CBSE Class 12 Biotechnology 2010 - Set 99

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. Question paper contains four sections – A, B, C and D.

(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.

Section A

1. Protein chemists prefer to monitor absorbance of protein fractions eluting from a chromatographic column at 280 nm. Why ?

2. If a researcher began with a sample that contained three copies of double stranded DNA, how many copies would he be able to generate after 27 cycles of PCR ?

3. What are monoclonal antibodies ?

4. Recombinant human insulin cannot be obtained from the culture filtrate of *E. coli*. Why ?

5. Why are long distance runners disqualified if they test positive for high amounts of erythropoietin (EPO) ?

Section B

6. Most media that are used for culturing microbes within laboratories are not used for large scale cultivation. Why ?

7. If you wanted to express a eukaryotic protein in bacterial cells, would you clone genomic DNA or cDNA into the expression vector ? Justify your choice.

8. What are homologous sequences ? How can you access information on homologous genes/sequences ?

9. Why is aeration important for microbial growth ? How can proper aeration be achieved in microbial cultures grown under laboratory conditions ?

10. Differentiate between primary and secondary metabolites. Name two secondary metabolites obtained through tissue culture and their application in medicine.

11. Monoclonal antibody against CD3 is an effective therapeutic agent in overcoming renal allograft rejection. Why ?

12. Listed below are four different single strands of DNA. Which of these in their double stranded form would you expect to be cleaved by a restriction endonuclease, and why ?
(a) ACTCCAGAATTCACTCCG
(b) ACTCCACTCCCGACTCCG
(c) GCCTCATTCGAAGCCTGA
(d) GAGCGGTTTATCTGAGCAG

13. (a) Expand 'EMBL'.
(b) Why is it necessary to insert gaps when aligning two or more genetic sequences ?

14. Which plant part(s) would be best suited for expressing antigens, and why ?

15. A fungal extract has anti-cancer potential and it has shown positive results in clinical trials against childhood leukemia. However, the active compound is present in very low concentration. Suggest any two ways to increase its production.

Section C

16. What is 'Molecular Pharming' ? Suggest any four advantages of expressing transgenic proteins in milk.

17. Suggest any four methods used for introduction of recombinant DNA into host cells. Also explain the method of insertional inactivation used for identification of the recombinants.

18. What is a 'fed-batch' culture ? What are its benefits in microbial technology ?

19. What are the major constraints in accepting transgenic crops ?

20. (i) Briefly explain what is meant by 'contact inhibition'.
(ii) What is the difference between a defined and a serum-supplemented medium ?

OR

20. (i) Differentiate between anchorage-dependent and anchorage-independent cells.
(ii) How is damage to cells prevented during cryopreservation ?

21. (i) Give any two applications of proteolytic enzymes.
(ii) How does the consumption of branched chain amino acids (BCAA) help athletes in enhancing their performance ?

22. What information can be obtained from genome sequencing projects ?

23. How can you obtain virus-free potato plants from virus-infected plants ? Are these plants virus-resistant ? Why or why not ?

24. How could embryonic stem (ES) cells potentially be used for treatment of diseases associated with tissue damage ? Give two examples.

25. Study the following enzyme purification table and answer the questions that follow :

Steps	Procedure	Total protein (mg)	Activity (units)
Step 1	Crude extract	10,000	1,00,000
Step 2	Salt fractionation	3,000	96,000
Step 3	Ion exchange chromatography	400	80,000
Step 4	Size exclusion chromatography	300	60,000
Step 5	Affinity chromatography	3	45,000

(a) Which step in the purification is most effective, and why ?
(b) Which of the procedures is least effective, and why ?

Section D

26. (i) What are the essential features of a vector ?
(ii) What is the role of cos sites in phage λ ?
(iii) What is the role of DNA ligase and alkaline phosphatase in recombinant DNA technology ?

27. (i) What is isoelectric focussing ?
(ii) Name some of the important branches of proteomics.
(iii) Why is the study of proteome relevant in the age of genomics ?

OR

27. What is the principle of protein fingerprinting ? Enlist major steps for performing this technique. Suggest one application of this technique for detection of human disease.

28. Expand NCBI. What are the possible uses (any two) of databases available in NCBI ? How can tools available in these databases be used to retrieve and compare genetic information ?

OR

28. Gene prediction for a given genome using bioinformatic tools may be different from the actual number of genes identified by experimental methods. Why is it so ? Do you think there is always a correlation between the complexity of the organism and total number of genes present in its genome ? Justify with suitable example.

- End of Question Paper -