**Total No. of Questions : 7]** **SEAT No. :**

**P4872** **[Total No. of Pages : 2**

# B.E./Insem. - 73

## B.E. (Computer Engineering)

## DESIGN & ANALYSIS OF ALGORITHMS

## (2012 Pattern)

***Time : 1 Hour]*** ***[Max. Marks : 30***

***Instructions to the candidates:***

1) ***Figures to the right indicate full marks.***
2) ***Draw neat diagram wherever necessary.***
3) ***Make suitable assumptions wherever necessary.***

***Q1)*** a) Solve following recurrence equation using Master Theorem. **[6]**

$T(n) = 16\,T(n/4) + n^2$.

b) Prove the following theorem:

If $f(n) = a_m n^m + \ldots\ldots\ldots\ldots + a_1 n + a_0$ and $a_m > 0$,

then $f(n) = O(n^m)$ **[4]**

OR

***Q2)*** a) Write quick sort algorithm with time complexity of this algorithm. **[6]**

b) Explain time and space complexity with suitable examples. **[4]**

***Q3)*** a) Let No. of keys, n = 3 and Keys $\{k_1, k_2, k_3\}$ = {do, if, while}

Let Probability of successful search, p(1:3) = {0.5, 0.1, 0.05}

Let Probability of unsuccessful search, q(0:3) = {0.15, 0.1, 0.05, 0.05}

Compute & construct OBST for above values. **[8]**

b) State and explain the principle of dynamic programming. Name the elements of dynamic programming. **[2]**

***P.T.O.***

OR

***Q4)*** a) Find an optimal solution for following greedy knapsack problem:

Number of objects n = 3, Knapsack capacity m = 20, Profits ($P_1$, $P_2$, $P_3$) = (25, 24, 15) and Weights ($W_1$, $W_2$, $W_3$) = (18, 15, 10). **[6]**

b) Write control abstraction (General Strategy Algorithm) of dynamic programming. **[4]**

***Q5)*** a) Write an algorithm to solve 4 queen's problem using backtracking method. Use mathematical modelling to support your answer. **[6]**

b) Explain how Travelling Salesperson problem is solved using branch and bound method with suitable example. **[4]**

OR

***Q6)*** a) Write an algorithm for graph coloring problem using backtracking Method. **[6]**

b) Explain in detail sum of subset problem using backtracking method with suitable example. **[4]**

OR

***Q7)*** a) Explain all three asymptotic notations with 2 examples of each. **[6]**

b) Derive worst case time complexity of following series: n(n-l). **[4]**