

2017

BIOTECHNOLOGY

(Theory)

Full Marks : 70

Pass Marks : 21

Time : Three Hours and *Fifteen Minutes

(*15 minutes are given as extra time for reading questions)

The figures in the right margin indicate full marks for the questions.

All the questions are compulsory.

For question Nos. 1 to 4 are of objective type questions carrying 1 mark each, select the most appropriate one from the given alternatives A, B, C and D and rewrite the same.

1. Eli Lilly was able to develop recombinant human insulin following the sequence of insulin established by 1
 - A. Pehr Edman.
 - B. Frederick Sanger.
 - C. Linus Pauling.
 - D. Max Perutz.

2. What is the number of predicted genes in *E. coli*? 1
 - A. 5000
 - B. 6340

- C. 13,600
- D. 19,000
3. Commercially developed Hepatitis B surface antigen are produced via recombinant technology by using 1
- A. *Saccharomyces cerevisiae*.
- B. *Aspergillus niger*.
- C. *Escherichia coli*.
- D. *Aspergillus oryzae*.
4. Which cells are responsible for the production of Hybridoma ? 1
- A. B-cell and T-cell.
- B. T-cell and Leucocytes.
- C. B-cell and myeloma cell.
- D. T-cell and cancerous cell.

For question Nos. 5 to 14 are of very short answer type questions carrying 1 mark each:

5. What is Thalassaemia ? 1
6. In what way expression proteomics differ from functional proteomics ? 1
7. How does DNA ligase join two DNA fragments ? 1
8. What are paralogs ? 1
9. Differentiate structural genomics with that of Functional genomics by giving one point. 1
10. Why a pilot plant is essential before attempting commercial production of microbes ? 1

11. When a eukaryotic gene is expressed in prokaryotic host, the non-coding region of eukaryotic gene must be excised.
What step should be taken to overcome this problem ? 1
12. State the definition of electroporation. 1
13. One of the greatest problems in big cities is the disposal of plastics. Suggest with one example of genetically engineered product to solve this problem. 1
14. A drug is administered intravenously to reverse acute rejection of transplanted organ. Suggest the possible name of the drug. 1

For question Nos. 15 to 24 are of short answer type - II questions carrying 2 marks each:

15. Write the essential conditions to be considered before the industrial scale production of proteins. 2
16. Give two basic requirements of polymerase chain reaction. 2
17. Write two points of difference between Bacterial Artificial Chromosomes and Yeast Artificial Chromosomes. 2
18. A Biotechnologist is able to create mutation selectively by using site-directed mutagenesis. Justify the statement by giving two points. 2
19. Why creation of Bioinformatics database is necessary ? 2
20. 'Not all genetic variations are beneficial'. Support this statement by giving two examples of human disease. 2
21. How Batch culture differs from Fed-batch culture ? 2
22. Illustrates two advantages of animal cell culture. 2
23. Draw a schematic diagram of the various parts of a mass spectrometer and label electromagnet and amplifier. 2

24. Draw a typical bacterial growth curve and label log phase and death phase. 2

For question Nos. 25 to 31 are of short answer type - 1 questions carrying 3 marks each:

25. Nowadays, genetically engineered enzymes are supplemented in laundry detergent. Give the chemical name and write *two* mode of action. 3

26. What are the three features required by a cloning vector ? 3

27. How Random Shotgun Sequencing approach can sequence the DNA of an organism ? 3

28. Write three good microbiological practices which are able to be followed for industrial applications. 3

29. Give three examples of biotic stress tolerance for increasing crop yield and quality. 3

30. Why CO₂ incubators are required for animal cell culture ? 3

31. State the differences between finite cell lines and continuous cell lines. 3

For question Nos. 32 to 34 are of long answer type questions carrying 5 marks each:

32. Write in brief about *five* protein based products developed by recombinant DNA technology. 5

33. Enumerate the properties of DNA polymerase, required in DNA replication. 5

34. Explain five types of plant cell and tissue culture. 5