

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR**Odd Semester Mid-Term Examination, 2023-24****Course Code:** BTO541

Full Marks: 25

Course Name: Introduction to Computational Biology

Time: 90 Minutes

Instructions: Answer all the questions.

Materials to be supplied: Graph paper shall be supplied, if required.

Question No.	Body of the Question	Marks	Mapped CO
1	<p>Answer the following showing the calculations.</p> <p>A. In a random DNA sequence, what is the probability that any codon is a potential stop codon?</p> <p>B. If an ORF including the stop codon is 228 nucleotides long, what will be the length of the translated protein sequence?</p> <p>C. If the content of guanine in a DNA molecule is 30% then what will be the percentage of thymine in it?</p> <p>D. In a double stranded DNA, if each strand consists of 100 bases, then how many phosphodiester bonds are present in total?</p> <p>E. If the True negative rate is 0.7 then what is the False positive rate?</p>	5*2=10	CO1, CO2
2	<p>Mention if the following statements are true or false:</p> <p>A. The genetic code is overlapping in nature.</p> <p>B. The National Center for Biotechnology Information (NCBI) is located in the USA.</p> <p>C. The synthesis of RNA takes place in 5'-3' direction.</p> <p>D. Two amino acids in a protein are connected by phosphodiester bond.</p> <p>E. PDB is a secondary database.</p>	5*1=5	CO1
3	In a population of 100, there are 60 healthy persons which do not suffer from diabetes. A model predicted 45 people to have diabetes out of which 25 really have diabetes. Draw the confusion matrix and mention the number of true positives, true negatives, false negatives and false positives in the confusion matrix. Calculate the specificity and sensitivity from the matrix.	5	CO2, CO3
4	If the coding DNA strand is GTATGCTACAGATACGCGAGATGAGAT then what will be sequence of RNA and the protein? Codon table is given for the reference.	5	CO1, CO2, CO3

Course Outcomes

- CO1: To impart knowledge of life science and biological data
- CO2: To acquire knowledge of computational and mathematical skills for addressing important biological questions.
- CO3: To learn how to develop and implement computational algorithms and tools for processing biological data

		Second letter					
		U	C	A	G		
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G	Third letter
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G	
	A	AUU } AUC } Ile AUA } AUG Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G	
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G	