

SECTION A [30 MARKS]

Answer ALL questions in this Section.

- 1 a. Define molecular genetics (1 mark)
- b. Explain the importance of methylation state of DNA in gene expression (3 marks)
- c. State and briefly explain the process pre-mRNA goes through to maturation (3 marks)
- d. Using a diagram explain how genes are structured to ensure their expression (3 marks)
- 2 a. Describe four common types of mutations that can alter the genetic code (4 marks)
- b. Name two types of plant genes, their regulation site and function (2 marks)
- c. State and explain the vector independent gene transfers (4 marks)
3. a. State and briefly explain three methods of direct gene transfer (3 marks)
- b. What difference between RNA and DNA helps to explain the greater stability of DNA and the implication of this feature on the function of DNA? (4 marks)
- c. Explain how molecular information may improve the efficiency of backcross breeding schemes (3 marks)

SECTION B [40 MARKS]

Answer any TWO QUESTIONS in this Section.

- Q4. (a) Agro bacterium-mediated gene transfer is a very important phenomenon in molecular biology. Discuss it and its application in plant improvement. (20 marks).
- Q5. Transcription and translation are two main processes in gene expression. Discuss in details these two processes. (20 marks).
- Q6. Discuss molecular markers used in plant improvement; highlight their merits, demerits and applications (20 marks).