Department of Computer Science & Engineering,
Motilal Nehru National Institute of Technology, Allahabad.
End Semester Examination
November-2017
MCA-III Semester

Subject: Analysis of Algorithms
Duration: 3 Hours

Paper code: CA-3304
Max. Marks: 60

Note: **Attempt all questions. Write all used formula in questions. Make assumptions wherever necessary and quote it.**

Q1. What is an optimal Huffman code for the following set of frequencies? Solve with description of Huffman algorithm. ***[5 Marks]***

Character	Frequency
A	5
B	9
C	12
D	13
E	16
F	45

Q2. What are greedy approaches? How it is different from backtracking and dynamic programming? Give the complete solution (step by step) for 8- Queen problem using back-tracking with pseudocode and explanation of each step. ***[8 Marks]***

Q3. Explain the optimal sub-structure and overlapping sub-problem with help of Fibonacci series and give the complete solution of Fibonacci series using dynamic programming with complexity analysis. ***[6 Marks]***

Q4. Find the length of longest increasing subsequence of given sequence {11, 21, 9, 32, 20, 49, 40, 59} such that all element of the subsequence are sorted in increasing order. ***[6 Marks]***

Q5. Consider the rod of length and piece of all prices smaller than 7, find the most profitable way of cutting of rod. ***[6 Marks]***

Length	1	2	3	4	5	6	7
Prices in $	2	6	9	11	18	19	21

Q6. Find the optimal way to multiply the following matrices to perform the fewest multiplications. ***[6 Marks]***

Matrix	A_1	A_2	A_3	A_4
Dimension	5×11	11×4	4×15	15×23

Q7. Consider the array A={26, 17, 41, 14, 21, 30, 47, 10, 16, 19, 21, 28, 38, 7, 12, 14, 20, 35, 39, 3}. Create RED-BLACK tree with one more attributes its size of node. Retrieve 17^{th} smallest element in the RED-BLACK tree. ***[6 Marks]***

P.T.O.

Q8. Show the comparisons the naive string matcher makes for the pattern P = 0001 in the text T = 000010001010001. ***[3 Marks]***

Q9. Working modulo q = 11, how many spurious hits does the Rabin-Karp matcher encounter in the text T = 3141592653589793 when looking for the pattern P = 26? ***[3 Marks]***

Q10. Construct the string-matching automaton for the pattern P = aabab and illustrate its operation on the text string T = aaababaabaababaab. ***[3 Marks]***

Q11. Write short note on: [2×4=8 Marks]

a. Floyd Warshall algorithm.
b. Optimal binary search tree.
c. Naive string matching algorithm.
d. Polynomial and non-polynomial time verification.