BACHELOR OF TECHNOLOGY (CBCS) (2020 COURSE)
B.Tech.Sem - IV INFORMATION TECHNOLOGY : WINTER : 2024
SUBJECT: APPLIED ALGORITHMS

Day : Monday
Date : 25/11/2024

W-24721-2024

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data if necessary.

Q.1 How do you analyze recursive algorithms? Why is the recursion tree method better than the substitution method of solving a recurrence relation? **(10)**

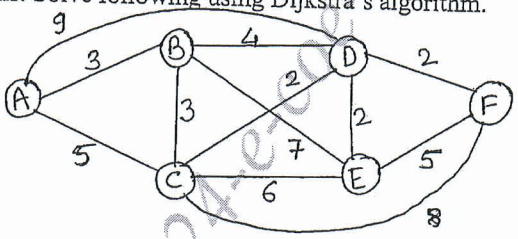
OR

Q.1 What is the basic idea behind the Substitution Method for solving recurrence relations? **(10)**

Q.2 What is the difference between an algorithm and a heuristic? How are heuristics and algorithms used to solve problems? What problems can be solved by heuristics? **(10)**

OR

Q.2 Write algorithmic steps to solve Single – Source shortest Paths using Dijkstra's Algorithms. Solve following using Dijkstra's algorithm. **(10)**



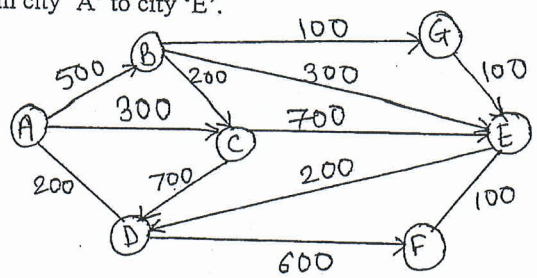
Q.3 What is meant by backtracking? How it helps to solve problems? Write a recursive and non recursive procedure for backtracking. **(10)**

OR

Q.3 What is Knapsack problem? How dynamic programming and greedy approaches are used to solve it? Consider following example to solve knapsack problem using both the approaches. Capacity of Knapsack = 40 **(10)**

Items	Values	Weights
1	10	30
2	20	10
3	30	40
4	40	20

Q.4 The railroad charges passengers a fixed fare to travel between any two towns. These fares are shown in following graph. These rates are the same whether the ride between two towns is part of a longer itinerary or not. Find the cheapest route from city 'A' to city 'E'. **(10)**



P.T.O.

OR

Q.4 Write pseudo code for insert operation of B tree. Construct a B – Tree of order 3 by inserting the given numbers. 5, 3, 21, 14, 8, 16, 7, 10, 21, 9, 13, 22. Then delete node 14, 3. Show all steps. (10)

Q.5 State and prove Cook's theorem. What is P – reduction in Cook's theorem? (10)

OR

Q.5 What is P class and NP class? Show relationship between them. Explain NP – complete and NP – hard with suitable example of each. (10)

Q.6 What is parallelism in Computer Science and why parallel computing is not ideal to implement in Real Time Systems? (10)

OR

Q.6 What are the specific probability distributions used for the random elements? How does performance of the randomized algorithm compare to deterministic algorithms for the same problem? (10)

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