

KENDRIYA VIDYALAYA SANGATHAN, CHENNAI REGION

II PREBOARD (2025-26)

SET 3

CLASS-XII

SUBJECT- BIOLOGY (044)

MAX.MARKS:70

TIME:3HRS

General Instructions:

- (i) All questions are compulsory.
The question paper has five sections and 33 questions. All questions are compulsory.
- (ii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section–C has 7 questions of 3 marks each; Section–D has 2 case- based questions of 4marks each; and Section–E has 3 questions of 5marks each.
- (iii) 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.
- (iv) Wherever necessary, neat and properly labelled diagrams should be drawn

SECTION-A

Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. Which of the following statements correctly describes the role of the acrosome in fertility

- A. It provides energy for sperm motility.
- B. It contains enzymes that help the sperm penetrate the egg.
- C. It initiates the fusion of male and female pronuclei.
- D. It prevents polyspermy after fertilization.

2. A couple is advised to undergo IVF due to blocked fallopian tubes in the female partner.

Which sequence of steps correctly represents the IVF process?

- A. Fertilization → Ovum retrieval → Embryo transfer → Hormonal stimulation
- B. Hormonal stimulation → Ovum retrieval → Fertilization → Embryo transfer
- C. Ovum retrieval → Hormonal stimulation → Fertilization → Embryo transfer
- D. Embryo transfer → Fertilization → Hormonal stimulation → Ovum retrieval

3. Which of the following is a purine base found in DNA?

- A. Cytosine B. Thymine C. Adenine D. Uracil

4. Who proposed the theory of natural selection?

- A. Jean Baptiste Lamarck B. Hugo de Vries C. Charles Darwin D. Ernst Haeckel

5. In a test cross involving a pea plant showing dominant traits for both seed shape (round) and seed colour (yellow), the progeny showed a 1:1:1:1 ratio. What does this indicate about the genotype of the parent plant?

- A. Homozygous dominant for both traits
- B. Heterozygous for both traits

- C. Homozygous recessive for both traits
 - D. Heterozygous for one trait and homozygous for the other
6. Which of the following best explains why Darwin's finches are considered an example of adaptive radiation?
- A. They migrated from different continents to the Galápagos Islands.
 - B. They evolved from different ancestors to occupy similar habitats.
 - C. They evolved from a common ancestor to occupy different ecological niches.
 - D. They were artificially selected by humans for specific traits.
7. A farmer observes that his legume crop is growing better without nitrogen fertilizers. What could be the reason?
- A. The crop is genetically modified
 - B. The soil is rich in phosphorus
 - C. The crop has symbiotic nitrogen-fixing bacteria
 - D. The crop is resistant to pests
8. Which of the following diseases is caused by Plasmodium?
- A. Typhoid B. Malaria C. Dengue D. Influenza
9. Which of the following enzymes is used to cut DNA at specific sites?
- A. DNA polymerase
 - B. Ligase
 - C. Restriction endonuclease
 - D. RNA polymerase
10. Why is *Agrobacterium tumefaciens* considered a natural genetic engineer?
- A. It produces insulin naturally
 - B. It transfers genes into animal cells
 - C. It transfers a part of its plasmid into plant cells
 - D. It synthesizes restriction enzymes
11. A scientist inserts a human insulin gene into a plasmid and introduces it into *E. coli*. After culturing, the bacteria produce insulin. What does this demonstrate?
- A. Bacteria can naturally produce human proteins
 - B. Plasmids are harmful to bacteria
 - C. Recombinant DNA technology enables gene expression across species
 - D. Insulin is a bacterial hormone
12. Which of the following best explains why pyramid of energy is always upright?
- A. Energy is created at each trophic level B. Energy is recycled between organisms

- C. Energy decreases at each successive trophic level due to loss as heat
- D. Energy increases due to accumulation in top consumers

Question 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 but R is true.**

13. Assertion (A): In flowering plants, double fertilization is a unique event.

Reason (R): One male gamete fuse with the egg, and the other fuses with the two polar nuclei.

14. Assertion (A): DNA replication is semi-conservative in nature.

Reason (R): Each daughter DNA molecule has one parental and one newly synthesized strand.

15. Assertion (A): Restriction endonucleases are used to cut DNA at specific sites.

Reason (R): These enzymes recognize palindromic sequences in DNA.

16. Assertion (A): Biodiversity is essential for ecosystem stability.

Reason (R): Diverse ecosystems are more resilient to environmental changes and disturbances.

SECTION-B

17. Attempt either option A or B

A. Define apomixis. How is it different from parthenocarpy?

OR

B. Assess the advantage of using copper-releasing IUDs to hormone releasing IUDs as a method of contraception based on their action.

18. A woman with blood group A marries a man with blood group B. Their child has blood group O. Using your understanding of genetics, explain how this is possible.

19. Attempt either option A or B

A. Explain how Rhizobium acts as a biofertilizer. Why is it particularly useful for leguminous crops?

OR

B. Drug addiction is one of the major concerns among adolescence. Identify A, B, C and D in the following table with respect to the source of drug and its impact.

Scientific name of the source plant	Drug	Harmful effects/Human body part affected
Papaver somniferum	-----A -----	Depressant/Slows down body function
Cannabis sativa	Cannabinoids	----- B -----
-----C-----	Cocaine	----- D -----

20. Name the two enzymes commonly used in recombinant DNA technology and state their functions.

21. **Attempt either option A or B**

A. Why do predator and prey populations in an ecosystem show cyclic oscillations?

OR

B. Bio-diversification of life started to occur 3 billion years ago. Since then, new species are evolving and disappearing in-masses from earth.

a. How many episodes of mass extinction of species have already taken place and which one is in progress in the current era?

b. How are current episodes in progress different from the previous episodes?

SECTION -C

22. A couple is unable to conceive due to low sperm motility in the male partner. Suggest a suitable assisted reproductive technique (ART) for them and explain how it helps overcome this problem.

23. Compare the hormonal changes during the follicular and luteal phases of the menstrual cycle.

How do these changes regulate the reproductive events?

24. A geneticist observes that a population of fruit flies shows a sudden increase in frequency of a recessive allele over generations. Suggest two possible evolutionary forces that could explain this change and describe how they act.

25. Compare the roles of *Lactobacillus* and *Propionibacterium* in dairy product formation.

How do their metabolic activities influence the characteristics of the final product?

26. List and briefly describe the three basic steps involved in genetically modifying an organism.

27. A developer plans to build a resort in a forested area rich in endemic species. As an ecologist, suggest three measures to minimize biodiversity loss and justify their ecological importance.

28. Construct a pyramid of biomass starting with phytoplankton. Label the trophic levels. Is the pyramid upright or inverted? Why?

SECTION-D

29. In a population of moths living near industrial areas, light-coloured moths were predominant before industrialization. After years of pollution darkening tree bark, dark-coloured moths became more common.

Questions:

a. What evolutionary concept does this scenario illustrate?

b. How did environmental change influence natural selection?

Attempt either option c or d.

c. What term describes the shift in population traits over time?

OR

d. Name the phenomenon which explains this.

30. A biotech company wants to produce human insulin using genetically engineered bacteria. They isolate insulin gene from human cells and insert it into a plasmid vector, which is then introduced into E. coli. After culturing, the bacteria begin producing insulin.

Questions:

- a. What is the role of the plasmid in this process?
- b. Why is E. coli commonly used in genetic engineering?

Attempt either option C or D.

- c. What term describes the bacteria that now produce human insulin?

OR

- d. How is this approach beneficial compared to extracting insulin from animal sources?

SECTION-E

31. Describe the process of fertilization in humans. Include the role of sperm structure, acrosomal reaction, and the events leading to zygote formation.

OR

Describe the structure of the embryo sac of a mature angiosperm. Explain the role of synergids in it.

32. Explain the principle of DNA fingerprinting. How is it used in forensic science and paternity testing? Discuss the role of VNTRs in this technique.

OR

A. Why are both the strands not copied during transcription?

B. How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms.

33. A community in a tropical region is experiencing frequent outbreaks of malaria and dengue.

As a public health officer, suggest a comprehensive strategy to control the spread of these diseases. Justify your approach with biological reasoning.

OR

Describe the primary and secondary treatment of domestic sewage before it is released for Reuse.
