Term End Examination 2022
Programme – M.Tech.(CSE)-AIML-2022
Course Name – Advanced Algorithm
Course Code - PCC-MCSM101
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) What procedure is being followed in Floyd Warshall Algorithm?

a) Top down
b) Bottom up
c) Big bang
d) Sandwich

(ii) Compute What will be the chromatic number for an empty graph having n vertices?

a) 0
b) 1
c) 2
d) n

(iii) What is the space complexity of the above dynamic programming implementation of the matrix chain problem?

a) O(1)
b) O(n)
c) $O(n^2)$
d) $O(n^3)$

(iv) Identify Which one of the following is an application of the backtracking algorithm?

a) Finding the shortest path
b) Finding the efficient quantity to shop
c) Ludo
d) Crossword

(v) What is the time complexity of the above dynamic programming implementation of the matrix chain problem?

a) O(1)
b) O(n)
c) $O(n^2)$
d) $O(n^3)$

(vi) Which of the following is not the algorithm to find the minimum spanning tree of the given graph?

a) Boruvka's algorithm
b) Prim's algorithm
c) Kruskal's algorithm
d) Bellman–Ford algorithm

(vii) Of the following given options, evaluate which one of the following does not provides an

optimal solution for 8-queens problem?

a) (5,3,8,4,7,1,6,2)
b) (1,6,3,8,3,2,4,7)
c) (4,1,5,8,6,3,7,2)
d) (6,2,7,1,4,8,5,3)

(viii) Calculating the chromatic number of a graph is a

a) P problem
b) NP hard problem
c) NP complete problem
d) cannot be identified as any of the given problem types

(ix) The time complexity of the solution tower of hanoi problem using recursion is _____

a) O(n2)
b) O(2n)
c) O(n log n)(
d) O(n)

(x) Determine Which algorithm is used to solve a maximum flow problem?

a) Prim's algorithm
b) Kruskal's algorithm
c) Dijkstra's algorithm
d) Ford-Fulkerson algorithm

(xi) Identify which of the following is/are property/properties of a dynamic programming problem?

a) Optimal substructure
b) Overlapping sub problems
c) Greedy approach
d) Both optimal substructure and overlapping sub problems

(xii) In dynamic programming, name the technique of storing the previously calculated values is called _____

a) Saving value property
b) Storing value property
c) Memorization
d) Mapping

(xiii) Define the recursive solution of tower of hanoi problem is an example of which of the following algorithm?

a) Dynamic programming
b) Backtracking
c) Greedy algorithm
d) Divide and conquer

(xiv) Express What is an in-place sorting algorithm?

a) It needs O(1) or O(logn) memory to create auxiliary locations
b) The input is already sorted and in-place
c) It requires additional storage
d) None of the mentioned

(xv) Describe What happens when the backtracking algorithm reaches a complete solution?

a) It backtracks to the root
b) It continues searching for other possible solutions
c) It traverses from a different route
d) Recursively traverses through the same route

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Classify different types of algorithm on the basis of their features. (3)

3. Construct a recursion tree for Quick Sort algorithm. (3)

4. A thief, with a knapsack, can steal n items. Each item Ii has is certain weight Wi and value Vi. The maximum capacity of the knapsack is W. Develop an algorithm which fills the knapsack with the maximum possible values. Perform your algorithm over the given set of values Item 1 2 3 Weight 80 30 40 Value 20 15 14 Given the Knapsack weight W = 100 (3)

5. Distinguish among Prim's and Kruskal Algorithm (3)

OR

Conclude that Graph colouring problem is NP Complete. (3)

6. Justify that Fractional knapsack is more useful than 0/1 Knapsack. (3)

OR

Propose an example to define Clique Decision Problem (CDP). (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. Determine the maximum value of the items you can carry using the knapsack? (5)
8. Illustrate the KMP algorithm for string matching problem and define the time complexity of it. (5)
9. Distinguish among Dynamic programming and Greedy approach with examples. (5)
10. Define time complexity and the methods to measure it. (5)
11. Compare different algorithmic technique using following criterias: Time, space, merits, demerits (5)
12. Evaluate the minimum cost to travel from one city to another using TSP: (5)

	C_1	C_2	C_3	C_4	C_5
C_1	∞	2	5	7	1
C_2	6	∞	3	8	2
C_3	8	7	∞	4	7
C_4	12	4	6	∞	5
C_5	1	3	2	8	∞

OR

Deduce that average case time complexity of quick sort is O(nlogn) (5)

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