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B022415(022)

B. Tech. (Fourth Semester) Examination, April-May 2021

(AICTE Scheme)

(Computer Science Engg. Branch)

DESIGN & ANALYSIS OF ALGORITHMS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Marks : 35

Note : Answer all questions. Part (a) of each question is compulsory and of 4 marks. Answer any two parts from part "b", "c" and "d", which is of 8 marks each.

1. (a) What are the fundamental steps involved in problem solving using algorithm.

   (b) Explain the Asymptotic notations used in designing algorithms.

(c) Write the algorithm of Insertion Sort and analyze this.
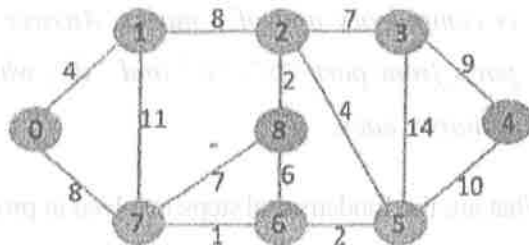
(d) Solve the following recurrences.

(i) $T(n) = T(n/2) + T(n/4) + T(n/8) + n$

(ii) $T(n) = T(n-2) + 2\lg n$

2. (a) Write the general plan for divide-and-conquer algorithms. Write any four example of divide-and-conquer.

(b) Write the algorithm of Quick Sort and analyze it.

(c) Find the minimum spanning tree using Kruskal algorithm for the following graph.

(d) Solve the Knapsack problem using Greedy algorithm, for the following data.

Item	A	B	C	D
Profit	280	100	120	120
Weight	40	10	20	24

where $W = 60$.

3. (a) What is Dynamic programming? Write the steps of Dynamic Programming.

(b) Find Longest Common subsequence of X and Y, where $X = $ A, B, C, B, D, A, B and $Y = $ B, D, C, A, B, A.

(c) Find the pattern in the given text by using Boyer Moore algorithm, where Text : "G C A A T G C C T A T G T G A C C" and Pattern : 'T A T G T G'.

(d) Write any one application of string matching algorithm. Which string matching algorithm you will use for this? How you will think that your selected algorithm is better than other string matching algorithm.

4. (a) Explain Backtracking and recursive backtracking.
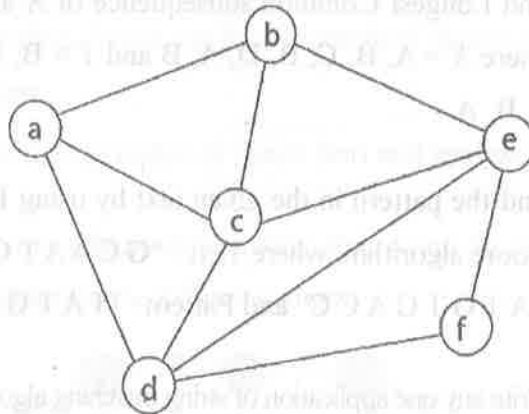
(b) Write the rules of 8-queen problem. Find any one

solution of 8-queen problem by using backtracking.

(c) Find the solution for the sum of subsets problem with the set $S = \{3,4,5,6,10\}$ with $M = 9$ using backtracking method.

(d) Find the Hamiltonian cycle for the given graph using backtracking.

5. (a) Define Branch-and-Bound method with different types of nodes used.

(b) Solve the 0/1 knapsack problem using Branch and Bound with following data :

Items	Weight	Value
11	3	4
12	4	5
13	5	6

where $W = 7$.

(c) Explain FIFO Branch and Bound and LC Branch and Bound, with example.

(d) Write short notes on any two :

(i) Cook's theorem

(ii) NP Complete Classes

(iii) NP Hard Classes