

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 24 carry 3 marks each.
- (v) Section D: Questions 25 to 27 carry 5 marks each.
- (vi) Attempt one alternative where an internal choice is provided. Follow the instructions within each question.
- (vii) Draw neat, properly labelled diagrams wherever necessary.

Section A

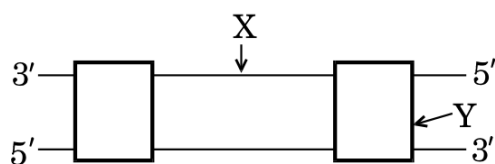
1. Biotechnological techniques can help to diagnose the pathogen much before the symptoms of the disease appear in the patient. Suggest any two such techniques.

OR

Mention the form in which inactive protein toxin is produced by *Bacillus thuringiensis*. How does it get activated in the pest body to kill it?

2. 'Swiss cheese' is characterised by the presence of large holes. Name the bacterium responsible for it.

3. What do 'X' and 'Y' represent in the transcription unit of the DNA molecule shown?



4. Name the disorder in humans with the following karyotype:

(a) 22 pairs of autosomes + XO

(b) 22 pairs of autosomes + 21st chromosome + XY

5. The diploid number of chromosomes in an angiospermic plant is 16. What will be the number of chromosomes in its endosperm and antipodal cells?

OR

State the reason why pollen grains lose their viability when the tapetum in the anther is malfunctioning.

Section B

6. Differentiate between spermiogenesis and spermiation.

7. You are given a tall pea plant and asked to find its genotype. How would you find its genotype? Explain.

8. Scientists tried to develop a single plant exhibiting the characteristic of tomato and potato by using cells from tomato and potato plants respectively. Name the procedure and list the steps to achieve this.

9. (a) How will you measure population density of fish in a lake?

(b) In a pond there are 100 frogs. 20 more were born in a year. Calculate the birth rate of this population.

OR

Draw a 'stable' human age pyramid. Comment on the population growth rate that is depicted by it.

10. MOET is a programme for herd improvement. Write the steps in correct sequence that are carried in the programme.

OR

Why is tobacco smoking associated with rise in blood pressure and emphysema? Explain.

11. What is cryopreservation? Mention how it is used in conservation of biodiversity.

12. How did David Tillman show that 'stability of a community depends on its species richness'? Explain.

Section C

13. (a) A patient had suffered myocardial infarction and clots were found in his blood vessels. Name a 'clot buster' that can be used to dissolve the clots and the micro-organism from which it is obtained.
- (b) A woman had just undergone a kidney transplant. A bioactive molecular drug is administered to oppose kidney rejection by the body. What is the bioactive molecule? Name the microbe from which this is extracted.
- (c) What do doctors prescribe to lower the blood cholesterol level in patients with high blood cholesterol? Name the source organism from which this drug can be obtained.

14. Give reasons for the following:

- (a) Antibody mediated immunity is called humoral immunity.
- (b) How is a child protected from a disease for which he/she is vaccinated?
- (c) Name the type of cells the AIDS virus enters after getting into the human body.

OR

(a) Identify the nos. (i) to (iv) in the following table:

	Name of Disease	Causative Organism	Symptoms
w	Pneumonia	<i>Streptococcus</i>	(i)
x	Typhoid	(ii)	High fever, weakness, headache, stomach pain
y	(iii)	Rhinoviruses	Nasal congestion and discharge, sore throat, cough, headache
z	Ascariasis	<i>Ascaris</i>	(iv)

(b) Which ones of the above mentioned diseases are transmitted through mechanical carriers?

15. Charles Darwin during his famous sea voyage around the world in a ship (HMS Beagle), concluded that there has been gradual evolution of life. Answer the following questions:

- (a) What is his theory known as? Explain the salient features of his theory.
- (b) Name a scientist who arrived at a similar conclusion as that of Charles Darwin.

16. Draw a diagram of LS of Maize grain and label its any six parts.

17. A woman with 'O blood group' marries a man with 'AB blood group'. Work out the cross to show all the possible phenotypes and genotypes of the progeny with respect to blood groups. Explain the pattern of inheritance observed in this cross.

18. Hershey and Chase carried out their experiment under three steps: (a) Infection, (b) Blending, and (c) Centrifugation. Explain each one of these steps that helped them to prove that DNA is the hereditary material.

OR

(a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?

(b) 'DNA replication is continuous and discontinuous on the two strands within the replication fork.' Give reasons.

19. (a) What is the breeding of crops for enhancing their nutritional value called? Why is the need felt for enhancing the nutritional value of the crops?

(b) Rice, wheat and maize are the most commonly used food grains the world over. How have these grains improved in their nutritional value in comparison to their conventional varieties?

OR

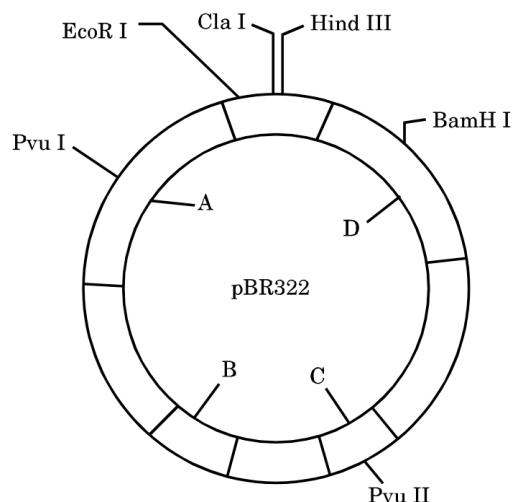
(a) Write the scientific names of the source plants from where opioids and cannabinoids are extracted.

(b) Write their receptor sites in the human body. How do these drugs affect the human beings?

20. Restriction endonucleases have played a very significant role in rDNA technology. Explain the roles of EcoRI and DNA ligase in formation of recombinant DNA.

21. Why DNA cannot pass through the cell membrane? How can the bacteria be made competent to take up a plasmid? Explain a method for introduction of alien DNA into a plant host cell. Name a pathogen that is used as a disarmed vector.

22. Study the figure of vector pBR322 given below.



Identify A, B and C and explain their roles in cloning a vector.

OR

Many people are apprehensive of accepting GM crops. Give three reasons so as to convince them to use these crops.

23. Draw a diagram of the sectional view of a human seminiferous tubule and label any six of its parts.

24. Which one of the two 'in-situ' or 'ex-situ' biodiversity conservation measures help the larger number of species to survive? Explain.

Section D

25. (a) Draw the embryo sac of a flowering plant and label the following:

- (i) Central cell
- (ii) Chalazal end
- (iii) Synergids

(b) Name the cell and explain the process it undergoes to develop into an embryo sac.

(c) Explain the development of endosperm in coconut.

OR

Write the duration and the events that occur in the ovary and the uterus during follicular and luteal phases of the menstrual cycle in humans. How do pituitary and ovarian hormones influence these two phases?

26. (a) Describe aminoacylation of tRNA.

(b) Explain the process that takes place in the ribosomes when mRNA makes its entry into it in a prokaryote.

(c) Due to transcription error, ATG codon of DNA is transcribed into UAG in mRNA which translates a non-functional polypeptide chain in the ribosome. Justify the statement.

OR

Explain how does lac operon in *E. coli* operate

(a) in the absence of an inducer.

(b) in the presence of an inducer.

27. (a) State what is an ecological succession.

(b) Write one similarity and one difference between hydrarch and xerarch successions.

(c) Explain the mechanism of co-evolution as seen in orchid *Ophrys* and bee.

OR

(a) List any two ways the biodiversity loss affects any region.

(b) Explain any two causes of biodiversity loss, with the help of suitable examples.

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