Total No. of Questions : 6]

SEAT No. :

P544

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APR - 18/TE/Insem. - 147

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2015 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Reorder the following complexities from the smallest to the largest **[5]**

1) $n\log_2 n$, $n + n^2 + n^3$, 24, sqrt (n).

2) n!, 2^n, (n + 1)!, 2^{2n}, n^n, $n^{\log n}$

b) Prove by contradiction that square root of 2 is irrational. **[5]**

OR

Q2) a) Explain the potential method of amortized analysis with example. **[5]**

b) Solve the following recurrence relation using substitution method $T(n) = T(n - 1) + 1$, $T(0) = 0$. **[5]**

Q3) a) Solve the following instance of job sequencing problem using greedy approach. Let n = 6, profit (1 : 6) = (30, 20, 15, 10, 5, 1) and deadlines d(1 : 6) = (4, 2, 2, 1, 4, 3). **[5]**

b) Write a recurrence relation for Merge sort and Find a time complexity using by Master's theorem. **[5]**

OR

Q4) a) Write an algorithm to find Minimum Spanning Tree using Kruskal algorithm and analyze it. **[5]**

b) Show the steps in multiplying the following two integers using efficiency integer multiplication 2345 and 678. **[5]**

P.T.O.

Q5) a) Let n = 3 and (a1, a2, a3) = {do, if, while}. Let P(1 : 3) = {05, 0.1, 0.05} and q(0 : 3) = {0.15, 0.1, 0.05, 0.05}. Compute and construct OBST for above value using dynamic Programming. **[8]**

b) State and explain the principle of Optimality. **[2]**

OR

Q6) a) Solve the knapsack problem using Dynamic programming for no. of objects n = 4, given capacity M = 8 **[5]**

Items	1	2	3	4
Value	15	10	9	5
Weight	1	5	3	4

b) Write a Bellman Ford algorithm to find shortest path and Analyze it. **[5]**