

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur  
(GIET University)**



B. Tech (Fourth Semester – Regular/Supplementary) Examinations, April 2026

**23BBTPC24001– Molecular Biology**

(Biotechnology)

Time: 3 hrs

Maximum: 60 Marks

**Answer ALL questions  
(The figures in the right hand margin indicate marks)**

**PART – A**

**(2 x 5 = 10 Marks)**

Q.1. Answer **ALL** questions

|                                                                                    | CO # | Blooms Level |
|------------------------------------------------------------------------------------|------|--------------|
| a. Justify the significance of C-value paradox in understanding genome size.       | CO1  | K5           |
| b. Why proofreading activity is important during replication?                      | CO2  | K2           |
| c. Analyze, how the nuclear transport of m-RNA occurs after transcription?         | CO3  | K3           |
| d. Why the first amino acid gets formylated during translation?                    | CO4  | K2           |
| e. Why methylation occurs to DNA and mention the name of enzyme doing methylation? | CO5  | K2           |

**PART – B**

**(10 x 5 = 50 Marks)**

Answer **ALL** the questions

|                                                                                                            | Marks | CO # | Blooms Level |
|------------------------------------------------------------------------------------------------------------|-------|------|--------------|
| 2. a. Explain how bacteriophage experiments demonstrated DNA as genetic material.                          | 5     | CO1  | K3           |
| b. Compare and differentiate between Nuclear genome and Organellar genome.                                 | 5     | CO1  | K4           |
| (OR)                                                                                                       |       |      |              |
| c. Analyze the reasons for the lack of correlation between genome size and organism complexity.            | 5     | CO1  | K4           |
| d. Explain how Cot curve analysis is used to determine genome complexity.                                  | 5     | CO1  | K3           |
| 3.a. Illustrate how Topoisomerase prevents supercoiling during DNA replication and explain its importance. | 5     | CO2  | K3           |
| b. Describe the Initiation of DNA replication, including the formation of the Replication fork.            | 5     | CO2  | K1           |
| (OR)                                                                                                       |       |      |              |
| c. Illustrate the mechanism of nucleotide excision repair with suitable diagram.                           | 5     | CO2  | K2           |
| d. Highlight the steps involved the mitochondrial DNA replication mechanism.                               | 5     | CO2  | K2           |
| 4.a. Compare the transcription machinery of prokaryotes and eukaryotes.                                    | 5     | CO3  | K3           |
| b. Analyze how transcription initiates in the promoter region on DNA with suitable diagram.                | 5     | CO3  | K4           |
| (OR)                                                                                                       |       |      |              |
| c. Describe the role of spliceosomes in Splicing mechanism with suitable diagram.                          | 5     | CO3  | K1           |
| d. Explain the mechanism of RNA editing with suitable examples.                                            | 5     | CO3  | K2           |
| 5.a. Compare the prokaryotic and eukaryotic ribosomes with diagram.                                        | 5     | CO4  | K3           |
| b. Explain the mechanism of elongation during protein synthesis.                                           | 5     | CO4  | K2           |
| (OR)                                                                                                       |       |      |              |
| c. Give the functions and mechanism of action of aminoacyl tRNA synthetase in translation.                 | 5     | CO4  | K1           |

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|------|--------------------------------------------------------------------------------------------------|---|-----|----|
| d.   | Analyze the role of chaperone proteins in proper protein folding.                                | 5 | CO4 | K3 |
| 6.a. | Predict the consequence of presence or absence of lactose in the mechanism of lac operon system. | 5 | CO5 | K4 |
| b.   | Give the properties of a Plasmid vector.                                                         | 5 | CO5 | K1 |
| (OR) |                                                                                                  |   |     |    |
| c.   | Compare and enlist the different types of enzymes used in recombinant DNA technology.            | 5 | CO6 | K3 |
| d.   | Describe the major steps involved in Recombinant DNA technology.                                 | 5 | CO6 | K2 |

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