Total No. of Questions : 10]

SEAT No. :

P3642

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[5560]-598

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2015 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Compare the following complexities and Reorder from the smallest to the largest. Justify your answer. **[5]**

i) n^2, 2^n, $n \log_2 n$, $\log_2 n$, n^3.

ii) $n\log_2 n$, n^8, $n^2/\log_2 n$, $(n^2 - n + 1)$.

b) Solve Homogeneous Recurrence relation for Fibonacci sequence. **[5]**

OR

Q2) a) Discuss a general plan for Analysing Time Efficiency of Recursive Algorithm. **[5]**

b) Solve the following instance of job sequencing problem using greedy approach. Let $n = 4$, profit $(1 : 4) = (100, 10, 15, 27)$ and deadlines $d(1 : 4) = (2, 1, 2, 1)$. **[5]**

Q3) a) Write an algorithm for Quick sort and analyse it with respect to worst, best and average case. **[5]**

b) Compare the following **[5]**

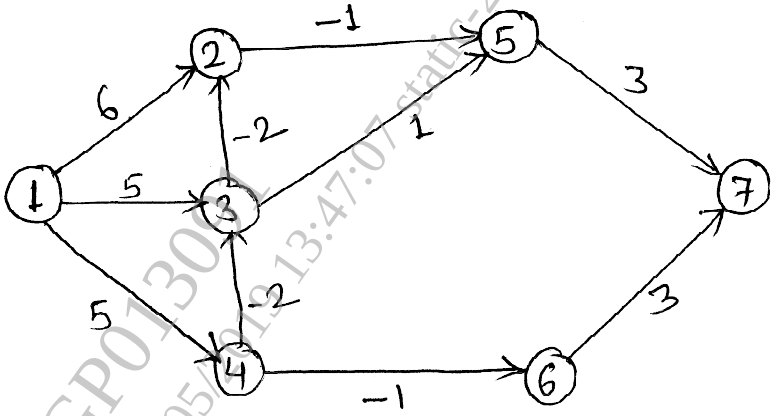
i) Divide and Conquer and Dynamic Programming.

ii) Greedy method and Dynamic Programming.

OR

P.T.O.

Q4) Use Bellman ford algorithm to find shortest path for the following graph. **[10]**



Q5) a) Write an algorithm to find Hamiltonian path using backtracking method. **[8]**

b) State the principal of backtracking and Write backtracking algorithm for N-Queen problem. **[8]**

OR

Q6) a) Let W = {5, 7, 10, 12, 15, 18, 20} and M = 35. Find all possible subsets of W that sum to M. Construct the portion of state space tree. **[8]**

b) Write an algorithm for 0/1 knapsack problem using backtracking method. **[8]**

Q7) Construct the solution of following Travelling Salesperson problem using Branch and Bound. **[18]**

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

OR

Q8) a) Solve the following instance of 0/1 knapsack problem by FIFO branch and bound approach. **[10]**

N = 4, (p1, p2, p3, p4) = (10, 10, 12, 18)
(w1, w2, w3, w4) = (2, 4, 6, 9) and M = 15.

b) Write an algorithm for Least Cost (LC) branch and bound. **[8]**

Q9) a) Explain in detail models for Parallel Computing. **[8]**

b) Differentiate between : **[8]**

i) P class and NP Class.

ii) NP complete and NP Hard.

OR

Q10)a) Prove that Satisfiability problem in NP complete. **[8]**

b) Explain Nondeterministic algorithm? Write the Nondeterministic algorithm for searching the element of an array. **[8]**