CBSE Class 12 Biotechnology 2011 - Set 99/1

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) All questions are compulsory.

(ii) There is no overall choice. However, an internal choice has been provided in one question of three marks and two questions of five marks. You have to attempt only one of the choices in such questions.

(iii) Question numbers 1 to 5 are very short answer questions, carrying 1 mark each.

(iv) Question numbers 6 to 15 are short answer questions, carrying 2 marks each.

(v) Question numbers 16 to 25 are also short answer questions, carrying 3 marks each.

(vi) Question numbers 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.

Questions

1. Farmers growing cotton find that bollworm is devouring their crop. Suggest a possible way by which genetic engineering can provide a solution to this problem.

2. A microbiologist involved in an antibiotic discovery programme has isolated some bacteria from hot springs in the Himalayas. However attempts of growing these bacteria under regular laboratory conditions have failed. What suggestion can you give him ?

3. An enriched medium containing salts, glucose, proteins and vitamins was made and a commercially available animal cell line was introduced. However the cells began dying. What could have been the mistake ?

4. In micro-propagation, axillary meristems are used as the source for raising virus free plants, why ?

5. A given microbial species grows rapidly. Which will be higher, its specific growth rate μ or doubling time 't' ?

6. What is the role of Factor VIII ? Why are animal cell lines required to produce it ?

7. Differentiate between homologous and paralogous genes.

8. Write the principle of Southern hybridization.

9. 'Whey', in ancient times, was recommended for its therapeutic role. Why ?

10. Indicate two important properties of animal cell cultures.

11. What are haploids and triploids ? What are their uses in plant cell culture ?

12. Indicate the use of the following in microbial cell culture (a) liquid nitrogen (b) agar (c) nitrosoguanidine (d) glycerol

13. Expand SNPs and describe their one application.

14. Give the principle of the blue-white screening method in rDNA technology.

15. In the enzyme chymotrypsin, why does Ser195 develop a negative charge on its –OH group.

16. Why is Agrobacterium tumefaciens referred to as a 'natural genetic engineer' ? How does this bacterium achieve this feat ?

17. After growth in fermentor, downstream processing involves a number of techniques. Explain the principles behind (a) centrifugation (b) ultrafiltration. What is the rational behind minimizing steps involved in downstream processing ?

18. What do you understand by the term “genomics” ? Differentiate between structural and functional genomics.

19. In an experiment involving cloning of a genomic DNA fragment into a vector :
(a) Suggest a vector to clone this fragment, if its size is approx 300 kb.
(b) Suggest a cloning strategy if the DNA has very uncommon restriction enzyme sites at its ends.

20. Indicate two disadvantages of vegetative propagation of plants. How does micropropagation overcome these and briefly outline the steps involved.

21. In a form of Alzheimers, a victim's brain tissue after an autopsy showed abnormal precipitates which appeared to be proteinaceous. Explain the modern methods which may be used to identify these abnormal proteins.

22. What are the 3 main features that a vector should possess and explain the role of each.

OR

22. Do you consider phage based vectors superior to plasmids ? Justify your answer.

23. The publication of 'Atlas of Protein Sequence and Structure' under the editorship of Margaret O. Dayhoff was a pioneering effort. Why ?

24. Briefly describe the commonly used culture methods used for biomass or metabolite production.

25. Foot and Mouth Disease Virus (FMDV) vaccine is made by growing the virus in animal cells, harvesting the virus and inactivating it for vaccine formulations. Given the following data, calculate the weight and volume of the harvested virus from a bioreactor.
(1) Total bioreactor capacity = 1000 l (atleast 20% space must be kept for oxygen and CO_2)
(2) No. of animal cells = 10^5/ml.
(3) No. of virus particles/animal cell = 50
Assume the virus to be a sphere with a gm molecular weight of 10^6(1 million) and r = 1 nm.

26. Expand the term 'BLAST'. Discuss the steps involved in comparison of DNA sequences using this tool.

OR

26. Name any five major databases commonly used in bioinformatics. Also suggest the type of information available from each of these databases.

27. What is the hierarchical organization in protein structure ? Indicate the nature of covalent and non-covalent forces which determine the protein structure.

OR

27. How can one use the method of aqueous – two-phase partitioning for separation of proteins ? Also suggest various efforts which may be taken to maximize protein stability during such separation.

28. Why have restriction enzymes been so named ? Only type II enzymes are used in recombinant DNA technology, why ? With an example, illustrate
(a) a blunt end cutter
(b) a sticky end cutter

- End of Question Paper -