant bearing red flowers were selfed to produce their respective F_2 progeny. Compare the phenotypes, the genotypes and the pattern of inheritance of their respective F_2 progeny.

14. For a layman, both apple and banana are fruits. But a biology student categorises fruits as true fruits, false fruits and parthenocarpic fruits. Justify.

15. Draw a schematic transverse section of a mature anther of an angiosperm. Label its epidermis, middle layers, tapetum, endothecium, sporogenous tissue and the connective.

16. Alien species invasion has been a threat to biodiversity. Justify with the help of a suitable example. List any other three causes responsible for such a loss.

17. Explain the changes that milk undergoes when suitable starter/inoculum is added to it. How does the end product formed prove to be beneficial for human health?

18. Explain the three steps carried out in the formation of recombinant DNA using the enzyme EcoRI.

19. In an *E. coli* cloning vector pBR 322, state the role of the following genes:

- (a) ori gene
- (b) Antibiotic resistance gene
- (c) rop gene

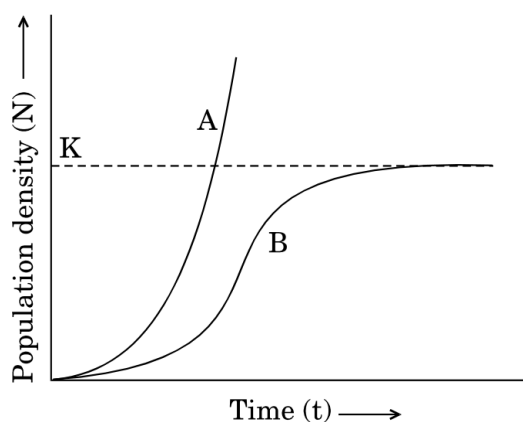
20. Study the table given below and identify a, b, c, d, e and f:

Crops	Variety	Resistance to disease
a	Pusa sadabahar	b
c	d	White rust
e	Himgiri	f

OR

20. What is plant breeding? Explain the two steps involved in classical plant breeding.

21. Study the population growth curve given below and answer the questions that follow:



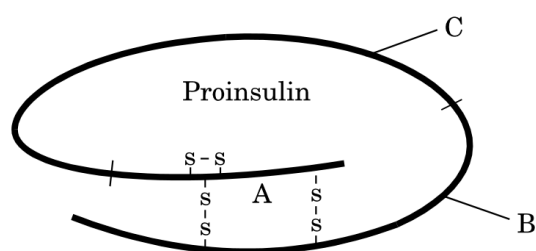
- (a) Identify 'A' and 'B' shown in the graph.
- (b) When and why do such curves occur in a population?

22. Study the age pyramids 'A', 'B' and 'C' of the human population given below and answer the questions that follow:



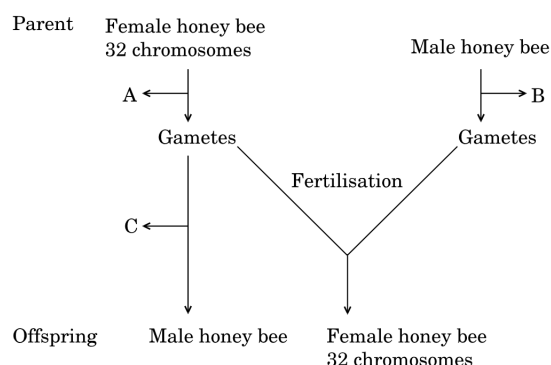
- Identify pyramids 'B' and 'C'.
- Write the basis on which the above pyramids are plotted.

23. Insulin in the human body is secreted by pancreas as prohormone/proinsulin. The schematic polypeptide structure of proinsulin is given below. This proinsulin needs to undergo processing before it becomes functional in the body. Answer the questions that follow:



- State the change the proinsulin undergoes at the time of its processing to become functional.
- Name the technique the American company Eli Lilly used for the commercial production of human insulin.
- How are the two polypeptides of a functional insulin chemically held together?

24. The cytological observations made in a number of insects led to the development of the concept of genetic/chromosomal basis of sex-determination mechanism. Honey bee is an interesting example to study the mechanism of sex-determination. Study the schematic cross between the male and the female honey bees given below and answer the questions that follow:



- Identify the cell divisions 'A' and 'B' that lead to gamete formation in female and male honey bees respectively.
- Name the process 'C' that leads to the development of male honey bee (drone).

Section E

25. Describe the model of phosphorus cycle in the terrestrial ecosystem.

OR

25. Describe the DDT biomagnification occurring in an aquatic food chain. State the negative effects the process has on the organisms at the last trophic level of the food chain.

26. (a) Write the features that a biomolecule must fulfil to be able to act as a genetic material.
(b) DNA and RNA are both genetic materials. Which one of the two is more stable and why?

OR

26. (a) Explain Hardy-Weinberg Principle on the basis of the algebraic equation $p^2 + 2pq + q^2 = 1$.
(b) How do gene migration and genetic drift affect this genetic equilibrium?

27. (a) IVF is a very popular method these days that is helping childless couples to bear a child. Describe the different steps that are carried out in this technique.

(b) Would you consider Gamete Intrafallopian Transfer (GIFT) as an IVF? Give a reason in support of your answer.

OR

27. (a) Draw a sectional view of a human ovary and label primary follicle, tertiary follicle, Graafian follicle and corpus luteum in it.
(b) Name the gonadotropins and explain their role in oogenesis and the release of ova.

- End of Question Paper -