

BCA Vth SEMESTER
C: (504) Design Analysis & Algorithms
QUESTION BANK

UNIT 1

1. What is an Algorithm? What is the need to study Algorithms?
2. Explain Euclid's Algorithm to find the GCD of two integers with an e.g.
3. Explain Consecutive Integer Checking algorithm to find the GCD of two numbers with an e.g.
4. Find the second largest number of an array. What is complicity in worst case?
5. Explain the Algorithm design and analysis process with a neat diagram.
6. Define:
 - a) Time Efficiency
 - b) Space Efficiency
7. What are the important types of problems that encounter in the area of computing?
8. What is a Data Structure? How are data structures classified?
9. Briefly explain linear and non-linear data structures.
10. What is a Set? How does it differ from a list?
11. What are the different operations that can be performed on a Set?
12. What are the different ways of defining a Set?
13. What is Order of Growth?
14. Define Worst case, Average case and Best case efficiencies.
15. Find the second largest number of an array. What is complicity in best case?

Unit2

1. Write a algorithm of Stack to delete a node.
2. What is Queue? Write a algorithm of Queue.
3. Write a algorithm of Stack to add a node.
4. Write a algorithm of Binary tree.
5. Define linked list. Write a algorithm for link list.
6. What is Graph.Differentiate between Graph and tree?
7. Define the internal representation of graph.
8. Write an algorithm for in-order. Also give an example.
9. Write an algorithm for pre-order. Also give an example.
10. Write an algorithm for post-order. Also give an example.
11. Differentiate between directed and in directed graph.
12. Write short notes on following.
 - Start Vertex.
 - End Vertex.
 - Incidence.
 - Adjacency.
 - Degree.
13. Differentiate between Regular and Complete Graph.
14. Differentiate between Bipartite and Isomorphism Graph.
15. Define Adjacency Matrix, with example.

Unit 3

1. What is Knapsack problem? Give the solution to solve it using dynamic programming technique
2. Give an algorithm to solve the knapsack problem.
3. Explain the concept of Greedy technique.
4. Explain Prim's algorithm with an eg.
5. Prove that Prim's algorithm always yields a minimum spanning tree.
6. Explain Kruskal's algorithm with an eg.
7. Explain Quick find and Quick union implementations of disjoint subsets
8. What is a state space tree? Explain how to construct a state space tree?
9. What is n-Queen's problem? Generate the state space tree for $n = 4$.
10. What is Greedy problem?
11. Give an example of Knapsack problem.
12. Differentiate between Prim and Kruskal's Algorithm.
13. Write the Complexity of Kruskal's and Prim Algorithms.
14. Solve the Knapsack problem by Greedy approach.
15. What is the difference between 0/1 Knapsack problem and fractional Knapsack problem.

Unit4

1. Give an algorithm to find the smallest element in a list of n numbers and analyze the efficiency.
2. Give an algorithm to check whether all the elements in a list are unique or not and analyze the efficiency
3. Give an algorithm to multiply two matrices of order $N * N$ and analyze the efficiency.
4. Give the general plan for analyzing the efficiency of Recursive algorithms with an e.g.
5. Give an algorithm to compute the Factorial of a positive integer n and analyze the efficiency.
6. Give an algorithm to solve the Tower of Hanoi puzzle and analyze the efficiency.
7. Define an explicit formula for the n th Fibonacci number.
8. Define a recursive algorithm to compute the n th Fibonacci number and analyze its efficiency.
9. Explain the Merge Sort algorithm with an e.g. and also draw the tree structure of the recursive calls made.
10. Analyze the efficiency of Merge sort algorithm.
11. Explain the Quick Sort algorithm with an example and also draw the tree structure of the recursive calls made.
12. Analyze the efficiency of Quick sort algorithm.
13. Give the Binary search algorithm and analyze the efficiency.
14. Give the algorithm to find the height of a Binary tree and analyze the efficiency.
15. Give an algorithm each to traverse the binary tree in In order, Preorder and Post order.

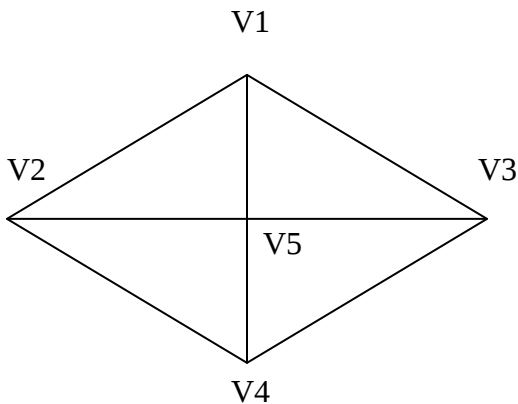
Unit 5

1. What is back tracking? Where Back tracking is used to solve the problem.
2. Write an algorithm of BFS? Also give an example.
3. Write an algorithm of DFS? Also give an example.
4. Write an algorithm of Best First Search? Also give an example.
5. What is 4-Queen's problem? Also give an example.
6. What is 8-Queen's problem? Also give an example.
7. What is n-Queen's problem?
8. Given three types of items with the following respective weights and values
9. $T=T_1, T_2, T_3$

$$W_i = 1, 4, 5$$

$V_i = 4, 5, 6$ and the Knapsack capacity is $W=5$. Apply Backtracking technique for obtaining the optimal solution.

10. Apply Back tracking technique to solve the three coloring problem for the graph.



11. Obtain the subset sum for the following set
 $S = (3, 4, 5, 6)$
 $X = 9$
12. Find all possible solution for 4X4 Chess Board, 4.queens problem.
13. Find all possible solution for 8X8 Chess Board, 8.queens problem.
14. Write an algorithm for 4 coloring problem
15. Write an algorithm for 8 coloring problem.