

2025

M.Sc. 1st Semester Examination

**BIOTECHNOLOGY AND
BIOINFORMATICS**

Paper : BTIC402X1

**[Introduction to Bioinformatics and
Programming Languages]**

Full Marks : 25

Time : One Hour

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *two* questions : $2 \times 2 = 4$

1. What will be the output of the following python code :

```
word = 'ACTGTTGCA'  
print(word[:2]*3)
```

2. What is the difference between primary memory and secondary memory?
3. Why 'dry lab' term is used for defining Bioinformatics? What is the difference between metagenomics and transcriptomics?

1+1

P.T.O.

(2)

4. Distinguish between a phylogram and a cladogram with the help of a diagram.

Group - B

Answer any *two* questions : $4 \times 2 = 8$

5. Why a list cannot be copied using '=' (i.e. *list_copy* = *list_original*) in python? What is the correct way to copy a list? Explain with proper example. $2+2$
6. Define a biological database. Explain the difference between primary, secondary, and specialized databases with suitable examples. Name one metabolic and one disease database. $1+2+1$
7. Explain the *insert()* and *remove()* method of python list with suitable examples for each.
8. Define sequence identity, similarity and homology. Name different variants of BLAST and their applications. $2+2$

Group - C

Answer any *one* question : $8 \times 1 = 8$

9. (a) Explain how Biopython facilitates the manipulation of nucleotide sequences, detailing the functions for complement and reverse complement operations.
- (b) Describe the process of calculating GC content in a DNA or RNA sequence using Biopython. $4+4$

(3)

10. What is the significance of Ramachandran plot in protein structure analysis? Why folds are important in protein structure prediction? Name any two protein fold libraries. Compare the major protein structure prediction methods along with tools. What is GMQE? Why RMSD is important in protein structure prediction?

1+1+2+2+1+1

Internal Assessment - 5 marks
