

M.Sc Sem-3 Examination

504

Biochemistry (EA - Adv Mole)

November-2024

Time : 2-30 Hours]

[Max. Marks : 70

Instructions: All questions in Sections I & II carry equal marks

Illustrate your answers with neat diagrams wherever necessary.

Question 1 Write the following

- (i) What are the key proteins responsible for the structuring and packaging of DNA within the nucleus? Include a diagram to illustrate their roles. (7 Marks)
- (ii) Explain the methods of DNA isolation and write about the importance of the reagents used. (7 Marks)

OR

- (i) Why only DNA is genetic/hereditary material? Discuss the molecular properties of DNA. (7 Marks)
- (ii) Explain eukaryotic gene structure with a diagram and write the function of each component. (7 Marks)

Question 2 Write the following

- (i) "Transcription Initiation in Eukaryotes Requires Many Proteins" Justify. (7 Marks)
- (ii) Write and discuss the steps involved in initiating replication. How is the Initiation of replication regulated? (7 Marks)

OR

- (i) How does the C-terminal domain influence the transition from transcription initiation to elongation? (7 Marks)
- (ii) How are amino acids activated for translation, and detail the steps involved in the initiation process? Explain in detail. (7 Marks)

Question 3 Write the following

- (i) What is the significance of using restriction enzymes when creating recombinant DNA? Explain with an example. (7 Marks)
- (ii) Explain how temperature changes during PCR contribute to DNA amplification. Write the importance of PCR in molecular cloning. (7 Marks)

OR

- (i) How can you visualize DNA in gel electrophoresis, and how do you decide the size and number of the fragments separated? (7 Marks)
- (ii) What are the key applications of genomic DNA libraries in research and biotechnology? How do you prepare it and write its applications? (7 Marks)

Question 4 Write the following

- (i) Explain the process of purifying a specific protein from a complex mixture. (7 Marks)
- (ii) How will protein be folded? Explain the mechanism. (7 Marks)

OR

- (i) Write a short note on the importance of proteomics in research. (7 Marks)
- (ii) Explain various tunnel theories of protein folding. (7 Marks)

Question 5 Attempt any seven out of twelve

(14 Marks)

- (i) How does the study of proteomics contribute to our understanding of cellular functions compared to genomics?
- (ii) What are the key functions of SDS-PAGE in analyzing protein samples?
- (iii) Can you explain the structural components and significance of chromatin in eukaryotic cells?
- (iv) What are the limitations associated with blunt end ligation techniques in genetic engineering?
- (v) Identify two key differences in how eukaryotic and prokaryotic mRNAs are processed post-transcriptionally.
- (vi) What are some examples of therapeutic proteins and their applications in medicine?
- (vii) Why is the sigma (σ) factor crucial for the initiation of transcription in bacteria?
- (viii) How is the transcriptome defined, and why is it important for understanding gene expression?
- (ix) What methods can be employed to desalinate purified proteins effectively?
- (x) What defines a vector in the context of molecular biology?
- (xi) How does affinity chromatography selectively isolate proteins from complex mixtures?
- (xii) What role does a host cell play in the process of gene cloning, and why is it necessary?