

M.Sc. (Biotechnology) (NEP Pattern) Semester-I
NEP-94-1 / 01MSCBT04-1 - Paper-IV : Molecular Biology

P. Pages : 2

Time : Three Hours



GUG/S/25/15055

Max. Marks : 80

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- Notes : 1. All questions are compulsory and carry marks as indicated.
2. Draw diagram wherever necessary.

1. Discuss the key enzymes involved in DNA replication, including DNA helicase, DNA polymerase, primase, and ligase. What specific roles does each of these enzymes play in the replication process? **16**

OR

- a) Explain the BER pathway, focusing on the roles of DNA glycosylases, AP endonucleases, and DNA polymerase. **8**
- b) Differentiate between chemical and physical mutagens, providing examples of each. How do these mutagens interact with DNA to induce mutations? **8**

2. Describe in detail the process of prokaryotic transcription. **16**

OR

- a) Describe the molecular mechanism by which the lac operon is regulated, focusing on the roles of the lac repressor, CAP, and the presence or absence of lactose and glucose. **8**
- b) Describe the process of 5' cap formation in eukaryotic mRNA. Why is the 5' cap important for mRNA stability and translation initiation? **8**

3. Describe Eukaryotic translation process in detail. **16**

OR

- a) Describe the key characteristics of the genetic code. Discuss the concepts of codon degeneracy, universality, and non-overlapping nature of the genetic code. **8**
- b) Discuss the different types of post translation modification of protein occur after translation. How do these modifications influence protein activity, localization, and stability? **8**

4. Describe the process of transformation in bacteria. What factors influence the competency of bacteria to undergo transformation, and how is this process used in genetic engineering techniques? **16**

OR

- a) Distinguish between regulatory genes and structural genes in terms of their function and role in gene expression. What are the key differences in how these two types of genes are transcribed, translated, and regulated? **8**
- b) Define extra chromosomal inheritance and explain how it differs from nuclear inheritance. how are they transmitted to offspring? Provide examples of extra chromosomal inheritance in plants and animals. **8**

5. Write notes on-

- a) The semiconservative model of DNA replication. **4**
- b) Packaging of chromosomes in eukaryotes. **4**
- c) Couple transcription translation. **4**
- d) C-value paradox. **4**
