IIIT Bhubaneswar

DESIGN AND ANALYSIS OF ALGORITHM

MID SEMESTER EXAMINATION

(CSE & IT)

F.M. – 30 **Time – 1.5 Hr.**

Answer all questions

1. (a) Illustrate the operation of merge sort on the array A= <3, 41, 52, 26, 38, 57, 9, 49>. **[2X 5]**

   (b) Rank the following functions by order of growth.

   2^n, n^2, n lg n, ln n, n!, 1, $2^{\lg n}$

   (c) Write Recurrence equation to find out the time complexity of quick sort algorithm and then solve it using master method.

   (d) Solve the following recurrence using recursion tree method.

   $$T(n) = T(n/4) + T(n/2) + cn^2$$

   (e) Show that the solution to $T(n) = 2T(n/2 + 17) + n$ is O(n lg n) using substitution method.

2. Find an optimal parenthesization of a matrix-chain product whose sequence of dimension is <5, 10, 3, 12, 5, 50, 6> using dynamic programming. **[5]**

3. Consider the following set of activities **[5]**

i	1	2	3	4	5	6	7	8	9	10	11
S_i	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	9	9	10	11	12	14	16

   Select a maximum-size subset of mutually compatible activities using greedy algorithm.

4. Determine an LCS of <1, 0,0,1,0,1,0,1> and <0,1, 0,1,1,0,1,1,0>. **[5]**

5. Give pseudocode to reconstruct an LCS from the completed C table and the original sequences $X = \langle x_1, x_2, \ldots, x_m \rangle$ and $Y = \langle y_1, y_2, \ldots, y_n \rangle$ in O(m+n) time, without using the b table. **[5]**

2^n, n^2 $n\log n$, $\ln n$, $n!$, 1, $2^{\log n}$