M.Sc. ZOOLOGY
Third Semester
CELL & MOLECULAR BIOLOGY
(MSZ – 13 A)

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

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

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.   **Marks: 50**

Answer any *five of* the following questions:

1. Write short notes on any *two* of the following: $(2 \times 5 = 10)$

   a) Ultrastucture of a nuclear pore complex.

   b) Simple diffusion and fascilitated diffusion.

   c) Structure of an K_{cs} Aion channeland its specificity to K^+ ions.

   d) Biogenesis of ribosomes.

2. What do you mean by amphipathic nature of membrane lipids? Describe with
   proper illustrations the molecular composition of a biomembrane. $(2+8=10)$

3. What is lipid peroxidation? Write about the mechanism of lipid peroxidation. Also
   add a note on reversible and irreversible cell injury. $(2+5+3=10)$

4. What are NLS molecules? Expalin with proper illustrations the mechanism of
   import and export of cargo proteins through nuclear pore complex. $(2+8=10)$

5. Define genome. Explain the role of proteomes in the expression of gene. $(2+8=10)$

6. What is meant by mitochondrial genome organization? How does it help to find out
   phylogenial lineage? $(6+4=10)$

7. Distinguish between physical and genetic map. What are various markers used to
   prepare physical map? Give an example. $(2+6+2=10)$

8. How do bioinformatics tools help in the process of gene expression? Explain.

(10)

Or

9. What is DNA sequencing? Describe in detail about the DNA sequencing following the chain termination method. (10)

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Duration: 20 minutes   **Marks – 20**

PART-A (Objective)

Time: 20 mins   **Total Marks: 20**

I. Choose the correct answer: **1×20=20**

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

2. In plasma membrane, carbohydrate present on the
   a. Both layer of lipid
   b. Only on cytoplasmic side of lipid bilayer
   c. Only on non-cytoplasmic side of lipid bilayer
   d. None

3. All membrane processes, such as pumping and channelling of molecules are carried out by
   a. Lipid   b. Carbohydrate
   c. Nucleic acid   d. Proteins

4. In simple diffusion process, molecules cross the plasma membrane
   a. Against concentration gradient
   b. Do not depend upon concentration
   c. Along concentration gradient
   d. With the help of energy

5. Diffusion across the plasma membrane is more rapid if a molecule is
   a. A protein
   b. high in its oil : water partition coefficient
   c. Hydrophilic
   d. large and globular shape

6. The Na^+- K^+ pump is called an electrogenic pump because it
   a) ionizes sodium and potassium atoms.
   b) pumps hydrogen ions out of the cell.
   c) is used to drive the transport of other molecules against a concentration gradient.
   d) contribute to the membrane potential.

7. The main difference between active transport and facilitated diffusion is that
   a) In active transport molecules move from areas of high to areas of low concentration
   b) Carrier protein is involved only in case of active transport
   c) In active transport energy is consumed to move molecules against a concentration gradient.
   d) In active transport only water molecules are transported.

8. In the mechanism of lipid peroxidation, the superoxides combine with H_2O to form H_2O_2 with the help of an enzyme
   a) Superoxide dismutase
   b) Superoxide peroxidise
   c) Peroxide synthetase
   d) Peroxide transferase

9. Choose the correct statements about nucleus.
   P. nuclear pore complex is made up of about 50 to 100 different proteins called nucleoporins
   Q. proteins found in the nucleus are imported into the nucleus contain a nuclear – localization signal
   R. nucleus contain Ran-GTP while the cytosol contains Ran-GDP
   S. transport through the nuclear pore does not require energy

   a) P,Q   b) P,Q,R   c) P,R   d) P,Q,R,S

10. Which of the following is more precise for nucleoporins?
    a) Nucleoporins are the molecules present between nucleus and cytoplasm.
    b) Small lipid molecules present inside the nucleus.
    c) Proteins of Nuclear pore complex.
    d) All of these.

11. Type-1 nuclear receptor located in
    a) Nucleoplasm
    b) Cytoplasm
    c) In nuclear pores
    d) None

12. Which of the following is true?
    a) Ran GAP 1 present in nucleus
    b) Ran GAP2 present in cytoplasam
    c) Promotes hydrolysis of Ran GDP to RanGTP
    d) all

13. The enezymatic method of DNA sequencing
    a) Uses RNA as template.
    b) Uses ddNTP in which the deoxyribose 3'-OH is missing.
    c) Uses ddNTP in which the deoxyribose 3'-OH is present.
    d) Uses different chemical treatment to cleave DNA preferentially at A, T, C or G.

14. In Sanger,s method of DNA sequencing, the growing DNA chains are terminated because
    a) DNA polymerase is not very processive.
    b) A radioactive nucleotide is incorporated.
    c) The substance become limiting.
    d) A phosphodiester bond cannot be made.

15. VNTRS are also known as
    a) Mini satellite
    b) Microsettelite
    c) Both
    d) None

16. Satellite DNAs are usually
    a) AT rich
    b) GC rich
    c) CT rich
    d) AG rich

17. transcriptome is a
    a) Coding sequences of DNA.
    b) Functional genes which produce functional proteins.
    c) Complete set of sequences in the genetic material of an organism.
    d) None of these.

18. Mitochondrial genome of E.coli are made up of
    a) 37 no of genes.
    b) 39 no of genes.
    c) 37 and 4 genes.
    d) None of the above is true.

19. Single Nucleotide Polymorphism (SNP) means
    a) One nucleotide difference in sequence of two organism.
    b) Single nucleotide difference in sequence of single organism.
    c) Single nucleotide polymorphism in multiple sequence of single organism.
    d) Single nucleotide polymorphism in multiple sequence in multiple organisms.

20. PAUP is a bioinformatics software used in
    a) Homology searching.
    b) Databse searching.
    c) Phylogenetic tree construction.
    d) Visualising 3D structure of protein.

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