

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

M.Sc -II Semester (MM/MB)

COURSE CODE (CREDITS): 20MS1BT213(2)

MAX MARKS: 35

COURSE NAME: Bioinformatics

COURSE INSTRUCTOR: Dr. Shikha Mittal

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is not allowed

Q.No	Question	Marks																									
Q1	Construct a phylogenetic tree using UPGMA method. <table><tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>A</td><td>0</td><td>2</td><td>6</td><td>10</td></tr><tr><td>B</td><td>2</td><td>0</td><td>5</td><td>9</td></tr><tr><td>C</td><td>6</td><td>5</td><td>0</td><td>4</td></tr><tr><td>D</td><td>10</td><td>9</td><td>4</td><td>0</td></tr></table>		A	B	C	D	A	0	2	6	10	B	2	0	5	9	C	6	5	0	4	D	10	9	4	0	(6)
	A	B	C	D																							
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C	6	5	0	4																							
D	10	9	4	0																							
Q2	You are designing a drug targeting a protein with unknown structure. Explain how computational prediction methods can assist in this process.	(6)																									
Q3	a. If gap opening penalty = 3 and gap extension = -1. Calculate penalty for gap of length 4. b. Two hits: Hit 1: E-value = 1e-5 Hit 2: E-value = 1e-20 Which is more significant and by how much?	(4)																									
Q4	You run a sequence similarity search and obtain multiple hits with varying E-values and identities. Explain how you would select the most biologically relevant match.	(3)																									
Q5	A: A T G C B: A T A C C: A G A C D: G G A C a. Identify informative positions b. Calculate total steps for each tree	(4)																									
Q6	a. Explain rooted vs unrooted trees with diagrams. b. Explain validation of predicted protein structures. c. Why structural information is more conserved than sequence?	(6)																									
Q7	Briefly explain - a. Difference between local and global alignment b. NCBI	(6)																									

	c. BLAST variants	
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JUIT TEST-3 EXAMINATIONS- MAY-2026