

2023

## BIOTECHNOLOGY

(Theory)

Full Marks : 70

Pass Marks : 21

Time : Three hours

*All the questions are compulsory.*

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

*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. A human disease, caused due to lack of a particular sub-unit, alpha and beta of oxygen carrying protein hemoglobin is – 1
  - (A) Thalassaemia
  - (B) Mad cow disease
  - (C) Sickle cell anaemia
  - (D) Severe combined immunodeficiency
  
2. Suggest the number of predicted genes in *Saccharomyces cerevisiae*. 1
  - (A) 5000
  - (B) 6340
  - (C) 13,600
  - (D) 19,000

3. Commercially developed Vitamin B12 is produced via recombinant DNA technology by using – 1
- (A) *Aspergillus niger*
  - (B) *Aspergillus oryzae*
  - (C) *Leuconostoc mensteroides*
  - (D) *Propionibacterium shermanii*
4. Culture of an unorganized mass of cells, which are parenchymatous in nature is – 1
- (A) organ culture
  - (B) explant culture
  - (C) callus culture
  - (D) cell suspension culture

*For Question Nos. 5 to 14 are short answer type questions carrying 1 mark each.*

5. Name the enzyme which can join two DNA fragments. 1
6. What is RefSeq database? 1
7. What is monoab-CD3? 1
8. Explain the main aim of Southern Hybridization Technique. 1
9. Explain the major primary aim of bioinformatics. 1
10. Illustrate one application of Entrez. 1
11. Explain the main effect of excessive foaming in microbial processes. 1

12. How batch culture differs from fed-batch culture ? 1
13. Distinguish organogenesis from somatic embryogenesis. 1
14. "Synthesis of DNA is required for the survival of living organism". Suggest the major enzymes responsible for this process. 1

*Question Nos. 15 to 24 are short answer type II questions carrying 2 marks each.*

15. What is biological value of protein? Give one example of higher biological value protein. 2
16. List two vectorless methods of introduction of rDNA into host cells. 2
17. Identify two easiest ways to measure microbial growth. 2
18. Explain the essential conditions to be considered before the industrial scale production of proteins. 2
19. Give two differentiating points between yeast artificial chromosomes and bacterial artificial chromosomes. 2
20. A pilot plant is necessary before mass production of microbes commercially. Why? 2
21. Differentiate between finite cell lines and continuous cell lines by giving two points. 2
22. An enzyme produced by bacteria which can digest most of the proteins commonly involved in soil clothing. Predict the name of the protein and its mode of action. 2
23. Demonstrate with two examples of transgenic plant for the production of biodegradable plastics. 2
24. Temperature for mammalian cell culture in incubators are maintained at 37°C. Give reason. 2

*For Question Nos. 25 to 31 are short answer type I questions carrying 3 marks each.*

25. Write three applications of plant genetic engineering. 3
26. How PCR techniques can revolutionized in many aspects of modern biology? 3
27. Explain how random shotgun sequencing approach can sequence the DNA of an organism? 3
28. 'Not all genetic variations are beneficial'. Summarize this statement by giving three examples of human diseases. 3
29. Demonstrate three good microbiological practices required to culture microbes. 3
30. Illustrate how, male sterility can be restored from a male sterile plant. 3
31. Draw an outline diagram of a mass spectrometer and label electromagnet and amplifier. 3

*For Question Nos. 32 to 34 are essay type questions carrying 5 marks each.*

32. Illustrate protein based products developed by recombinant DNA technology. 5
33. Indicate five uses of Erythropoietin. 5
34. A biotechnologist is able to create mutation selectively by using site-directed mutagenesis. Justify this statement by giving five points. 5