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**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**

Ph.D. (First Semester) Examinations, June – 2025

23WPPEBTS1011/23SPPEBTS1011 – Advanced Biotechnology

(Biotechnology)



Time: 3 hrs

Maximum: 70 Marks

The figures in the right hand margin indicate marks.

Answer ANY FIVE Questions.

(14 x 5 = 70 Marks) Marks

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| 1. Discuss the various levels of protein structure and explain the significance of three-dimensional conformations of proteins in biological function. | 14 |
| 2.a. Describe the different types of protein motifs and folds. | 7 |
| b. Explain the working principles of UV-visible and FT-IR spectroscopy in the study of biomolecules | 7 |
| 3. Describe the principle and methodology of X-ray crystallography for macromolecular structure determination. | 14 |
| 4. Compare and contrast suspended growth and attached growth biological treatment systems. | 14 |
| 5.a. Describe the processes involved in biological nutrient removal (BNR) from wastewater. | 7 |
| b. Describe different types of vectors used in genetic engineering, including plasmids, bacteriophages and cosmids. | 7 |
| 6.a. Explain the principle of CRISPR-Cas9 technology and its components. | 14 |
| 7.a. Differentiate between a cDNA library and a genomic DNA library. | 7 |
| b. Describe the kinetics of growth and product formation in mammalian cell cultures. | 7 |
| 8. Outline the various types of bioreactor systems used for large-scale production using animal cells. | 14 |

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