TCS-503   250   Printed Pages : 4

Paper Code & Roll No. to be filled in your Answer Book

Roll No. ☐☐☐☐☐☐☐☐☐☐☐

Odd Semester Examination-2016

B.Tech (Semester-V)

DESIGN & ANALYSIS OF ALGORITHM

[Time : 3 Hours]   [Maximum Marks : 100]

Note : Attempt all questions.

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

     (a) What do you understand by analysis of algorithms. Also explain the cases considered during the analysis of algorithm?

     (b) Prove that $n! = o(n^n)$

     (c) Explain Master theorem. Solve the recurrence by using Master method

$$T(n) = T(\sqrt{n}) + 1$$

     (d) Illustrate the operation of Build max heap on the array = (7, 4, 6, 5, 19, 12, 13, 17, 11, 10, 3, 2)

(e) How will the Quick sort algorithm sort an array filled with numbers 10, 2, 12, 7, 4, 6, 9, 5, 1, 3, 11, 0 ? Show all steps.

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

(a) Show the red black trees that result after successively inserting the keys 41, 38, 31, 12, 19, 8 into an initially empty red black tree.

(b) Explain the process of augmenting a data structure with an example?

(c) How the results of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E, G, I in order into an empty B tree only. Draw the configuration of the tree just before some node must split and also draw the final configuration. Use t=3, where t is minimum degree of B-Tree.

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

(e) Explain disjoint set operations. Also explain the applications of Disjoint–set data structures?

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

(a) Find the optimal solution for the knapsack 0/1 problem using the dynamic problem approach? Consider, $n=4, W=5$, $(w1, w2, w3, w4)=(2,3,4,5)$ and $(b1, b2, b3, b4)=(3,4,5,6)$

(b) Compare Greedy versus Dynamic programming. Explain travelling sales man problem with example.

(c) Write a short note on Amortized analysis. Explain the 4-Queen problem using backtracking?

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

(a) Write DFS algorithm to determine whether or not on undirected graph contains a cycle?

(b)
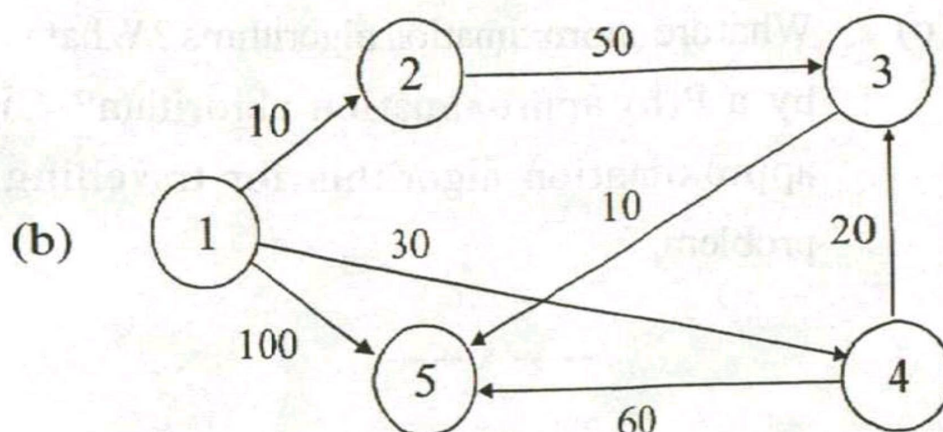
Find the shortest path in the above graph from the source vertex 1 to all other vertices by using Dijkstra's algorithm.

(c) Explain the Floyd Warshall algorithm with example?

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

(a) Define Rabinkarp algorithm for string matching modulo q=11, how many spurious hit does the Rabinkarp matcher counter in the text T= 3141592653589793, when looking for pattern P=26 ?

(b) Define NP, NP hard and NP complete. Give example of each.

(c) What are approximation algorithms ? What is meant by a P(n) approximation algorithm? Give an approximation algorithm for travelling sales problem.

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