Roll No. .....

D–1058

M. Sc. (Fourth Semester) (Main/ATKT) EXAMINATION, 2020

BIOTECHNOLOGY

Paper Fourth

(Functional Genomics and Proteomics)

Time : Three Hours] [*Maximum Marks : 80*

Note : Attempt all Sections as directed.

Section—A 1 each

(Objective/Multiple Choice Questions)

Note : Attempt all questions.

Choose the correct/most appropriate answer :

1. Sequence repeat of TTAGGG is present in :
   (a) SINEs
   (b) LINEs
   (c) DNA transposons
   (d) Telomeres
2. Archea have a very much smaller genome size than bacteria, because archea :
   (a) Present in a specialized environment

   (b) Are autotrophs
   (c) Have little need of energy
   (d) Are similar to eukarya
3. Bigger-sized mtDNA is present in :
   (a) Animals
   (b) Plants
   (c) Fungi
   (d) Human
4. Bacterial genome made-up of majorly :
   (a) Coding region
   (b) Non-coding region
   (c) Histone-packed DNA
   (d) Heterochromatin
5. Bacterial genomes do not have :
   (a) Ori
   (b) Centromere
   (c) RNA
   (d) dsDNA
6. Which human chromosome contains the fewest numbers of genes ?
   (a) X
   (b) Y
   (c) 3
   (d) 19

7. The first digit of an entry in OMIM (six digit identifier) is '3', which indicates the mode of gene inheritance is :

   (a) X-linked

   (b) Y-linked

   (c) Mitochondrial

   (d) Autosomal

8. The maximum account of the repetitive DNA in human genome :

   (a) LINEs

   (b) SINEs

   (c) LTR

   (d) DNA transposons

9. Pseudogenes present in the human genome are :

   (a) Functional genes

   (b) Non-functional copies of the genes

   (c) Identical copies of the genes

   (d) True genes

10. The human genome includes :

   (a) Autosomes

   (b) Sex chromosomes

   (c) Mitochondrial genome

   (d) All of the above

11. For protein sequencing, reagent used by Edman :

   (a) 1-fluoro-2, 4-dinitrobenzene

   (b) Phenyl isothiocyanate

   (c) Polyvinyl pyrrolidon

   (d) Polyethylene glycol

12. Which of the following statements about the use of mass spectrometry in protein investigation are correct ? Select all that apply :

   (a) Mass spectrometry is used to rapidly determine the molecular weight of a protein

   (b) Mass spectrometry is only used to determine the sequence of peptides and not protein

   (c) Mass spectrometry can be used to investigate post-translational modification

   (d) Mass spectrometry involves separating ionic fragments on a gel

13. All the proteins produced by a species is :

   (a) Directly proportionate to the size of the individual

   (b) Its genetic complement

   (c) Its proteome

   (d) All of the above

14. Which of the following statements about the determination of the three-dimensional structure of proteins are correct ? Select all that apply :

(a) X-ray diffraction requires that the protein first be crystallized

(b) X-ray diffraction requires that the protein first be solubilised

(c) X-ray diffraction records electron densities around the atoms of a protein

(d) X-ray diffraction is performed to separate proteins

15. Which of the following describes an advantage of the yeast two-hybrid method for analysis of protein interactions ?

(a) Assay works well for membrane bound proteins

(b) Assay can screen for interaction partners of a protein without the need for protein purification

(c) Assay only detects direct association between two proteins

(d) Assay secretes proteins from the cell and thus works well for proteins with disulphide bridges

16. In two dimensional gel electrophoresis :

(a) Different forms of the same protein will tend to migrate at the same position

(b) Up to about a hundred different proteins can be distinguished from each other

(c) Proteins with similar functions will be located near each other

(d) None of these

17. Which of the following statements regarding the proteome is the most correct ?

(a) A large proportion of the proteome is expressed by each cell of a species.

(b) Levels of gene expression at the *m*-RNA level generally correlate highly with levels of functional protein.

(c) The protein produced by a specific cell depends on cell type and environmental condition.

(d) Al of the above

18. In SDS_PAGE, gel cross-linking agent is :

(a) Bis-acrylamide

(b) Acrylamide

(c) Sodium dodecyl sulfate

(d) β-Mercaptoethanol

19. In chromatography, the component that elutes first which has higher affinity with :

(a) Mobile phase

(b) Stationary phase

(c) Column beads

(d) None of these

20. Generally, in the spectrophotometer, cuvette path length is :

(a) 1 mm

(b) 5 mm

(c) 10 mm

(d) 45 mm

Section—B 2 each

(Very Short Answer Type Questions)

Note : Attempt all questions. Define the following in **2** or **3** lines only.

1. Paralogos
2. Gene
3. Alternative splicing
4. Contig
5. *In-silico*
6. Polymorphism
7. Proteome
8. Electrophoresis

Section—C 3 each

(Short Answer Type Questions)

Note : Attempt all questions. Answer each question in **75** words.

1. What do you mean by mitochondrial genome ?
2. What are the Low, Medium_ and High.Copy_Number DNA in plant genomes ?
3. How you can compare the genomes of different organisms ?
4. What is 'Junk DNA' ?
5. How protein chips are useful to study the proteins ?
6. What are the super-secondary structures of proteins ?
7. What is Y2H screening ?
8. What is the protein-ligand docking ?

Section—D 5 each

(Long Answer Type Questions)

Note : Attempt all questions. Answer each question in **150** words.

1. Discuss different types of repeats present in the human genome.

   Or

   Describe the role of genomics in disease models.

2. Write a technical note on the Human Genome Project and its important outcomes.

   Or

   Explain any DNA sequencing method of your choice.

3. Discuss types of proteomics.

   Or

   Describe the practical applications of proteomics.

4. Discuss the futures of the proteomics.

   Or

   Discuss protein database available on the public domain.