

General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) Question paper comprises five sections – A, B, C, D and E.
- (ii) There are 27 questions in the question paper. All questions are compulsory.
- (iii) Section A question number 1 to 5 are multiple choice questions, carrying one mark each.
- (iv) Section B question number 6 to 12 are short answer questions type-I, carrying two marks each.
- (v) Section C question number 13 to 21 are short answer questions type-II, carrying three marks each.
- (vi) Section D question number 22 to 24 are short answer questions type-III, carrying three marks each.
- (vii) Section E question number 25 to 27 are long answer questions, carrying five marks each.
- (viii) Answer should be brief and to the point also the above word limit be adhered to as far as possible.
- (ix) There is no overall choice in the question paper. However, an internal choice has been provided in two questions of 1 mark, one question of 2 marks, two questions of 3 marks and three questions of 5 marks questions. Only one of the choices in such questions have to be attempted.
- (x) The diagram drawn should be neat proportionate and properly labelled, wherever necessary.
- (xi) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION – A

1. Which one of the following is not found in a female gametophyte of an angiosperm ?

(a) Germ pore	(b) Synergids	
(c) Filiform apparatus	(d) Central cell	1

2. The autosomal disorder/disease in humans is

(a) Colour blindness	(b) Thalassemia	
(c) Haemophilia	(d) Turner's Syndrome	1

3. Choose the chromosome, in a human, that possesses least number of genes.

(a) 21 st Chromosome	(b) Autosome	
(c) X-Chromosome	(d) Y-Chromosome	1

4. The practice of mating unrelated animals within the same breed, but with no common ancestor on either side of the pedigree for 4-6 generation is known as
- | | | |
|--------------------|------------------|---|
| (a) out-breeding | (b) out-crossing | |
| (c) cross-breeding | (d) in-breeding | 1 |

OR

Bacteria present in rumen of a cattle digest cellulose to produce

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|---------------------|-------------|---|
| (a) Polysaccharides | (b) Sucrose | |
| (c) Ethanol | (d) Methane | 1 |

5. It is observed that, the species diversity decreases as we
- | | |
|--|---|
| (a) move away from equator to poles | |
| (b) move towards equator from poles | |
| (c) move along the equator | |
| (d) move from deserts to rain-forests. | 1 |

OR

CNG is preferred as a fuel over diesel for public transport because

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|---------------------------|----------------------------------|
| (i) it is cost effective. | (ii) it burns almost completely. |
| (iii) it can be recycled. | (iv) it burns only partially. |

Choose the correct combination.

- | | | |
|------------------|------------------|---|
| (a) (i) + (ii) | (b) (i) + (iii) | |
| (c) (ii) + (iii) | (d) (iii) + (iv) | 1 |

SECTION – B

6. Mention the advantages of emasculation and bagging in artificial hybridization in plants bearing unsexual, and bisexual flowers. 2
7. Two children one with blood group 'AB' and other with blood group 'O' are born to parents, where the father has blood group 'A' and the mother has blood group 'B'. Work out a cross to show how is it possible ? 2
8. Name the types of acquired immune responses, and the special types of lymphocytes involved in providing them. 2
- OR
- Name two organisms belonging to two different kingdoms, that are commonly used as biofertilizers, and how ? 2
9. Write the basis of naming the restriction endonuclease EcoR-I. 2
10. What are transgenic animals ? How was the first transgenic cow found to be more useful than the normal cow, for humans ? 2

11. How do the following organisms pull through the adverse environmental conditions ?
- (a) Fungi (b) Zooplankton
(c) Bear (d) Snails 2
12. (a) How many primary producers do you think would be needed to support six tertiary consumers in a grassland ecosystem ?
(b) Draw a grassland pyramid to substantiate your answer. 2

SECTION – C

13. Explain the role of pituitary and ovarian hormones in the menstrual cycle of humans females. 3
14. (a) List the four major causes of increasing population in our country that you would like to speak on to your fellow students.
(b) Write any two steps that you would stress upon to control the population explosion. 3
15. Explain the discovery made by Hershey and Chase using radioactive sulphur and phosphorus in their experiment. 3

OR

- Describe the experiment where Mathew Meselson and Franklin Stahl used heavy isotope of Nitrogen. 3
16. Analogous organs are a result of convergent evolution whereas homologous organs are a result of divergent evolution. Justify with the help of suitable example for each. 3
17. Compare the symptoms of ascariasis, amoebiasis and elephantitis. 3
18. (a) Write the difference between the pro insulin and mature insulin.
(b) How did American company Eli Lilly produce human insulin using rDNA technique ? 3
19. Study the table showing the population interaction between species 'Z' and 'Y' respectively. Assign the appropriate '+'/'-' signs for 'A', 'B', 'D', 'E' and respective interactions for 'C' and 'F'.

Species 'Z'	Species 'Y'	Name of Interaction
A	B	Mutualism
-	-	C
D	E	Parasitism
+	O	F

20. How would you differentiate between gross primary productivity from net primary productivity, and secondary productivity of an ecosystem. 3
- OR
- (a) Explain the concept of endemism.
(b) Name four regions in and around our country that are considered hot-spots. 3

21. Describe the significance of "Amrita Devi Bishnoi Wildlife Protection Award". Write her contribution towards the conservation of forests.

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SECTION – D

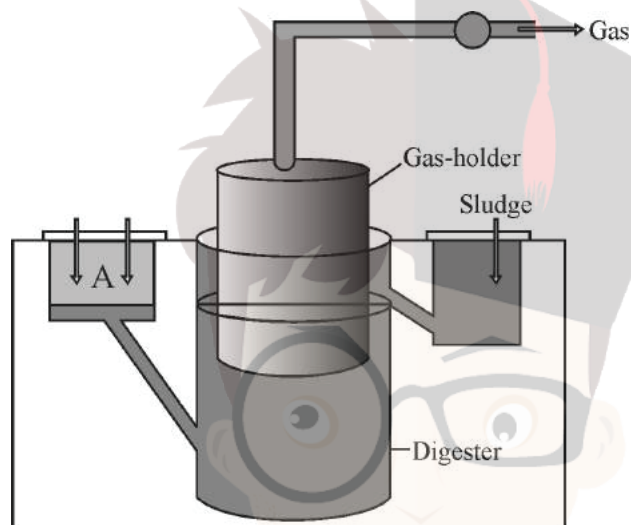
22. Hardy-Weinberg Principle is stated in the following algebraic equation :

$$P^2 + 2Pq + q^2 = 1.$$

- (a) State what do 'P' and 'q' denote in the equation.
 (b) State Hardy-Weinberg principle as indicated in the equation.
 (c) What would you interpret if the value of '1' in the equation gets deviated?

3

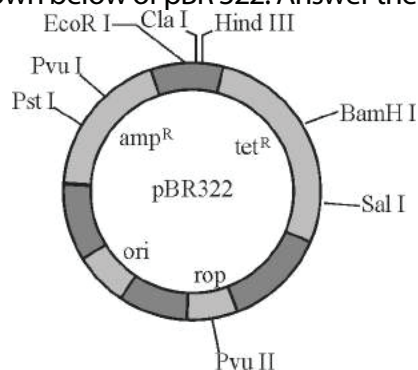
23. Study the picture of biogas plant given below and answer the questions that follow :



- (a) Name the components gaining entry from A into the chamber.
 (b) Mention the group of bacteria and the condition in which they act on the component that entered from A in the digester.
 (c) Name the components that get collected in gas holder.

3

24. Observe the diagram shown below of pBR322. Answer the questions that follow :



- (a) What is pBR322 ?
 (b) Write the role of 'rop'.
 (c) State the significance of 'amp^R' and 'tet^R'.

3

SECTION – E

25. Trace the development of a 2-celled pollen grain of an angiosperm within an anther. Draw a labelled diagram to substantiate your answer. 5

OR

Where does fertilisation occur in the oviduct of a human female ? Explain the embryonic development from fertilised ovum upto its implantation. 5

26. Explain the relationship of ribosomes, t-RNA and m-RNA during the process of translation in Prokaryotes. 5

OR

A cross was carried out between two pea plants homozygous dominant for yellow and round seeds with homozygous recessive for the same trait. The F_2 progeny of such a cross showed phenotypic ratio of 9 : 3 : 3 : 1.

- (a) State the different laws of Mendel that could be derived from such a cross.
- (b) Write the possible genotypes for the progeny for such a cross having
- (i) yellow and wrinkled seeds
 - (ii) green and round seeds. 5

27. (a) How do normal cells become cancerous ?
- (b) Cancer can be treated successfully only if detected at an early stage. How do the following help in detecting cancer ?
- (i) Biopsy (ii) Histopathology (iii) MRI
- (c) Name any two methods that can possibly cure cancer. 5

OR

- (a) State what is hidden hunger.
- (b) Name the crop breeding phenomenon and state its objective that has helped in overcoming hidden hunger.
- (c) IARI has helped in improving some vegetable crops in this respect. Explain with the help of two examples. 5
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