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BCS-042

BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)

Term-End Examination, 2019

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 Hours **Maximum Marks : 50**

Note : Question no. 1 is compulsory. Answer any three questions from the rest.

1. (a) Let f(n) and g(n) are two positive functions, using basic definition of Big Oh ("O") and Theta (θ), prove/disprove the following : [5]

(i) $\max\{f(n), g(n)\} = \theta(f(n) + g(n))$

(ii) $2^n = O(2^{n+1})$

(b) Solve the following Recurrence using Recursion tree method : [5]

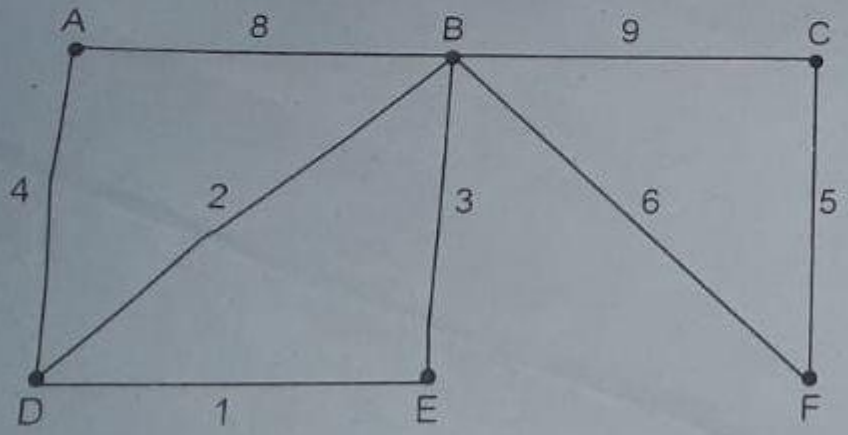
$T(n) = 2T(n-1) + 1$

Find tight solution of the Recurrence.

(c) Explain general algorithm to solve any problem using Greedy techniques. Write any two characteristics of Greedy Algorithm. [5]

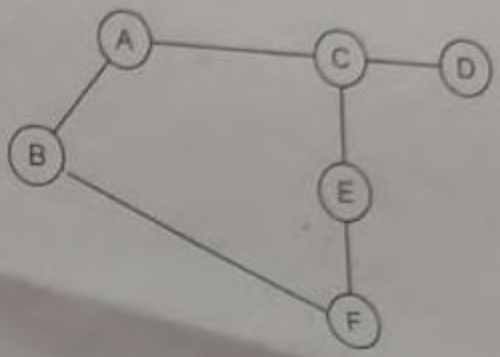
(d) Write Algorithm to solve Knapsack (fractional) problem using Greedy Method. Find the running time of the algorithm also. [5]

2. (a) Define minimum spanning tree. Apply Kruskal's Algorithm to find minimum cost spanning tree for the following graph : [6]



(b) Write bubble sort algorithm and find its time complexity in worst case. [4]

3. (a) For the following graph write DFS (sequence of traversal) from the node A : [4]

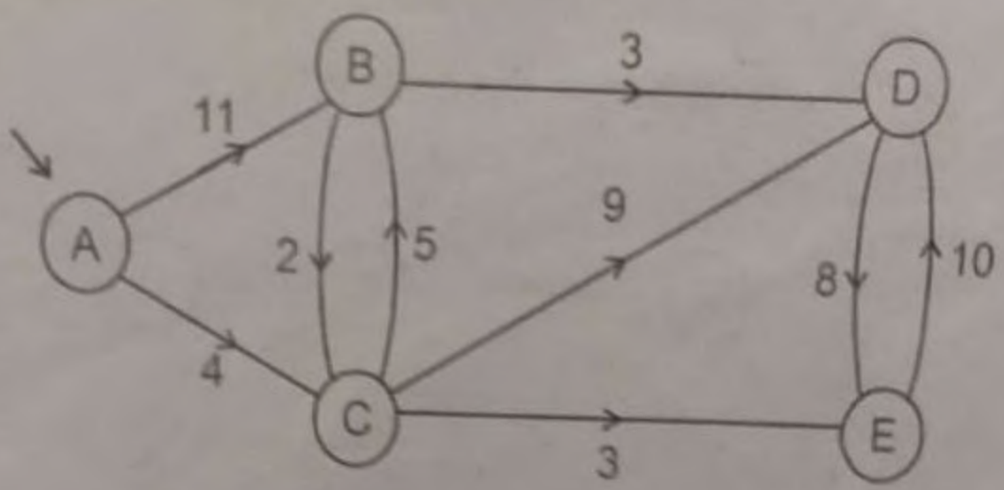


(b) Apply master method to solve the following recurrence relation : [6]

(i) $T(n) = 2T\left(\frac{n}{2}\right) + n$

(ii) $T(n) = 3T\left(\frac{n}{4}\right) + n\log n$

4. Explain Dijkstra's Algorithm to find a single source shortest path in a given graph. Apply Dijkstra's Algorithm and find the shortest path from source vertex 'A' to rest of the vertices : [10]



5. Differentiate between the following with respect to method of solving a problem and time complexity : [10]

(a) Depth-First-Search (DFS) Vs. Breath-First-Search (BFS)

(b) Bellman-Ford Algorithm Vs Dijkstra's Algorithm for single source shortest path.

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