



**MAITRI VIDYA NIKETAN, EMSSS, RISALI, BHILAI**  
**CLASS X, MODEL EXAMINATION (2022-23)**  
**BIOLOGY (CODE – 044)**

**Time: 3 Hours**

**Maximum Marks: 70**

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**General Instructions:**

- (i) All questions are compulsory.**
- (ii) The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.**
- (iii) Section–A has 14 questions of 1 mark each and 02 case-based questions of 4 mark each. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D has 3 questions of 5 marks each.**
- (iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.**
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn.**

**Section – A**

1. Name the organisation responsible for maintaining the Red Data Book.
2. What does R represents in the equation  $GPR-R=NPP$ .
3. What is stratification in an ecosystem?
4. What is the function of DNA ligase in the construction of rDNA?
5. Name the fungal symbiont that functions as biofertilizers.
6. State any one reason why breast feeding the baby acts as a natural contraceptive, for the mother.
7. Expand MALT.
8. Mention the useful as well as the harmful drug obtained from the latex of poppy plant.
9. Name the commonly used vector for transformation in plant cells.
10. Name two species of fungus, which are used in the production of antibiotics.

**Question No. 11 to 14 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true and R is not the correct explanation of A
- C. A is true but R is false
- D. A is False but R is true

11. Assertion: A patient of ADA-deficiency requires periodic or repeated infusion of genetically-engineered lymphocytes.

Reason: Lymphocytes are not immortal, but have life span.

12. Assertion: Verhulst Pearl logistic growth model is considered a more realistic one.

Reason: Any population growing exponentially under unlimited resource conditions, can reach enormous population densities in a very short period.

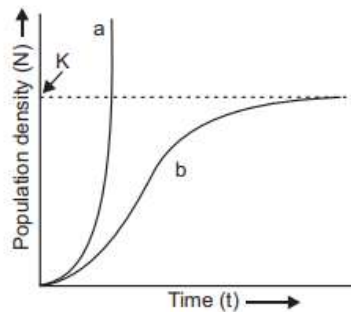
13. Assertion: The secondary treatment of sewage water is appropriately called biological treatment.

Reason: Secondary treatment of sewage is carried out by the heterotrophic microbes naturally present in the sewage.

14. Assertion: Use of cyanobacteria in the paddy fields increases the productivity of paddy.

Reason: Cyanobacteria can fix atmospheric nitrogen in the soil.

15. Study the population growth curves in the graph given below and answer the questions that follow:



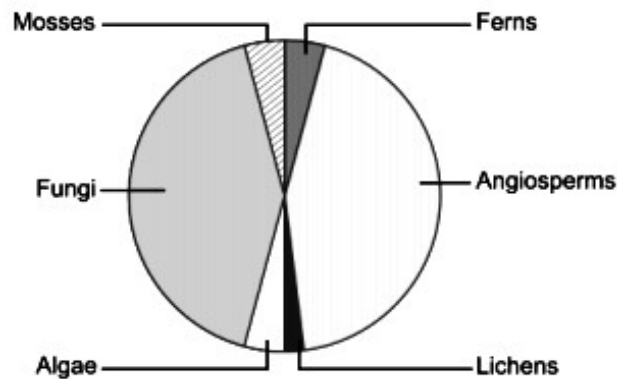
(i) Identify the growth curves 'a' and 'b'.

(ii) Which one of them is considered a more realistic one and why?

(iii) If  $dN/dt = rN(K-N/K)$  is the equation of the logistic growth curve, what does K stand for?

(iv) What is symbolised by N?

16. Observe the global biodiversity distribution of major plant taxa in the diagram alongside and answer the questions that follow.



a. Which group of plants are most endangered?

b. Why are mosses/ferns so few? Give reason.

c. How do fungi that are heterotrophs sustain themselves as a large population?

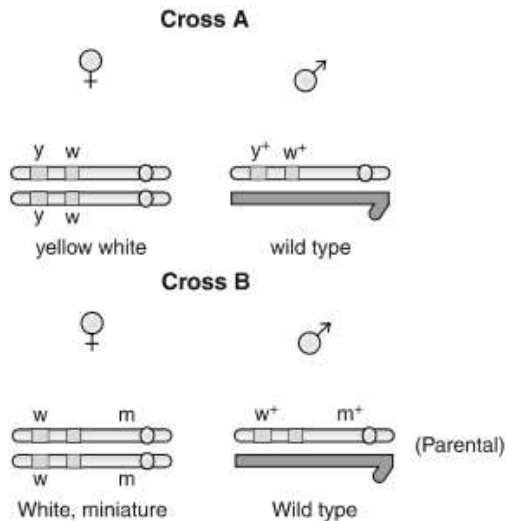
d. Which group of plants is most advanced and which one is most primitive?

### Section- B

17. Write the relationship between productivity, gross productivity and secondary productivity.

18. Why is predation important and required in a community with rich biodiversity? Explain with the help of suitable examples.

19. Study the figures given below and answer the question.



Identify in which of the crosses the strength of linkage between the genes is higher. Give reasons in support of your answer.

20. ATGGAGTACTTCGTGTGA is the coding strand of DNA in a transcription unit.

- Write the mRNA transcribed from this DNA segment.
- How many amino acids does it code for? Why?

OR

Draw a neat labelled sketch of a replicating fork of DNA.

- Name the stage of the human embryo that gets implanted in the uterus and draw its labelled diagram.
- Why is ZIFT a boon to childless couples. Explain the procedure.
- A mature embryo sac in a flowering plant may possess 7-cells, but 8-nuclei. Explain with the help of a diagram only.
- How are malignant tumours different from benign tumours? Why are some patients administered  $\alpha$ -interferons?
- Why are certain groups of bacteria referred to as methanogens? List any two characteristic features of methanogens.

### Section- C

- How is insertional DNA inactivation of an enzyme used as a selectable marker to differentiate recombinants from non-recombinants?
- Explain with the help of an example, each of the three population interactions, where the organisms live closely together.
- Expand VNTR and describe its role in DNA fingerprinting. List any two applications of DNA fingerprinting techniques.
- How are the structural genes inactivated in *lac* operon in *E. coli*? Explain.
- Explain the role of the enzyme, EcoRI, in recombinant DNA technology.

OR

Draw the structure of a human sperm and relate its different parts with their function.

### Section- D

31. a. Work out a dihybrid cross up to F<sub>2</sub> generation between pea plants bearing violet-coloured axial flowers and white-coloured terminal flowers. Give their phenotypic ratio.  
b. State the Mendel's law of inheritance that was derived from such a cross.

OR

A homozygous tall pea plant with green seeds is crossed with a dwarf pea plant with yellow seeds:

- a. What would be the phenotype and genotype of F<sub>1</sub>?
  - b. Work out the phenotype ratio of F<sub>2</sub> generation with the help of a Punnett square.
- 32.a. What is Ti plasmid? Name the organism where it is found. How does it help in genetic engineering?  
b. Expand the following and mention one application of each:
- i. PCR
  - ii. ELISA
33. Give a schematic representation of oogenesis in humans. Mention the number of chromosomes at each stage. Correlate the life phases of the individual with the stages of the process.