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B.Tech
PECS5410

8th Semester Regular / Back Examination 2016-17
ALGORITHM FOR BIOINFORMATICS
BRANCH(S): BIOMED, CSE, IT, ITE
Time: 3 Hours
Max Marks: 70
Q.CODE: Z201

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Name two positive and negative charged amino acids
b) What is platelet-derived growth factor (PDGF)?
c) What is the advantage of Dynamic programming over greedy technique?
d) What is entropy? Give the formula.
e) How can you find co-expressed genes through microarray?

f) Note down various tools for comparing genomes.
g) What is recursion? Explain with an example
h) What are various approaches of suffix tree?
i) What is a pseudo code algorithm? Write an algorithm for Fibonacci Number generation.
j) List the various types of rearrangements that can be done within a chromosome.

Q2 **a)** What is central Dogma? What are the various ways to express a gene? **(2)**

b) What is MUM? Write down the algorithm to find MUM using Brute-Force method. **(8)**

Q3 **a)** Devise an efficient algorithm for finding longest increasing and decreasing subsequences in a permutation of integers. **(5)**

b) Devise an algorithm to compute the number of distinct optimal global alignments (optimal paths in edit graph) between a pair of strings. **(5)**

Q4 **a)** Design an approximation algorithm for the Pancake Flipping problem. What is its approximation ratio? **(5)**

b) What is the optimal global alignment for MOAT and BOAST? Show all optimal alignments and the corresponding paths under the scoring matrix below and indel penalty -1 **(5)**

	A	B	M	O	S	T
A	1	-1	-1	-2	-2	-3
B		1	-1	-1	-2	-2
M			2	-1	-1	-2
O				1	-1	-1
S					1	-1
T						2

Q5 **a)** Write down the divide & conquer approach to merger sorting. **(5)**

b) Construct the recursion tree for MergeSort on the input 20, 4, 7, 6, 1, 3, 9, 5. **(5)**

Q6 **a)** What is the optimal global alignment for **APPLE** and **HAPPE** ? Show all optimal alignments and the corresponding paths under the match premium+1, mismatch penalty−1, and indel penalty −1? **(5)**

b) Design a divide-and-conquer algorithm for the Motif Finding problem and estimate its running time **(5)**

Q7 **a)** What is Exact Pattern Matching? Give an example that uses a Pattern matching problem? **(5)**

b) Give an account of Sequencing by Hybridization (SBH) as a Hamiltonian Path Problem. Explain through example **(5)**

Q8 **Write short answer on any TWO:** **(5 x 2)**

a) Smith-Waterman Algorithm

b) Manhattan Tourist Problem

c) Selection Sort Vs Merge Sort

d) Protein identification Via Database Search