Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 09] 03 JAN 2023 [Total No. of Pages: 2]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Design and Analysis of Algorithms
Subject Code: PCCS-111
Paper ID: 16431
Scientific calculator is Not Allowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) How do you measure the efficiency of an algorithm?

b) Compare Back Tracking and Branch and Bound algorithm.

c) How is Prim's algorithm better in finding the Minimal spanning tree in comparison to the Kruskal's method?

d) List the steps to find the number of bits for encoding a given message using Huffman coding.

e) Design the algorithm for matrix addition and find the time complexity of the algorithm using step count method.

f) Distinguish between polynomial and exponential running time.

Part – B **[Marks: 04 each]**

Q2. Explain P and NP problems.

Q3. What is meant by Divide and Conquer approach? Write Divide and Conquer recursive Merge sort algorithm to sort the list E, X, A, M, P, L, E in alphabetical order.

Q4. Demonstrate the 4-queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm.

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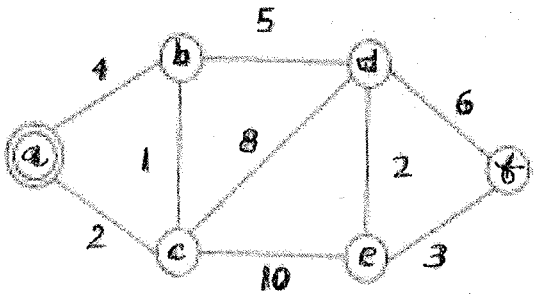
Q5. Discuss the Greedy Knapsack? Determine an optimal solution to the Knapsack instance n=3, m=20, (P1, P2, P3) = (25, 24, 15) and (W1, W2, W3) = (18, 15, 10).

Q6. Explain Dijkstra's algorithm and apply it to determine single source shortest paths problem for the following graph taking vertex 'a' as source.



Q7. Construct the open hash table, for the input 30, 20, 56, 75, 31, 19. Find average number of key comparisons in a successful search in the table. (HOTS)

Part – C **[Marks: 12 each]**

Q8. Compare the run time and storage by explaining knapsack problem solution using Greedy algorithm and Dynamic Programming approach.

OR

Use a recursion tree to finds a good asymptotic upper bound on the following recurrence relation.

$$T(n) = 3T(n/4) + cn^2$$

Also verify the answer using substitution method.

Q9. Distinguish between run time and storage by explaining graph search problem using DFS and BFS approaches.

OR

Explain KMP algorithm. Given a string 'T' and pattern 'P' as follows:

T:	b	a	c	b	a	b	a	b	a	b	a	c	a	c	a

P:	a	b	a	b	a	c	a

Using KMP algorithm determine whether 'P' occurs in 'T' and discuss its running time analysis.

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