

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 **33 questions**. All questions are compulsory.
- (ii) Section A: Questions 1 to 16 carry 1 mark each.
- (iii) Section B: Questions 17 to 21 carry 2 marks each.
- (iv) Section C: Questions 22 to 28 carry 3 marks each.
- (v) Section D: Questions 29 to 30 carry 4 marks each.
- (vi) Section E: Questions 31 to 33 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. In which of the following plants are both male and female flowers born on the same plant and the mode of pollination can be geitonogamy or xenogamy?

- | | |
|------------|---------------|
| (A) Papaya | (B) Date Palm |
| (C) Maize | (D) Spinach |

2. Which one of the following hormones is secreted by the human placenta that helps in the maintenance of pregnancy?

- | | |
|--------------|----------------------------------|
| (A) Relaxin | (B) Human Chorionic Gonadotropin |
| (C) Oxytocin | (D) Human Placental Lactogen |

3. The periodic abstinence by a couple for family planning should be from:

- | | |
|-------------------------------------|-------------------------------------|
| (A) Day 5 to 10 of menstrual cycle | (B) Day 13 to 15 of menstrual cycle |
| (C) Day 10 to 17 of menstrual cycle | (D) Day 16 to 20 of menstrual cycle |

4. Select the incorrect match from the following:

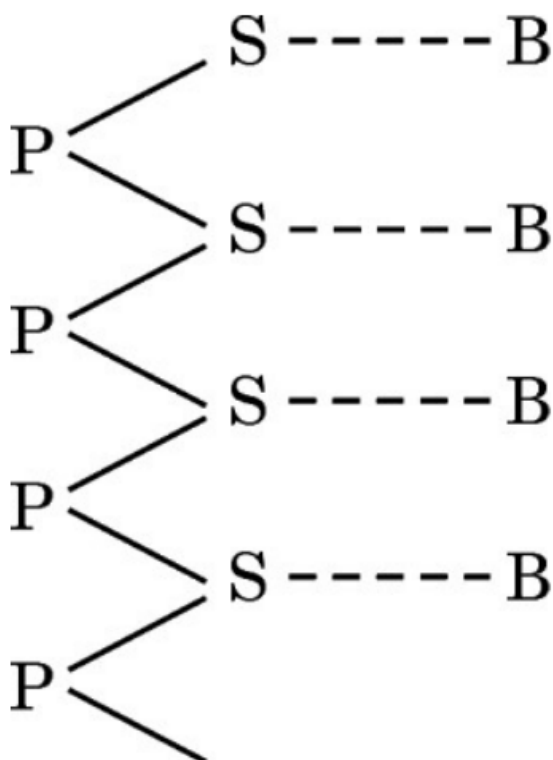
Human Karyotype Characters

- | | |
|--|---|
| (A) 45+XX - Broad palm with characteristic palm crease | (B) 44+XXY - Overall feminine development |
| (C) 44+XO - Sterile females as ovaries are rudimentary | (D) 44+XY - Normal male |
| (A) 45+XX - Broad palm with characteristic palm crease | (B) 44+XXY - Overall feminine development |
| (C) 44+XO - Sterile females as ovaries are rudimentary | (D) 44+XY - Normal male |

5. You know that there are twenty different types of naturally occurring amino acids and four different types of bases in the DNA. A combination of 3 such bases code for a specific amino acid. If instead there are 96 different amino acids and 12 different bases in the DNA, then the minimum number of combination of bases required to form a codon is:

- | | |
|-------|-------|
| (A) 6 | (B) 8 |
| (C) 2 | (D) 4 |

6. The type of bond represented by the dotted line '-----' in a schematic polynucleotide chain is:



- | | |
|--------------------------|-------------------------|
| (A) Hydrogen bond | (B) Peptide bond |
| (C) N-glycosidic linkage | (D) Phosphodiester bond |

7. In which of the following conditions/diseases is there a substantial increase in the activity of mast cells observed in the human body?

- | | |
|----------------|-------------|
| (A) Typhoid | (B) Allergy |
| (C) Ascariasis | (D) AIDS |

8. Lactobacillus that sets milk into curd is categorised as:

- | | |
|-----------------------------|----------------------------|
| (A) Cyanobacteria | (B) Archaeobacteria |
| (C) Chemosynthetic bacteria | (D) Heterotrophic bacteria |

9. Which one of the following transgenic animals is being used to test the safety of the polio vaccine?

- | | |
|-----------|----------|
| (A) Sheep | (B) Goat |
| (C) Pig | (D) Mice |

10. Restriction Endonuclease - Hind II always cuts DNA molecules at a particular point by recognising a specific sequence of:

- | | |
|----------------------|----------------------|
| (A) Six base pairs | (B) Four base pairs |
| (C) Seven base pairs | (D) Three base pairs |

11. The improved trait that is found in the genetically modified transgenic crop - Golden rice is:

- | | |
|--------------------------|----------------------------|
| (A) High lysine content | (B) Insect resistant |
| (C) High protein content | (D) High vitamin-A content |

12. The rate of formation of new organic matter by consumers, and the biomass available for consumption of herbivores as well as decomposers are referred to as:

- | | |
|---|---|
| (A) Gross primary productivity and Net primary productivity | (B) Net primary productivity and Secondary productivity |
| (C) Secondary productivity and Net primary productivity | (D) Secondary productivity and Gross primary productivity |

13. Assertion (A): The laws of our country permit legal adoption and it is as yet, one of the best methods for childless couples looking for parenthood.

Reason (R): Emotional, religious and social factors are no deterrents to the legal adoption of orphaned and destitute children in India.

- | | |
|--|---|
| (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). |
| (C) Assertion (A) is true, but Reason (R) is false. | (D) Assertion (A) is false, but Reason (R) is true. |
-

14. Assertion (A): Linked genes do not show dihybrid F₂ ratio 9:3:3:1.

Reason (R): Linked genes do not undergo independent assortment.

- | | |
|--|---|
| (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). |
| (C) Assertion (A) is true, but Reason (R) is false. | (D) Assertion (A) is false, but Reason (R) is true. |
-

15. Assertion (A): Agrobacterium tumefaciens is a pathogen of several monocot plants.

Reason (R): It is able to deliver a piece of DNA known as 'T-DNA' to transform normal plant cells into a tumor.

- | | |
|--|---|
| (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). |
| (C) Assertion (A) is true, but Reason (R) is false. | (D) Assertion (A) is false, but Reason (R) is true. |
-

16. Assertion (A): Indian Government has set up an organisation known as GEAC to decide the validity of GM research.

Reason (R): Genetic modification of organisms has no effect when such organisms are introduced in the ecosystem.

- | | |
|--|---|
| (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). |
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Section B

17. Identify A, B, C and D in the table given below:

Terms Part of the plant it represents

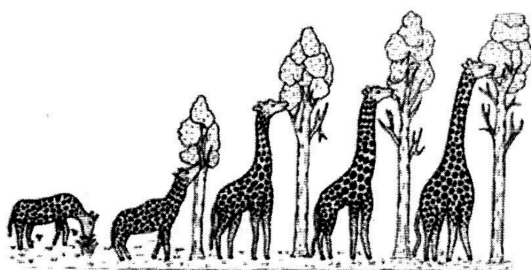
Pericarp - 'A'

'B' - Cotyledon in seed of grass family

Embryonal axis - 'C'

'D' - Remains of nucellus in a seed

18. Observe the picture given below. Name the naturalist and write the explanation given by him that evolution of life forms had occurred on the basis of this example.



19. Write the basic steps followed in the Assisted Reproductive Technologies (ART) programme to help childless couples. Why is it also known as test tube baby programme?

20. (a) A farmer while working on his farm was bitten by a poisonous snake. He was rushed to a nearby health centre where the doctor gave him an injection to save his life.

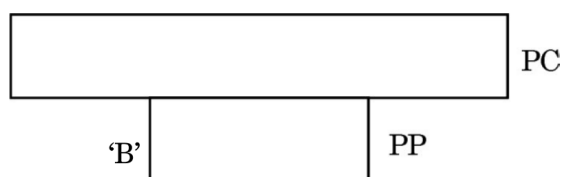
(i) What did the doctor inject and why?

(ii) Name the kind of immunity provided by this injection.

OR

(b) Why do organic farmers not recommend complete eradication of insect pests? Explain giving reason.

21. Study the diagram of a pyramid of biomass given below. Name the two standing crops that could be occupying level 'A' and level 'B' in it. Name this type of pyramid and the ecosystem in which it is found.



Section C

22. Explain the mode of action of contraceptive pills taken by human females. Mention the schedule to be followed for effective outcome.

23. (a) Name and write two characteristics of the type of DNA that forms the basis of DNA fingerprinting technique.

(b) Mention any two applications of this technique.

24. (a) Explain the significance of the experiment carried out by S.L. Miller. Name the scientists whose hypothesis prompted him to carry out this experiment.

(b) How does meteorite analysis favour this hypothesis?

25. Identify A, B, C, D, E and F in the table given below:

Name of Human Disease	Causative Organism
Symptoms	
Pneumonia - 'A'	
Typhoid - 'B' - High fever, weakness, headache, stomach pain	
Common Cold - 'C'	
Ringworm - 'D' - Dry scaly lesions on body parts, redness, itching	
Ascariasis - 'E'	
'F' - Entamoeba histolytica - Constipation, cramps, stools with mucous and blood clots	

26. In a family, the father, the daughter and the son are colour blind, whereas the mother has normal vision. Do you think the son and the daughter have inherited the disease from their father? Work out a cross to justify your answer.

27. (a) (i) What are transgenic animals?

(ii) Name the first transgenic cow and state its importance.

OR

(b) (i) Explain the convention for naming EcoRI.

(ii) With the help of an illustration only, show the action of EcoRI on a DNA Polynucleotide.

28. (a) Explain how it is ensured that the orchid Ophrys is pollinated by a specific species of bee.

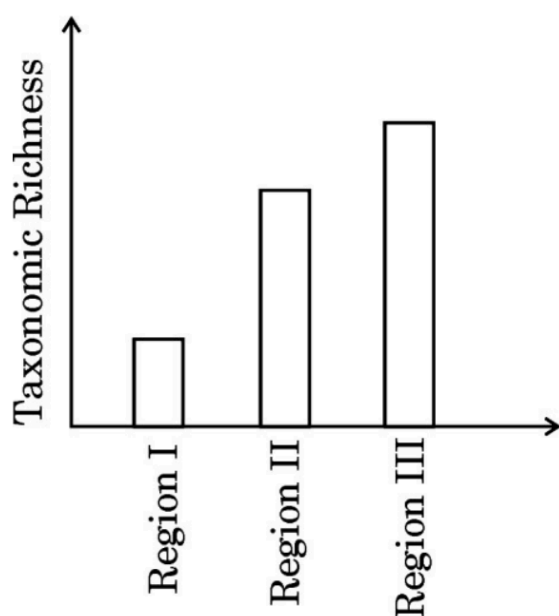
(b) Describe co-evolution with the help of this example.

Section D

29. Read the following passage and answer the questions that follow.

Isn't it incredible that India's land area is only 2.4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent! However, in these estimates of species, prokaryotes do not figure anywhere.

Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below:



(a) Why is the species richness maximum in Region III in the bar graph?

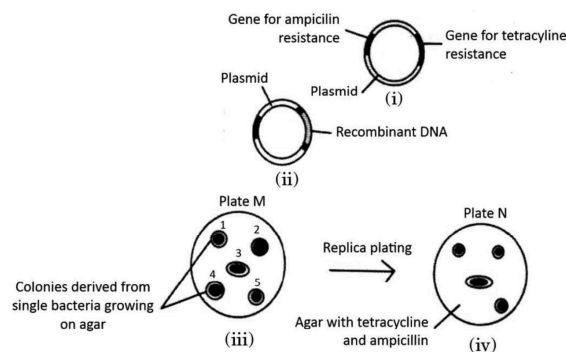
OR

(a) Why is the species richness minimum in Region I in the bar graph?

(b) Plants and animals do not have uniform diversity in the world but show rather uneven distribution. Mention what this kind of diversity is referred to as.

(c) Why is it that prokaryotes do not have an estimated number of their species diversity as seen in plants and animals? Explain.

30. Study the diagram given below that shows the steps involved in the procedure of selecting transformed bacteria and answer the questions that follow:



(a) Identify the colony that has got transformed. Justify your answer.

(b) What are the sites in a plasmid called where ampicillin and tetracycline resistance genes are inserted? State their role in genetic engineering.

(c) Name two enzymes playing an important role in genetic engineering.

OR

(c) State the role of beta-galactosidase in insertional inactivation.

Section E

31. (a) (i) Explain the development of male gametophyte in an angiosperm.

(ii) Draw a labelled diagram of a three-celled male gametophyte.

OR

(b) (i) Draw a diagrammatic sectional view of ovary of human female and label the following:

- (1) Blood vessels
- (2) Primary follicle
- (3) Tertiary follicle
- (4) Ovum

(ii) At which stage of life are primary follicles formed in a human female?

(iii) Explain the events (both hormonal and structural) that occur at the time of ovulation till the onset of the next menstrual cycle.

32. (a) Stability, as one of the properties of genetic material, was very evident in one of the very early experiments in genetics. Name the scientist and describe his experiment. State the conclusion he arrived at.

OR

(b) A tall pea plant bearing violet flowers with unknown genotype is given. Find the genotype by working out different crosses only by selfing the plants. Write the genotypic and phenotypic ratios of each cross shown by you.

33. (a) (i) Name and explain the property present in normal cells but is lost in cancer cells.

(ii) All normal human cells have genes that may become cancerous under certain conditions.

Name them and explain how.

(iii) State the role of the following techniques in detection and diagnosis of cancer:

- (1) Biopsy and Histopathology
- (2) Magnetic Resonance Imaging

OR

(b) Large quantities of sewage are generated every day in cities as well as in towns and are treated in Sewage Treatment Plants (STPs) to make them less polluting. Given below is the flow diagram of stages of STP

Study the flow diagram and answer the questions that follow:

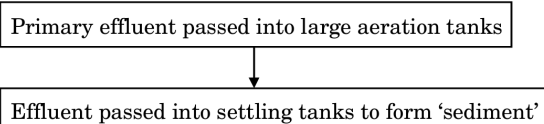
Primary effluent passed into large aeration tanks
→ Effluent passed into settling tanks to form 'sediment'

(i) (1) Why is primary effluent passed into large aeration tanks?

(2) What is the 'sediment' formed, referred to as? Mention its significance.

(3) Explain the final step in the settling tank before the treated effluent is released into water bodies.

(ii) Name any two organisms commonly used as biofertilisers, belonging to different kingdoms. Write how each one acts as a biofertiliser.



- End of Question Paper -