

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).