Code No: D-2483/N/AICTE

FACULTY OF ENGINEEERING

B.E.(CSE(AI&DS), CSE(AI&ML), IoT) IV-Semester (AICTE) (Main) (New) Examination, September/October 2022

Subject: Design and Analysis of Algorithm

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed

1. (a) An algorithm of order $O(n^2)$ takes 5 seconds to compute answers for answer for an input instance size n =10. If the algorithm size is increase to 50, how much time will it take?
   (b) Explain set representation and write deadlines?
   (c) Describe job scheduling with deadline?
   (d) Define Backtracking? List the applications of Backtracking.
   (e) How are P and NP problems related?
   (f) Write the applications of Tire
   (g) What is Parallel Computing?

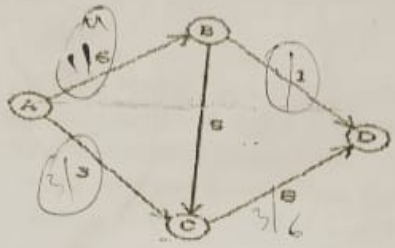
2. (a) Estimate the time complexity using f(n) and g(n) functions in asymptotic notations.
   (b) Let N be the number of guests attending a party. If each guest shakes his hand with everyone else only once, how many handshakes will take place? Write a recursive definition and algorithm.

3. (a) Write an algorithm to sort the given numbers using Quick sort and derive the time complexity 12,15,4,11,13,10,15,9,12,6.
   (b) State the Greedy Knapsack? Find an optional solution to the Knapsack instance n=3, m=20, (P1,P2,P3) = (25,24,15) and (W1, W2, W3) =(18, 15, 10).

4. (a) Draw an Optimal Binary search tree for n=4 identifiers (a1, a2, a3, a4) = (do,if,read,while) P(1:4) = (3,3,1,1) and Q(0:4) = (2,3,1,1,1).
   (b) Discuss the 4-queen's problem. Draw the portion of the state space tree for n= 4 queens using the backtracking algorithm.

5. (a) Construct standard trie and compressed trie for the set of strings S = {bear, bell, bid, bull, buy, sell, stock, stop} and analyze its complexity.

   (b) Compute the maximum flow of the following network



6. (a) Prove that vertex cover is NP-Complete assuming that a clique problem is NP-Complete.

   (b) Discuss in detail the models of parallel computing.

7. (a) What are the differences between backtracking and branch and bound solutions?

   (b) Draw the portion of the state space tree generated by LCBB for the knapsack instance; n=5, (p1,p2,p3,p4,p5) = (w1,w2,w3,w4,w5) =(4,4,5,8,9), and m=15.

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