

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-III Semester (BI)

COURSE CODE (CREDITS): 18B11BI313 (4)

MAX. MARKS: 35

COURSE NAME: Biological Computation

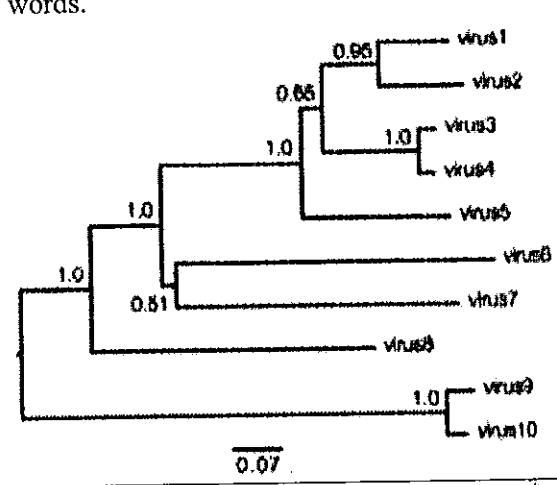
COURSE INSTRUCTORS: Dr. Raj Kumar, Dr. Tiratha Raj Singh

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*

Q.No	Question	CO	Marks
Q1	What are substitution matrices? How are these utilized for biological sequence analysis? Discuss PAM in detail with an example demonstrating how PAM100 can be fabricated?	3,4	5
Q2	Differentiate between local, global, and semi-global alignments with an example of each. Align the given two sequences A = "TAGCTGCA" and B = "CTGCA" for the scoring system as match = +1, mismatch = 0, gap penalty = -1 using Dynamic Programming and semi-global (ESF) approach.	3-5	6
Q3	Identify the most probable pattern by determining the HMM probabilities for the occurrence of the following sequence patterns in the given multiple sequence alignment. a) AVHPL b) AVQPM c) AIHPL  Sequence A    A   V   H   P   L Sequence B    A   V   H   P   L Sequence C    A   I   H   P   L Sequence D    A   V   Q   P   I Sequence E    A   I   P   P   M	3-6	9
Q4	There are different zones of sequence alignment identity that indicate the likelihood of adopting similar structures. How do zones of homology influence the process of homology modeling and template selection?	5	3
Q5	There are several model building steps in homology modelling. Discuss backbone generation and loop modeling steps.	5	5

<p>Q6</p>	<p>Analyze the given phylogenetic tree and provide your interpretations in your own words.</p> 	<p>4</p>	<p>4</p>
<p>Q7</p>	<p>Write short notes on:</p> <ul style="list-style-type: none"> <li>a) Hidden states and observable states in HMMs</li> <li>b) Transition and emission probabilities in HMMs</li> <li>c) Molecular markers used in phylogenetic analysis</li> </ul>	<p>3-6</p>	<p>3</p>