

Set-1

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 which is compulsory and any five questions from the rest

The figures in the right-hand margin indicate marks

1. Answer all questions : 2 × 10

(i) $F(n) = n^2 \log n + n^3$, then find $O(F(n))$

(ii) $F(n) = n^2$, $g(n) = n^3$ then find $O(fg(n))$

(iii) $T(n) = 4T(n/2) + n^2$ then $O(T(n))$ is _____

(iv) $T(n) = 8T(n/2) + n^2$ then $O(T(n))$ is _____

(v) What do you mean by time complexity and space complexity ?

(vi) Arrange the terms n^3 , $\log n^3$, $5n^2$, 2^n in asymptotic order.

(vii) Construct a max heap tree with {A, L, G, O, R, I, T, H, M}

(viii) If A is an algorithm of $O(n^2)$, $n = 100000$, computer C is of speed 3.0 GHz find execution time of A in C . 3 GHz/sec

(ix) Draw optimal tree with the weights 3, 5, 9, 2, 4, 10.

(x) What is NP hard problem.

2. (a) If $T(n) = 4T(\sqrt{n}/2) + (\log n)^2$ then find $O(T(n))$ 5

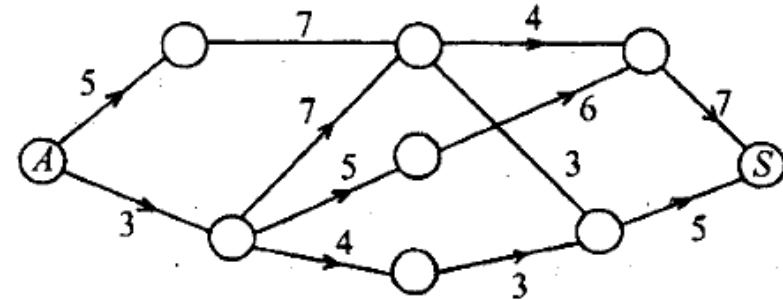
(b) Write the recursive algorithm to find max and min of n given numbers and discuss its time complexity. 5

3. (a) Discuss Graham's algorithm to find convex hull of a given set. 5

(Turn Over)

- (b) What is TVSP ? Discuss with a suitable example. 5
4. (a) Discuss Knapsack problem with $n = 5$, $m = 45$, $w = (20, 5, 10, 15, 7)$ $P = (18, 20, 30, 17, 14)$ 5
- (b) Write the algorithm to solve magic square problem and test it with $n = 5$ 5
5. (a) Discuss Prim's algorithm to find spanning tree of a given graph with a suitable example. 5
- (b) $X = \text{aabaababaa}$ $Y = \text{babaabab}$ find a minimum edit sequence that transfer X into Y . 5
6. (a) Discuss 8 queens problem. 5
- (b) Write the algorithm to find Hamiltonian circle of a graph. 5
7. (a) Discuss dynamic programming with a suitable example. 5

- (b) Find the shortest path from A_S 5



8. (a) Discuss NP hard and NP complete problem with suitable examples. 5
- (b) Discuss Graph coloring problem. 5

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