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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-IV Semester (BT)

COURSE CODE: 18B11BT413 / 10B11BT511

MAX. MARKS: 25

COURSE NAME: Introduction to Bioinformatics

COURSE CREDITS: 4

MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. Answer the following questions very precisely: (CO-2)

- a) Why it is difficult to identify homologs in the twilight zone of sequence alignment? [3 Marks]
- b) How can dot plots be utilized to visualize evolutionary divergence? [2 Marks]

Q2. Answer the following:(CO-2,3)

- a) Find the sequence identity for the given alignment. [2 Marks]

C T A G G C C A G C
C T A T G C _ _ G C

- b) Find out the suitable alignment for the given trace-back scheme. [3 Marks]

		G	A	A	T	T	C	A	G	T	T	A
G	0	0	0	0	0	0	0	0	0	0	0	0
G	0	1	1	1	1	1	1	1	1	1	1	1
A	0	1	2	2	2	2	2	2	2	2	2	2
T	0	1	2	2	3	3	3	3	3	3	3	3
C	0	1	2	2	3	3	4	4	4	4	4	4
G	0	1	2	2	3	3	3	4	5	5	5	5
A	0	1	2	3	3	3	3	4	5	5	5	6

Q5. Find out the most relevant alignment by choosing a consistent scoring scheme for matches, mismatches, and gaps. [5 Marks] (CO-4)

- a) AATCTATA
AAG-AT-A
- b) AATCTATA
AA-G-ATA
- c) AATCTATA
AA---GATA

Q6. Demonstrate the 2D matrix filling step using Needleman-Wunsch algorithm for the given sequences. [5 Marks](CO-4)

Seq 1 = CCGTCG

Seq 2 = CCGCG

Q7. Answer the following questions very precisely:(CO-2,3)

a) Mutations are crucial events in evolution. Discuss the effect of indel on protein function. [2 Marks]

b) What type of mutations are observed in the given image? Discuss their effect on protein function. [3 Marks]

Normal DNA: ATG TGT GTT TAT GGA...
Normal Protein: Met Cys Val Tyr Gly...

Case-1: ATG TGC GTT TAT GGA...
Met Cys Val Tyr Gly...

Case-2: ATG TGG GTT TAT GGA...
Met Trp Val Tyr Gly...

Case-3: ATG TGA GTT TAT GGA...
Met STOP