53 (IT 504) DAAL

2016

DESIGN AND ANALYSIS OF ALGORITHM

Paper : IT 504

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. Write Insertion Sort Algorithm. Find the best case and worst case time complexity of Insertion Sort Algorithm. 5+15=20

2. *(a)* Compare and Contrast Dynamic Programming and Divide and Conquer. 10

   (b) Apply Quick Sort Algorithm to sort the list 42, 76, 35, 49, 28, 57. Give step by step description. 10

3. *(a)* Prove that lower bound for any comparison sort algorithm is $\Omega(n \lg n)$. 10

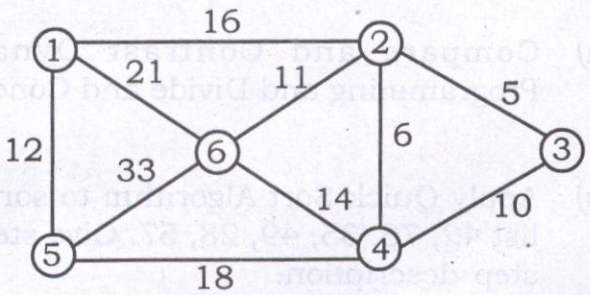
(b) Let $f(n) = n^2$ and $g(n) = n \lg n$. Show that $f(n)$ does not belong to $O(g(n))$. 5

(c) Specify the asymptotic upper bound and lower bound of

(i) $n \lg n + 5n^2 + 3$

(ii) $(n+a)^5$ 5

4. Specify the Greedy choice for Prim's and Kruskal's Algorithms. Find the Minimum Cost Spanning Tree for the given graph by using both Prim's and Kruskal's algorithm. 4+8+8=20



5. Find an optimal parenthesization of a Matrix-Chain-Product whose sequence of dimension is 20

<5, 5, 3, 12, 5, 50, 6>

6. Following is an instance of 0-1 Knapsack Problem. Solve the problem by using Branch and Bound strategy. 20

Item	Value	Size
1	15	6
2	20	5
3	22	10
4	44	2

Assume Knapsack size to be 15.

7. Write short notes on : ***(any two)*** 10×2=20

(a) NP-Hard and NP-Complete problems

(b) Back tracking

(c) Graph searching.