

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

- (i) Question paper contains four sections A, B, C and D.
- (ii) There is internal choice in questions in all the sections. You have to attempt only one of the choices in such questions.
- (iii) Questions No. 1 to 6 are very short answer questions, carrying 1 mark each.
- (iv) Questions No. 7 to 14 are short answer questions, carrying 2 marks each.
- (v) Questions No. 15 to 25 are also short answer questions, carrying 3 marks each.
- (vi) Questions No. 26 to 28 are long answer questions, carrying 5 marks each.
- (vii) Use of calculators is not permitted. However, you may use log tables, if necessary.

Section A

1. What is the function of reverse transcriptase enzyme ?

OR

1. What is the advantage of using polylinker in a vector ?

2. Why is macerozyme used in obtaining cell suspension culture from plant tissue ?

OR

2. Name the hormone involved in fruit ripening.

3. What does IUPAC single letter code 'R' stand for ?

4. What is lipofection ?

5. If the specific growth requirements of an isolated strain of bacterium are not known, which type of medium should be used to grow (culture) the same ?

6. Which type of non-covalent interaction, through a weak attraction force, is important in biomolecules ?

Section B

7. How does nerve gas cause death in humans ?

8. Differentiate between primary and secondary metabolites in plants, with one example of each.

OR

8. Inter-generic crosses hardly lead to successful production of hybrids. Why ?

9. How was 'Golden Rice', a transgenic plant, developed using genetic engineering techniques ?

10. OKT-3 can help in preventing transplant rejection. How ?

OR

10. How can tPA prevent heart attack ?

11. Maintenance of extra-cellular and intra-cellular pH is essential for survival of mammalian cells in culture. Why ?

12. You are given a sequence without label. How will you find out if it is a DNA or RNA or a protein sequence ?

13. A protein with molecular weight of 20,000 D contains 5 and 4 charges. At what m/z are protein ions detected by the mass spectrometer ?

14. In a given genome sequence, the relationship between number of genes and number of proteins is not linear. Why ? Give two reasons.

OR

14. How are DNA chips useful in functional genomics ?

Section C

15. Detergents now-a-days are provided with 'biologically active enzymes'. (a) Name the enzyme commonly used. (b) Why is this enzyme inactivated in the presence of bleach ? (c) How is the engineered enzyme different from its natural form ?

16. Draw a flow chart to show the various steps used for the isolation of recombinant insulin (Humulin) produced in *E. coli*.

OR

16. What are the main concerns for the safety aspects related to microbial biotechnology ?

17. How does meta genomics approach help scientists to identify the novel gene products present in the environment ?

18. Differentiate between Batch and Continuous culture.

OR

18. (a) Why are fermentors provided with baffles ? (b) Foaming of (in) medium can hinder microbial growth. Why ? (c) Microbial strains are usually exposed to chemicals like NTG (Nitrosoguanidine). Why ?

19. Describe aqueous two-phase partition process for separation of proteins.

20. With an example, show (a) blunt-end cutter restriction enzyme. (b) sticky-end cutter restriction enzyme. Which one of the ends are better for directional gene cloning and why ?

21. Draw a labelled diagram showing the technique which can be used to identify and locate a specific sequence in a DNA gel using a probe.

OR

21. Draw a diagram to show and compare the features of pBR 322 and YE_p. Why is YE_p called a shuttle vector ?

22. Describe any three methods used to introduce recombinant DNA into the host cells.

23. Define the terms : RefSeq, Homologues and Paralogs

OR

23. What is BLAST ? Write the principles that underlie BLAST search.

24. Name any three databases for Bioinformatics and the information available in them.

25. Why are genes difficult to count, even if we know where the genes are in a given genome ? Write any three reasons.

Section D

26. (a) What are stem cells ? (b) Differentiate between pluripotent and multipotent stem cells. Which of these act as repair system for the body and how ? (c) Give three applications of stem cells in the field of medicine.

OR

26. (a) What is a 'gene knockout' ? (b) Why are mouse models prepared using gene knockouts useful ? (c) Who developed the technique to grow Human Embryonic Stem Cells (hESCs) in culture and what is the source of these cells ?

27. Explain how the desired genes are introduced in plants using vector mediated gene transfer. Draw diagram. How can one differentiate between the transgenic and non-transgenic plant ?

OR

27. (a) How are edible vaccines produced ? (b) Edible vaccines have advantages over recombinant vaccines produced by bacteria. List any three advantages.

28. (a) What are nutraceutical proteins ? (b) Curd has been used as a pro-biotic. Why ? (c) Whey protein can treat a spectrum of diseases. Explain. (d) In which food system is the water binding property of whey protein used ?

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