

3. Write short notes on any **three** : (3×5=15)

- (i) Concept of phosphorylation as a regulatory mechanism in proteins.
- (ii) Role of bioinformatics in whole genome sequencing.
- (iii) Role of enzymes as biological catalysts.
- (iv) *Arabidopsis* as model organism in plant biology
- (v) Human genome project

4. (a) Describe the working principle of ion exchange chromatography and its use in protein purification.

(8)

(b) Define metabolomics. Write the application of metabolomics in plant biology and medicines?

(7)

5. (a) What is ELISA? Explain its types and how it is used for the detection and quantification of proteins.

(8)

(b) Discuss the diverse applications of DNA sequencing across various scientific disciplines and industries.

(7)

(200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4925

J

Unique Paper Code : 2164000011

Name of the Paper : Genomics, Proteomics and Metabolomics

Name of the Course : **Generic Elective (GE)**

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** questions in all.
3. Question No. 1 is compulsory.
4. Attempt **all** parts of a question together.

1. (a) State True or False of the following (**any five**) :
(5×1=5)

- (i) *E. coli* has a short generation time, which makes it ideal for rapid genetic experiments.

P.T.O.

- (ii) *Saccharomyces cerevisiae* was the first eukaryote to have its entire genome sequenced.
- (iii) In Sanger sequencing, only one DNA fragment is sequenced at a time.
- (iv) *Arabidopsis* has a relatively small and simple genome (~135 Mb), which was one reason it was chosen as a model plant.
- (v) NGS allows millions of DNA fragments to be sequenced simultaneously.
- (vi) Third-generation sequencing methods are known for their high accuracy per read.
- (vii) Yeast can reproduce both asexually (budding) and sexually (mating and meiosis).

(b) Expand the following (**any five**) : (5×1=5)

- (i) SDS-PAGE (ii) NGS
- (iii) HPLC (iv) EDTA
- (v) GC-MS (vi) WGS
- (vii) EST

(c) Fill in the blanks (**any five**) : (5×1=5)

- (i) The _____ genome was the first crop genome to be fully sequenced.

- (ii) Hemoglobin and collagen are examples of _____ proteins.
- (iii) _____ is a common post-translational modification where a phosphate group is added to a protein.
- (iv) Study of all RNA molecules present in a cell or tissue at specific time is known as _____.
- (v) _____ correspond to cDNA sequences obtained from a single read of a cDNA sequencing.
- (vi) Enzymes are the proteins which lower down the _____ to increase the rate of reaction.
- (vii) Alpha-helices and beta-sheets are examples of the _____ structure of proteins.

2. Differentiate between **any five** : (5×3=15)

- (i) Sanger method of sequencing and next-generation sequencing
- (ii) Structural and functional genomics
- (iii) Whole genome sequencing and clone-by-clone sequencing
- (iv) Proteomics and genomics
- (v) Eukaryotic and prokaryotic genome
- (vi) HPLC and Gas chromatography