

**BIOLOGY**

Time 3 hrs

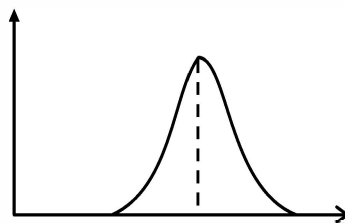
Max. Marks : 70

**General Instructions :**

- There are 33 questions in all. All questions are compulsory.
- This question paper has five sections: Section A, Section B, Section C, Section D and Section E. All the sections are compulsory.
- Section A** contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each, **Section B** contains five questions of two marks each, **Section C** contains seven questions of three marks each, **Section D** contains two case study based questions of four marks each and **Section-E** contains three long answer questions of five marks each.
- There is no overall choice. However, an internal choice has been provided in one question in Section B, one question in Section C, one question in each CBQ in Section D and all three questions in Section E. You have to attempt only one of the choices in such questions.
- Use of calculators is not allowed.

**SECTION – A**

- Vegetative fertilization results in the formation of special tissue called the endosperm in \_\_\_\_\_. [1]  
(A) Gymnosperms (B) Angiosperms (C) Dichosperms (D) Parenchyma
- What does the androecium produce? [1]  
(A) Spores (B) Microspores (C) Egg (D) Ovules
- On what locations are untranslated regions (UTRs) found? [1]  
(A) At both the 5' and the 3' ends (B) At only the 5' end  
(C) At only the 3' end (D) Outer to the 5' and the 3' end
- Of these species, which one does not exhibit the male heterogametic condition? [1]  
(A) Grasshoppers (B) Humans (C) Drosophila (D) Birds
- This diagram represents which selection? [1]



- (A) Stabilizing selection (B) Disruptive selection  
(C) Directional selection (D) Artificial selection
- What theory was coined by Sutton and Boveri? [1]  
(A) Chromosomal theory of inheritance (B) Genetic theory of inheritance  
(C) Theory of Gravitation (D) Universal theory of everything

7. What is the process of activation of amino acids in the presence of ATP and its linkage to their cognate tRNA known as? [1]  
(A) Charging of tRNA (B) Charging of ATP  
(C) Aminoacylation of tRNA (D) Aminoacylation of ATP
8. Which of the following does not describe a characteristic of a person with Down's syndrome? [1]  
(A) Furrowed tongue (B) Big tongue  
(C) Wrinkled tongue (D) Straight tongue
9. Which of the following statements is not true regarding BOD? [1]  
(A) Sewage water is treated until the BOD is reduced.  
(B) BOD is a measure of organic matter present in the water  
(C) Greater the BOD, lesser is the polluting potential of water  
(D) BOD measures the rate of uptake of oxygen
10. The adenosine deaminase gene, \_\_\_\_\_, is the cause of ADA deficiency. [1]  
(A) Addition (B) Change  
(C) Deletion (D) Multiplication
11. Strains of *Bacillus thuringiensis* are being used for designing \_\_\_\_\_. [1]  
(A) Biomineralization (B) Biofertilizers  
(C) Biometallurgical techniques (D) Bioinsecticidal plants
12. Which phrases are used to describe the connection that exists between producers and consumers? [1]  
(A) Problems (B) Biomass  
(C) Ecological success (D) Age

**Directions :** Q. No. 13 to 16 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 and R is true.

13. **Assertion :** The tapetum cells are usually haploid. [1]  
**Reason :** Tapetum cells have dense cytoplasm.
14. **Assertion :** The human genome contain 3.1647 million base pairs. [1]  
**Reason :** The human genome contain 20,000 to 25,000 genes.
15. **Assertion :** Morphine is useful in patients who have undergone surgery. [1]  
**Reason :** It is very effective sedative and painkiller.
16. **Assertion :** Chitinase is used for treating the cells of yeast to assist DNA extraction. [1]  
**Reason :** Yeast cell wall is made of chitin.

### SECTION – B

17. Infertility is typically observed in males whose testes do not descend to the scrotum. And why? [2]
18. Mention any two applications of DNA fingerprinting. [2]

OR

Define allergy? What are the different types of allergens.

19. What does autoimmune disease mean? Give an example. [2]
20. What distinguishes endonucleases and exonucleases from one another? [2]
21. What are the limitations of ecological pyramids? [2]

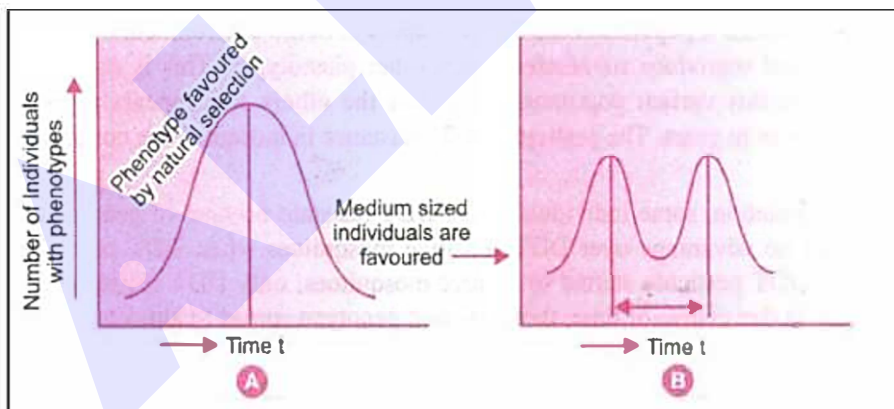
### SECTION – C

22. T.S. of the mammalian testis demonstrates the various cell types found in the seminiferous tubules. [3]
- (i) Name the two types of cells of germinal epithelium.
- (ii) Name of cells scattered in connective tissue and lying between seminiferous tubules.
- (iii) Write down the function of the spermatogonium & sertoli cell.
23. The following days during a normal woman's menstrual cycle should be explained: [3]
- (a) Pituitary hormone levels from 8 to 12 days.
- (b) Uterine events from 13 to 15 days.
- (c) Ovarian events from 16 to 23 days.
24. Give the name of contraceptive methods. [3]

OR

IUD stands for? And what are the different types of IUD.

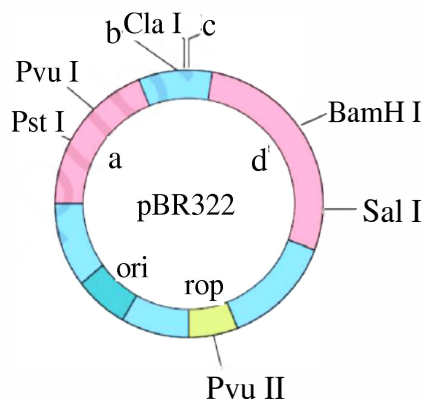
25. Study the given figures (a) and (b) and answer the questions given below : [3]



- (i) Under the influence of which type of natural selection would graph (a) becomes like graph (b)?
- (ii) What could be the likely reasons of new variations arising in the population?
- (iii) Who suggested natural selection as a mechanism of evolution?
26. Microbes are used to reduce the need for chemical pesticides and fertilizers. How is this carried out? Describe. [3]
27. Compare and contrast the benefits and drawbacks of creating genetically modified organisms? [3]
28. How do area and species richness relate to each other? What role does the regression's slope play? [3]

**SECTION – D**

29. Observe the diagram of the first artificial plasmid vector pBR322. [4]



- Determine which selectable markers are present in the above *E. coli* vector diagram.
- How is the coding sequence of  $\beta$ -galactosidase considered a better marker than the ones identified by you in the diagram? Explain.
- Why is it essential to have a 'selectable marker' in a cloning vector?

**OR**

Which antibiotic resistance is present in pBR322 ?

30. In a huge culture flask with unlimited supply of nutrient medium, bacteria were grown. Their population kept on increasing as they were dividing by binary fission. [4]

- What type of growth pattern will be seen in this population?
- Write the equation which can be used to calculate the population size after time  $t$ , when the initial population size of the bacteria is represented by  $N$  and population size after time  $t$  is represented by  $N_t$ .
- Draw a growth curve to depict the growth in the population size when growth in the population size is plotted over time. What will be the shape of this growth curve?

**OR**

If instead of providing the unlimited supply of culture medium in a huge flask, it is provided only in a very small test tube, then what will be the pattern of growth and the shape of the growth curve? Depict diagrammatically also.

**SECTION – E**

31. (i) What is foetal ejection reflex ? [5]  
 (ii) Which hormones is responsible for foetal ejection reflex ?  
 (iii) Explain parturition?

**OR**

- What are the three ways that sperm fertilization of human ovum might be avoided?
- Describe the technique which is used for sex determination in foetus?

32. Explain operon? Write down its components. [5]

**OR**

Explain human genome project? What are their goals.

33. A person's immune system is suppressed. The ELISA diagnostic test revealed that he tested positive for a pathogen. [5]

- Identify the illness that the patient is experiencing.
- Which pathogen does the ELISA test identify?
- Which cells of the body are attacked by the pathogen?
- Suggest preventive measure of the infection.

**OR**

Explain innate immunity? What are the barriers of innate immunity.