TCS-503   1205

Odd Semester Examination, 2017-18

B.TECH. (SEMESTER-V)

DESIGN & ANALYSIS OF ALGORITHM

Time: 03:00 Hours   Max Marks: 100

Note: Attempt all questions:

1. Attempt any four questions: [5x4=20]

    (a)   What is B and B+ tree? Write four differences between them.

    (b)   What is minimum spanning tree? Write two difference between prism and kruskal.

    (c)   Priority Queue using Heap Data Structure has always been a data structure of choice for many applications. Discuss its beauty in terms of its salient features. How it performs in terms of access and modification. How it performs better than other peer formations in terms of resource complexity.

    (d)   Differentiate between Greedy and Dynamic Algorithms with appropriate examples?

    (e)   Insert all the elements in red black tree and show all the steps of insertion:

          42,24,75,14,65,35,90,10,20,18,55,70,80,60,40

                                                              [5x4=20]

2. Attempt any four questions:

    (a)   (1)   Insert the following elements in B Tree (Order-3) and show all the steps of insertion.

                42, 24, 75, 14, 65, 35, 90, 10, 20, IS, 55, 70, 80, 60, 40.

          (2)   Delete 24 and 75. Show all the steps.

    (b)   Explain disjoint set Operations .Also Explain the applications of Disjoint –Set data Structures?

    (c)   Write algorithm for union of two binomial heaps. Also explain the properties of Binomial trees?

    (d)   Let A= {a/20, b/15, c/5, d/15, e/45) be the alphabet and its frequency distribution. Construct the Huffman tree and algorithm.

                                                              [P.T.O.]

TCS-503/1680   1

(e) Explain the process of deletion in red black tree.

3. Attempt **any two** questions: [10x2=20]

(a) Write algorithm for n queen problem using Backtracking approach. Discuss your algorithm using 4x4 chess board.

(b) Define complete KMP algorithm for string matching. It should give the preprocessing and searching algorithms separately. Given the pattern: 101001 and string: 1101010101001111111, solve this using KMP.

(c) Write algorithm for 0-1 knapsack problem using dynamic programming. Apply the same to find optimal items in the Knapsack in the following example and show all the intermediate steps. Consider 4 items along their respective weights and values

Item i Value (vi) Weight (wi)

1 15 1

2 10 5

3 9 3

4 5 4

The maximum capacity of the knapsack is $W = 8$ .Fill the knapsack such that knapsack should not exceed its maximum capacity and it should have maximum profit value.

                                                                                      [10x2=20]

4. Attempt **any two** questions:

(a) What are approximation algorithms? Explain traveling salesman problem with example. Also give 2 differences between binomial and Fibonacci heaps.

(b)

TCS-503/1680   2
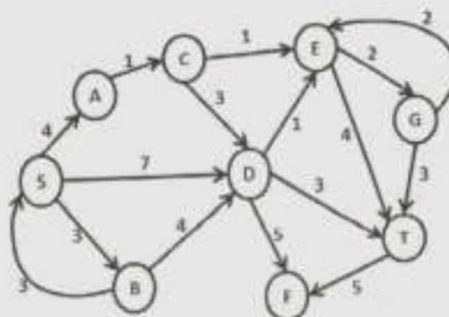
Consider the following directed graph. There are a multiple shortest paths between 12M vertices S and T. Which one will be reported by Dijkstra's shortest path algorithm? Write the sequence of vertices and cost of the shortest path from S to T. Assume that, in any iteration the shortest path to a vertex v is updated only when a strictly shorter path to v is discovered.

(c) What is Topological sorting? Write complete algorithm for Topological Sort.

[10x2=20]

5. Attempt **any two** questions:

(a) (1) Compare P and NP.

(2) Differentiate among Divide and conquer, Dynamic Programming and backtracking.

(3) Define Queue and its possible operations.

(4) Differentiate between BFS and DFS.

(5) Discuss memory representations of a graph

(b) Given two string sequences, write an algorithm to find the longest common (10) subsequence and its length using dynamic programming. Apply the algorithm to following two sequences: X = <A, B, C, B, A> and Y = <B, D, C, A, B>.

(c) Write short notes on:

i. Genetic Algorithms

ii. Intelligent Algorithms

iii. Parallel Algorithms

iv. NP-complete problem

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