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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Midterm Examination, Fall 2026

Course Code: CSE115

Course Title: Introduction to Biology and Chemistry for Computation

Level: 1 Term:1 Batch: 73

Time: 01:30 Hrs **Marks: 25**

Answer ALL Questions

1.		A food laboratory receives a beverage suspected of containing several chemical components. After a scientific lab test, the sample produces three separate spots. Two spots move faster, while the third remains closer to the starting point.		CO2
	a)	Explain the separation technique described in the scenario. Analyze how the relative affinities of the components for the stationary and mobile phases influence their movement.	[4]	
2.		A laboratory observes that a particular gene is present in a cell, but the corresponding protein is not produced. Further analysis shows that the DNA remains intact, but no mRNA for that gene can be detected.		CO1
	a)	Relate which stage of protein synthesis is most likely affected in the given scenario? Interpret how the absence of mRNA affects protein synthesis, analyzing the roles of DNA, mRNA, tRNA, and ribosomes in the process.	[4]	
		A student observes that during DNA replication, one newly synthesized strand is formed continuously, whereas the other is produced in short fragments that are later joined together.		
	b)	Illustrate how the antiparallel structure of DNA leads to this difference in identifying the short fragments.	[4]	
3.		A bioinformatics researcher compares two DNA sequences obtained from the same gene in two closely related species. Given the sequences: Sequence 1 = GATCA Sequence 2 = GTACG Scoring scheme: Match = +2, Mismatch = –1, Gap = –2		CO3
	a)	Apply the appropriate sequence alignment method for this scenario and explain how it aligns the two DNA sequences from beginning to end.	[5]	
	b)	Calculate the final alignment score.	[1]	

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4.		Gene sequence for five species (A, B, C, D, E) are given below,		**CO2**

A:	A	C	G	G	C.	A.	T.	G.	C.	A.	T	T.	C.
B:	T	C	C	G	C	A	T	G	C	G	G	T	C
C:	G	C	G	C	C	G	C	G	A	A	T	G	G
D:	G′	T	A	T	T	A	G	C	T	A	G	C	G
E:	A	A.	A	G	C.	A.	T.	A.	G.	C.	T	C.	G

	a)	Determine p-value based distance matrices and draw the UPGMA tree step by step.	[7]

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