

Duration: 3-hour

Max. Marks: 75

28/04/25

- N. B. 1. Figures to right indicate full marks.
2. All questions are compulsory.
3. Draw the diagram wherever necessary

Questions

- | Q.1 | Multiple Choice Questions (MCQs) | Marks |
|-----|---|-------|
| 1. | Which material is commonly used for enzyme immobilization through adsorption?
a) Glass beads
b) Sodium chloride
c) Glucose
d) Water | 20 |
| 2. | Which of the following is NOT a component of a biosensor?
a) Bioreceptor
b) Transducer
c) Signal processor
d) Demagnifier | |
| 3. | In rational design, what is primarily used to predict protein modifications?
a) Random mutations
b) Computational modeling and structural analysis
c) Natural selection
d) Gene cloning | |
| 4. | Which of the following microorganisms is commonly used for industrial amylase production?
a) Escherichia coli
b) Aspergillus niger
c) Lactobacillus
d) Mycobacterium tuberculosis | |
| 5. | Which disorder was the first to be treated using gene therapy?
a) Cystic fibrosis
b) Severe Combined Immunodeficiency (SCID)
c) Sickle cell anemia
d) Alzheimer's disease | |
| 6. | Which of the following techniques is used to amplify DNA?
a) CRISPR
b) Polymerase Chain Reaction (PCR)
c) Gel electrophoresis
d) Southern blotting | |
| 7. | What is the main benefit of Bt crops?
a) Drought resistance
b) Pest resistance
c) Higher protein content
d) Faster growth | |

8. Which of the following is an advantage of using a prokaryotic expression system?
- Fast growth and high protein yield
 - Complex protein modifications
 - Large genome size
 - High cost
9. Which molecular technique is commonly used to visualize RFLP patterns?
- PCR
 - Gel electrophoresis
 - Western blotting
 - Spectrophotometry
10. Which part of the antibody binds to antigens?
- Constant region
 - Variable region
 - Heavy chain
 - Fc region
11. Which immune cells are primarily affected by HIV, leading to immune suppression?
- B cells
 - CD8⁺ T cells
 - CD4⁺ T helper cells
 - Macrophages
12. Which cytokine plays a major role in immune stimulation?
- Interleukin-2 (IL-2)
 - Cortisol
 - Cyclosporine
 - Insulin
13. What is a plasma substitute?
- A synthetic alternative to red blood cells
 - A fluid used to replace lost blood volume
 - A type of blood transfusion
 - A component of white blood cells
14. Which of the following is an example of a live attenuated vaccine?
- Hepatitis B vaccine
 - Polio (Sabin) vaccine
 - Tetanus toxoid
 - Influenza inactivated vaccine
15. Which nitrogen source is frequently used in industrial fermentation?
- Yeast extract
 - Sodium chloride
 - Calcium carbonate
 - Agar
16. Which of the following is a key difference between prokaryotic and eukaryotic genomes?
- Eukaryotic genomes are circular, while prokaryotic genomes are linear
 - Prokaryotic genomes have introns, while eukaryotic genomes do not
 - Eukaryotic genomes are much larger and organized into chromosomes
 - Prokaryotic genomes are found within a membrane-bound nucleus

17. **What is the role of the F (fertility) factor in conjugation?**
a) It codes for antibiotic resistance
b) It allows bacteria to produce a pilus for DNA transfer
c) It helps in DNA replication
d) It degrades foreign DNA
18. **In indirect ELISA, what is detected?**
a) Antigen
b) Primary antibody
c) Secondary antibody
d) Enzyme
19. **Which type of sterilization is best suited for heat-sensitive fermentation media?**
a) Steam sterilization
b) Dry heat sterilization
c) Filtration
d) Chemical sterilization
20. **Which of the following control strategies is commonly used in large-scale fermentation?**
a) Manual monitoring
b) Automated feedback control systems
c) Using color indicators
d) Visual inspection

Q.2 Long Answers (Answer 2 out of 3)

1. Define antibody and explain structure of antibody and types of antibodies with its significance
2. Define GMO'S, Explain methods of transgenic animal gene transfer and write a note on applications of Transgenic animals
3. Describe production of diphtheria antitoxin

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Q.3 Short Answers (Answer 2 out of 3)

1. Write a short note on plasma substitutes. What are the key considerations for the storage of plasma substitutes?
2. Describe the upstream and downstream fermentation process of vitamin B12
3. Explain in detail various types of fermentation processes
4. Enlist the types of mutagenic agents and explain the same
5. Write a note on Insulin production using r DNA technology
6. Enlist various vectors used in r DNA technology and explain any one vector in detail.
7. Describe various primary techniques used in protein engineering?
8. Enlist blotting techniques and Comment on Southern blotting technique.
9. Explain the following methods of enzyme immobilization in detail:
a. Adsorption b. covalent binding

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