# IMPORTANT QUESTIONS (MCA II SEM)

# SUB: DESIGN AND ANALYSIS AND ALGORITHAM

**UNIT I**

1. Briefly explain how to analyze algorithms?

2. What is Heap ? How to delete an element from the Heap ?

3. Define the following notations

(i) BigOh

(ii) Omega

(iii) Theta

4. Write an algorithm to add an element to a circular queue

5. Write the bounding functions used in the container loading problems.

**UNIT - II**

1. Write the quick sort algorithm using divide and conquer strategy.

2. What is minimum spanning tree? Write Prim's algorithm for finding minimum spanning tree.

3. Write a function to sort the given n elements using Quick sort. Also prove that the average complexity of Quick sort is $\Theta$ (nlogn ).

4.Define best, average and worst case time complexities by considering the sequential search method as an example.

5. Consider the 0/1 Knapsack instance n=5, p= [6, 3, 5, 4, 6] w = [2, 2, 6, 5, 4 ] and c= 10. Solve using dynamic programming method.

**UNIT - III**

1. Write BFS and DFS algorithms. Explain their working with suitable examples.

2. Write an algorithm to find an Optimal Binary Search tree using dynamic programming.

3. Describe the procedure of the Depth First Search with an example.

4. Define (i)approximation scheme (ii) NP complete problems in detail?

5. Solve All pairs shortest path problem using dynamic programming method. Obtain the final matrix & kay matrices.

| | | | |
|---|---|---|---|
| 0 | 1 | 5 | 8 |
| ∞ | 0 | 2 | 4 |
| ∞ | ∞ | 0 | 1 |
| 2 | ∞ | ∞ | 0 |

**UNIT - IV**

1. What is M-Colourability optimisation problem? Write an algorithm that finds all MColorings of a Graph.

2. Explain how the branch and bound technique can be used to solve 0/1 Knapsack problem.

3. Write the functions of iterative merge sort for sorting the given n elements in descending order.

4. Describe the various criteria applicable for solving the 0/1 Knapsack problem using greedy method. Consider the following 0/1 Knapsack instance n=4 , p= [6, 10, 12, 13 ] w = [2, 4, 6, 7 ] and c= 11. Solve using K optimal method.

5. Write the decision tree for sorting in descending order when n=3.

**UNIT - V**

1. State and prove Cook's Theorem.

2. What is Directed Hamiltonian Cycle? Prove that CNF - Satisfiability reduces to Directed Hamiltonian Cycle.

3. Write the iterative function of finding the minimum and maximum element using Divide and conquer approach.

4. Write the high level description of Prim’s algorithm which is used to find the Minimum cost spanning tree. Also define the greedy criteria used in this method.

5. Explain the advantages of median of median three quick sort?