M. Sc. ZOOLOGY

FIRST SEMESTER

BIO-INSTRUMENTATION AND CELL BIOLOGY

MSZ - 102

Duration: 3 Hrs. **Marks: 70**

Part : A (Objective) = 20
Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. With the help of a neat labelled diagram, explain in details about fluorescence microscopy. State any two of its major applications. 8+2=10

2. What is the principle of ELISA? Discuss in details about its different types. 2+8=10

3. What is the basic principle of PCR? Explain the steps involved in the mechanism. 2+8=10

4. Explain the working mechanism of Nuclear magnetic resonance spectroscopy. 10

5. Write short notes on- 5+5=10
   a. GPCR (b) Plasmodesmata

6. What is electrophoresis? State the factors affecting electrophoresis. Why is agarose gel electrophoresis important? 2+6+2 =10

7. What are the different functions of Cytoskeletons? Explain with proper illustration the structural organization of Intermediate Filaments. 4+6=10

8. What is amphipathic molecule? Explain and draw the basic structure of the major types of lipids found in cellular membranes. 10

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[PART-A : Objective]

Choose the correct answer from the following : **1×20=20**

1. Image formation in Electron microscope depends on
   a. Differential scattering of electrons by the specimen
   b. Number of electromagnetic lenses used in electron microscopy
   c. Source of illumination
   d. None of the above

2. The ultrastructure of frozen cells is often viewed using the technique called
   a. Cryofixation
   b. Shadow casting
   c. Freeze-fracture replication
   d. All the above

3. In ELISA, the product formation (monitored as colour intensity) is _____ to the concentration of antigen solution in the sample.
   a. Directly proportional
   b. Indirectly proportional
   c. Not related
   d. None of the above

4. Which of the following immunoprecipitation test can be used for quantitative test of antigen in the sample
   a. Double diffusion method
   b. Mancini method
   c. Counter current electrophoresis
   d. All the above

5. In which of the following technique liquid nitrogen is not used
   a. Sperm banking
   b. Cosmetic surgery
   c. Cryofixation
   d. Shadow casting

6. A colorimeter helps to measure in a reaction mixture its _____ .
   a. Progress
   b. Reactant
   c. Products
   d. Temperature

7. Western blotting is the technique for detection of _____ .
   a. Specific DNA in a sample
   b. Specific RNA in a sample
   c. Specific protein in a sample
   d. Specific glycolipid in a sample

8. The technique to distinguish individuals based on their DNA print pattern is called _____.
   a. DNA fingerprinting
   b. DNA profiling
   c. Molecular fingerprinting
   d. All the above

9. The speed of migration of ions in an electric field depends on
   a. Magnitude of charge and mass of molecules
   b. Magnitude of charge and shape of molecules
   c. Shape and size of molecules
   d. Magnitude of charge, shape and mass of molecules

10. In SDS-PAGE separation is based on
   a. Molecular weight
   b. Shape
   c. Charge
   d. All the above

11. Which of the following is most suitable for detecting the presence of a gene product?
   a. Dot blotting
   b. Southern blotting
   c. Plaque blotting
   d. Western blotting

12. The basic requirements for PCR reaction includes
   a. DNA segment to be amplified
   b. Two oligonucleotide primers
   c. A heat stable DNA polymerase
   d. All the above

13. Which of the following stain is commonly used in Electron Microscopy
   a. Ethidium bromide
   b. Osmium tetroxide
   c. Bismark brown
   d. Nile red

14. Junction that prevents two cell compartments from mixing is _____
   a. Gap junction
   b. Desmosomes
   c. Tight Junction
   d. Cell Junction

15. The signaling molecules that travel the farthest are-
   a. Endocrine
   b. Paracrine
   c. Neurotransmitter
   d. Intracellular

16. Which of the following statements are true in case of fluid-mosaic model for cell membranes?
   P . Between 5-8 nm thick and appear trilaminar when viewed in cross section under electron microscope
   Q . Less than 1 nm thick and consist of a layer of protein sandwiched between two layers of phospholipids
   R . In the lipid bilayer, proteins are embedded at irregular intervals and held by hydrophilic interactions between lipids and hydrophilic domains of proteins.
   S . The protein domains exposed on one side of the lipid bilayer are different from those exposed on the other side.
   a. P, Q
   b. P, S
   c. Q, S
   d. P, R

17. A polar molecule
   a. Is slightly negative at one end and slightly positive at one end
   b. Has an extra electron, giving it a negative charge
   c. Has an extra neutron, making it weight more
   d. Has covalent bond

18. Most abundant lipid in plasma membrane is-
   a. Cholesterol
   b. Sphingolipids
   c. Phospholipids
   d. Glycolipids

19. Lipid anchored proteins are bound to membrane by a complex oligosaccharides linked to a molecule of
   a. Phophatidylcholine
   b. Phosphatidylinositol
   c. Phosphatidylserine
   d. Phosphatidic acid

20. Identify the correct set of three statement for cytoskeletal protein filaments from the following list
   P . Microfilament is about 8 nm wide
   Q . Microfilament is about 25 nm wide
   R . Intermediate filaments have size intermediate between microfilament and Microtubules
   S . Proto-filament of microtubules are composed of alpha/beta tubulin heterodimer
   T . Colchicine binds to the actin subunits in the microfilament causing disassembly to free units
   a. R, S, T
   b. Q, R, S
   c. P, R, S
   d. P, Q, R

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