

Duration: 3 Hrs

Maximum Marks: 75

- N.B. :** 1. All questions are compulsory
2. Figures to right indicate full marks

Q. I Choose the appropriate option for following multiple choice questions. **20M**

1. Which of the following best defines pharmaceutical biotechnology?
 - a) The study of plants used in traditional medicine
 - b) The application of biological systems and organisms to the development of drugs
 - c) The study of chemical synthesis of pharmaceuticals
 - d) The development of medical devices for drug delivery
2. Which of the following microorganisms is commonly used for the industrial production of catalase?
 - a) *Bacillus subtilis*
 - b) *Candida albicans*
 - c) *Streptococcus pyogenes*
 - d) *Staphylococcus aureus*
3. What advantage does enzyme immobilization offer in industrial biocatalysis?
 - a) Decreased production costs
 - b) Increased reaction rates
 - c) Greater substrate specificity
 - d) Reduced enzyme activity
4. Which of the following is an example of an ethical concern in pharmaceutical biotechnology related to access to healthcare?
 - a) Patent infringement
 - b) Animal testing
 - c) Informed consent
 - d) Drug pricing and affordability
5. Which of the following regions of an antibody molecule binds specifically to an antigen?
 - a) Variable region

- b) Constant region
 - c) Fc region
 - d) Fa region
6. Which of the following features is essential for a plasmid vector used in rDNA technology?
- a) Resistance to antibody
 - b) Ability to self-replicate in host cells
 - c) Large size
 - d) Ability to cut DNA at specific sequences
7. Which expression system is commonly used for the production of recombinant proteins in bacteria such as Escherichia coli?
- a) Yeast expression system
 - b) Mammalian expression system
 - c) Bacterial expression system
 - d) Plant expression system
8. In RFLP analysis, what is the purpose of running the digested DNA fragments on an agarose gel?
- a) To amplify DNA fragments
 - b) To visualize DNA fragments based on size differences
 - c) To synthesize DNA probes
 - d) To sequence DNA fragments
9. In Sanger sequencing, what is used to terminate DNA synthesis at specific bases?
- a) Radioactive labels
 - b) Fluorescent dyes
 - c) DNA ligase
 - d) Dideoxynucleotides (ddNTPs)
10. What is the purpose of ligation in rDNA technology?
- a) To isolate DNA from its source organism
 - b) To join DNA fragments together with a vector
 - c) To transform DNA into host cells
 - d) To express proteins from recombinant DNA

11. What is the purpose of the extension step in PCR?
 - a) To separate the DNA strands
 - b) To anneal primers to the template DNA
 - c) To amplify the DNA sequence
 - d) To extend the primers by adding nucleotides
12. Which class of antibodies is the most abundant in serum and is involved in secondary immune responses?
 - a) IgA
 - b) IgD
 - c) IgG
 - d) IgE
13. MHC class I molecules are composed of how many chains?
 - a) One α chain
 - b) One β chain
 - c) One α chain and one β chain
 - d) Two α chains and two β chains
14. Vaccines that combine a weak antigen with a strong antigen to enhance the immune response are called:
 - a) Live attenuated vaccines
 - b) Inactivated vaccines
 - c) Recombinant vector vaccines
 - d) Conjugate vaccines
15. What does vaccine stability refer to?
 - a) The ability of a vaccine to cause an immune response
 - b) The ability of a vaccine to maintain its potency over time and under various conditions
 - c) The ability of a vaccine to be easily administered
 - d) The ability of a vaccine to prevent all infectious diseases

16. What is the term for the process of selecting a hybridoma cells that produce a specific monoclonal antibody?
 - a) Cloning
 - b) Fusion
 - c) Screening
 - d) Transformation
17. Which of the following is a characteristic feature of eukaryotic gene expression regulation but not prokaryotic?
 - a) Transcription and translation occur simultaneously.
 - b) Operons regulate gene expression.
 - c) mRNA undergoes post-transcriptional modifications.
 - d) DNA is organized into circular chromosomes.
18. Transduction involves the transfer of bacterial DNA using:
 - a) Pili
 - b) Bacteriophages
 - c) Plasmids
 - d) Capsules
19. In which type of fermentor is the microbial culture immobilized on the surface of solid particles or within a porous matrix?
 - a) Stirred tank fermentor
 - b) Air-lift fermentor
 - c) Packed bed fermentor
 - d) Fluidized bed fermentor
20. Which device is used to measure the level of agitation in a fermentor?
 - a) Turbidity sensor
 - b) pH electrode
 - c) Dissolved oxygen probe
 - d) Tachometer

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Q. II A) Answer any two of the following (Any TWO) 20M

- a) Define enzyme immobilization, enlist the methods of enzyme immobilization with diagrams. (10)
Describe the composition and working of Penicillin biosensor.
- b) Define vectors, enlist them and write the ideal characteristics of vectors used in rDNA technology. (10)
Write a note on Transgenic animals and Transgenic Plants with examples.
- c) Explain the method of preparation of diphtheria toxoid. (10)
Define Hypersensitivity reactions, enlist them and explain any one in details.

Q. III Answer any seven of the following (Any SEVEN) 35M

- a) Describe the methods of Protein Engineering (05)
- b) What is gene therapy? Explain the same for SCID. (05)
- c) Differentiate between Humoral and Cellular Immunity. (05)
- d) Enlist the blotting techniques, explain the one used for protein. (05)
- e) Explain Microbial Biotransformation, write its applications in pharmaceuticals. (05)
- f) Define Mutation, classify it and Explain the various types of microbial mutants. (05)
- g) Explain fermentation media composition and Sterilization. (05)
- h) Enlist the methods of fermentation. Explain the fermentation of vitamin B12 (05)
- i) Write a short note on blood products and plasma substitutes. (05)