53 (CS 503) DAAL

2018

DESIGN AND ANALYSIS OF ALGORITHMS

Paper : CS 503

Full Marks : 100

Time : Three hours

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

Answer ***all*** *questions.*

1. *(a)* With examples define the terms —

   (i) Upper bound

   (ii) Lower bound

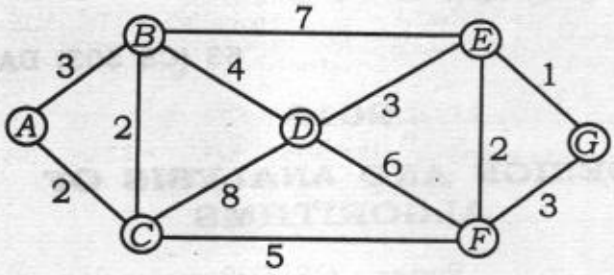
   (iii) Strictly bound. 3+3+4

   (b) Consider the following recursion :

   $T(n)=T(n/2)+T(n/2)+n$.

   Compute the time complexity using the strictly bound. 10

2. Consider the following graph :



(a) Use Prim's algorithm to find out the minimum spanning tree.

(b) Compute BFS and DFS of the graph.

10+5+5

3. *(a)* Write a recursive function to compute Fibonacci numbers.

(b) Draw the recursion tree for input 6. [fib (6)].

(c) Use dynamic programming to compute Fibonacci numbers.

(d) Compare the time complexity with previous approach.

5+5+5+5

4. Consider the cost matrix of TSP problem.

	A	B	C	D	E
A	–	7	3	1	4
B	7	–	2	6	8
C	3	2	–	9	3
D	1	6	9	–	5
E	4	8	3	5	–

(a) Use greedy method to compute the minimum cost. (using tree representation)

(b) Use branch and bound to compute the same.

(c) Show how much computations you saved using branch and bound than that of the greedy method.

5+10+5

5. (a) Define — NP, NP hard and NP complete.

(b) Prove that if there exists a deterministic polynomial algorithm for Hamiltonian path then the same exists for Hamiltonian cycle. 10+10
