

8. **In prokaryotic gene expression, which molecule binds to the promoter region to initiate transcription?**
 - a) DNA ligase
 - b) RNA polymerase
 - c) DNA polymerase
 - d) Reverse transcriptase
9. **In RFLP, why do different individuals produce different DNA fragment patterns?**
 - a) Differences in restriction enzyme activity
 - b) Variations in the DNA sequences at restriction sites
 - c) Differences in the number of chromosomes
 - d) Differences in RNA content
10. **Which part of an antibody interacts with immune cells and complement proteins?**
 - a) Fab region
 - b) Fc region
 - c) Hypervariable region
 - d) Light chain
11. **MHC Class II molecules present antigens to**
 - a) CD8+ T cells
 - b) CD4+ T cells
 - c) B cells
 - d) Plasma cells
12. **Which condition may require immune suppression therapy?**
 - a) Cancer
 - b) Autoimmune diseases (e.g., Rheumatoid Arthritis)
 - c) Diabetes
 - d) Hypertension
13. **What is the primary purpose of plasma substitutes?**
 - a) To replace red blood cells
 - b) To maintain blood volume in cases of severe blood loss
 - c) To enhance white blood cell function
 - d) To carry oxygen in the blood
14. **Which of the following is an example of a conjugate vaccine?**
 - a) Hib (Haemophilus influenzae type B) vaccine
 - b) Smallpox vaccine
 - c) Influenza (nasal spray) vaccine
 - d) Hepatitis A vaccine
15. **Which of the following is often used as a pH buffer in fermentation media?**
 - a) Sodium chloride
 - b) Calcium carbonate
 - c) Ethanol
 - d) Copper sulfate
16. **Which of the following is present in eukaryotic genes but generally absent in prokaryotic genes?**
 - a) Introns
 - b) Exons
 - c) Start codons
 - d) Promoters

17. What are transposons

- a) Genes that code for essential bacterial enzymes
- b) DNA sequences that can move from one location to another within the genome
- c) Bacterial ribosomal subunits
- d) Circular RNA molecules

18. In indirect ELISA, which component is labeled with the enzyme?

- a) The antigen
- b) The secondary antibody
- c) The substrate
- d) The primary antibody

19. Which sterilization method is most commonly used for fermenter vessel sterilization?

- a) Autoclaving
- b) In situ steam sterilization
- c) Chemical sterilization
- d) UV radiation

20. What is the unit of measurement for aeration rate in fermentation?

- a) Liters per minute (L/min)
- b) Moles per second (mol/s)
- c) Kilograms per hour (kg/h)
- d) Degrees Celsius (°C)

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

- 1. a) Draw a neat labelled diagram of immunoglobulin and explain any one in details. 20
- b) Define Hypersensitivity reaction and explain any one in details.
- 2. a) Enlist and explain the steps involved in rDNA technology for the production of insulin.
- b) Explain the working principle of PCR and enlist its application.
- 3. a) Explain seed lot system of vaccine production.
- b) Comment on Hybridoma technology.

Q.3 Short Answers (Answer 7 out of 9)

- 1. Describe the process of blood collection and processing including steps involved in separation of blood components and storage conditions. 35
- 2. Define fermenter, classify it and draw a neat labelled diagram of mechanically stirred fermenter.
- 3. Describe the process of Penicillin production by fermentation technology.
- 4. Discuss the process of Southern blotting technique.
- 5. Define mutation, explain any four types of mutants.
- 6. Define Gene therapy, explain any one ex-vitro gene therapy.
- 7. Define Enzyme immobilization, enlist the various methods of enzyme immobilization and write the application of enzyme immobilization.
- 8. Comment on transgenic animal.
- 9. Write a note on Protein Engineering.
