

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 2 Hours

Maximum Marks: 35

General Instructions

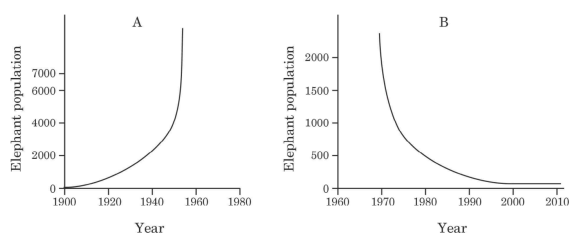
- (i) This question paper contains **13 questions**. All questions are compulsory.
- (ii) Section A: Questions 1 to 6 carry 2 marks each.
- (iii) Section B: Questions 7 to 12 carry 3 marks each.
- (iv) Section C: Questions 13 carry 5 marks each.
- (v) Attempt one alternative where an internal choice is provided. Follow the instructions within each question.
- (vi) Draw neat, properly labelled diagrams wherever necessary.

Section A

1. How does Human Immuno deficiency Virus cause immuno deficiency in the human body?

2. Different species belonging to genus *Trichoderma* are useful to humans as well as to plants. Justify their roles by giving one instance of each.

3(a). The graphs given below, A and B, represent population of elephants in two different National Parks (a hypothetical situation) at different times.



Study the graphs and comment upon the pattern of growth observed. Mention the possible reason for such patterns seen in nature.

OR

3(b). As per a recent newspaper report, a particular country showed declining population growth rate. According to you, what could be the two most possible reasons for this decline and why?

4. To survive unfavourable conditions, some organisms hibernate and others go into aestivation. How is hibernation different from aestivation? Give one example of each.

5(a). Mention the common bacterium found in the anaerobic sludge during sewage treatment and also in the rumen of cattle. How is this bacterium commercially useful?

OR

5(b). Name the effective biocontrol agents of several plant pathogens belonging to group of viruses. Also write about the ways they support the environment.

6. Explain, giving two reasons, how immune response by "vaccine" is different from that by "antitoxin" in humans.

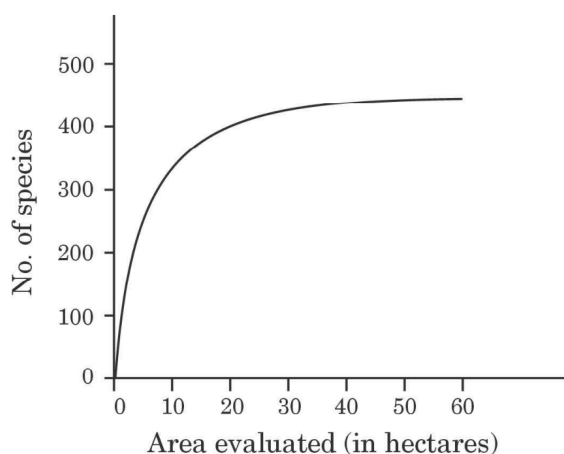
Section B

7. "Genetically modified plants are considered to be superior to non-genetically modified plants." Explain, giving three reasons why.

8. (a) Explain the roles of (i) primary, and (ii) secondary lymphoid organs that are responsible for developing defence to combat the action of pathogens/foreign antigens which enter our body.

(b) Doctors generally advise not to undergo surgery of tonsils. Why?

9(a). The graph given below shows species-area relationship of a certain region.



(i) Study the graph and explain what it represents.

(ii) After a while, a small area was taken for constructing a road which divided the region into two. Write the impact this construction would have on species richness of the region.

OR

9(b). How did Dr. David Tilman relate experimentally, the stability of a community and its species richness? Explain.

10. Causative agents of HIV-AIDS and COVID-19 belong to the same group of viruses. To diagnose and amplify the genetic material for further study of COVID-19 virus, 'RT-PCR' test is carried out.

(a) What does 'RT-PCR' stand for?

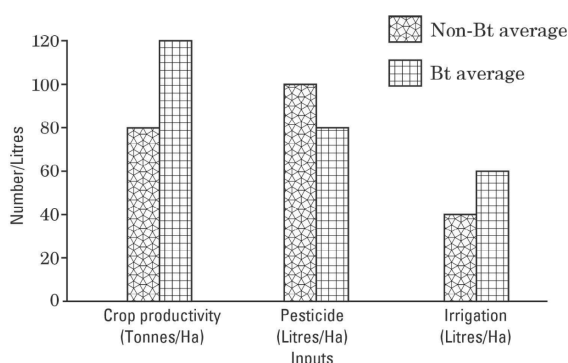
(b) Explain the various steps of PCR technique.

11. *Bacillus thuringiensis* plays an important role in Integrated Pest Management strategy. Explain how. Name any two crops that are protected efficiently from pests.

12. With the help of three examples, explain the 'broadly utilitarian' argument for conservation of biodiversity.

Section C

13(a). There are two different farm lands, one where Bt-cotton crop was cultivated and the other where non Bt-cotton crop (indigenous) was cultivated. Farmers responsible for this experimental cultivation were free to use the farming practices of their choice. During the cultivation period, the data was collected with respect to the amount of pesticide used, water required for irrigation and at harvesting time, the crop productivity. Based on the data collected, a bar graph was plotted which is shown below.

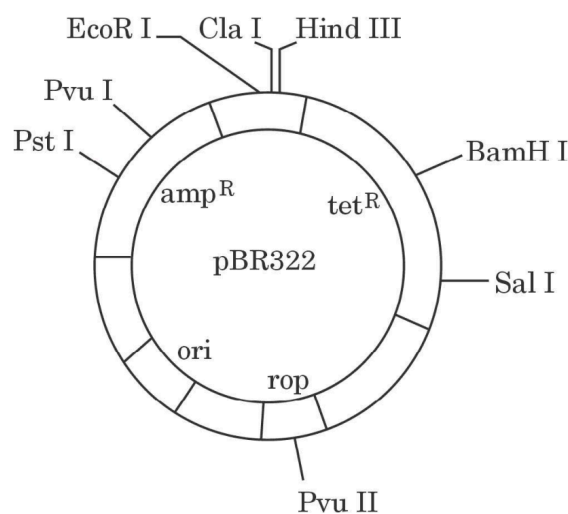


Answer the following questions:

- (i) Write your interpretation, with reason, on the basis of the three parameters plotted in the graph.
- (ii) Which one of the crops would you like to cultivate in your farm and why?
- (iii) Which one out of these two crops would a farmer from Rajasthan like to cultivate and why?

OR

13(b). Gene of interest/alien gene is introduced by a cloning vector into a host cell to bring about a desired phenotypic expression in a host cell. The cloning vectors used are plasmid and bacteriophages. Biotechnologists in their labs, for desired results engineered specialised cloning vectors. One such vector is pBR322. Study the diagram carefully and answer the questions that follow.



- (i) What do 'EcoR I', 'BamH I' and 'Hind III' represent? State their functions.
- (ii) Identify the gene you would select for the role of a selectable marker in pBR322. Explain why.
- (iii) Write the property/characteristic of plasmid and bacteriophage that makes them efficient cloning vectors.
- (iv) Biotechnologists always insert 'ori' gene in their engineered cloning vector. Justify the statement.
- (v) Will the experiment be successful if the alien DNA is ligated at Hind III restriction site? Give reason in support of your answer.

- End of Question Paper -