



**SIDDHARTH GROUP OF INSTITUTIONS:: PUTTUR  
(AUTONOMOUS)**

Siddharth Nagar, Narayanananam Road – 517583

**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code:** Data Structures (20MC9102)

**Course & Branch:** MCA

**Year & Sem:** I-MCA & I-Sem

**Regulation:** R20

**UNIT -I  
BASIC CONCEPT, LINEAR LIST**

- |    |  |                 |
|----|--|-----------------|
| 1  | a) What is an Algorithm? Explain its specifications.   | [L1][CO1] [6M]  |
|    | b) What are the steps required to find sum of two numbers.   | [L1][CO1] [6M]  |
| 2  | a) What is a Data Structure? Explain its advantages.   | [L1][CO1] [6M]  |
|    | b) Explain various types of Data Structures.   | [L2][CO1] [6M]  |
| 3  | a) What is space complexity? Evaluate space complexity for the following code<br>int square(int a) { return a*a; }<br>b) What is time complexity? Evaluate time complexity for the following code<br>int square(int a) { return a*a; } | [L5][CO1] [6M]  |
| 4  | Discuss how you can measure Performance of an algorithm.   | [L2][CO1] [12M] |
| 5  | a) Identify the steps to print the product of two numbers.<br>b) Identify the steps to display numbers from one to given number.   | [L3][CO1] [6M]  |
| 6  | a) What is an Array? Explain the representation of an array.<br>b) Apply various operations that can perform on array.   | [L2][CO2] [6M]  |
| 7  | a) Explain Linear and Non Linear Data structure with examples<br>b) Differentiate linear and non-linear data structure.  | [L2][CO1] [6M]  |
| 8  | Analyze and write a program to store a set of values of same data type into a single variable.   | [L4][CO2] [12M] |
| 9  | Explain the following i) Big-Oh      ii) Big-Omega      iii) Big-Theta   | [L2][CO2] [12M] |
| 10 | Discuss about Asymptotic Notations with their types.   | [L2][CO2] [12M] |

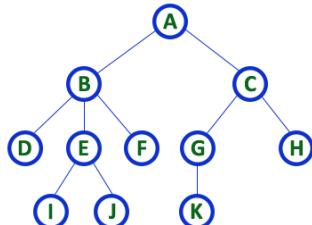
**UNIT -II****LINKED REPRESENTATION, STACK & QUEUE**

- |           |   |                 |
|-----------|---|-----------------|
| <b>1</b>  | a) Prepare an algorithm to insert an element at the end of doubly linked list.          | [L3][CO2] [6M]  |
|           | b) Prepare an algorithm to delete an element at the end of doubly linked list.          | [L3][CO2] [6M]  |
| <b>2</b>  | Explain different ways for inserting an element into a Single Linked List with example. | [L2][CO2] [12M] |
| <b>3</b>  | Develop Circularly Linked List with various operations.                                 | [L6][CO2] [12M] |
| <b>4</b>  | a) What is linked list? What are the different types of linked list?                    | [L1][CO2] [6M]  |
|           | b) Explain the advantages of linked list over arrays.                                   | [L2][CO2] [6M]  |
| <b>5</b>  | a) Design an algorithm to insert an element at beginning of circularly linked list.     | [L3][CO2] [6M]  |
|           | b) Design an algorithm to delete an element at end of circularly linked list.           | [L3][CO2] [6M]  |
| <b>6</b>  | a) What is a Stack? What are the operations that perform on a stack?                    | [L1][CO2] [6M]  |
|           | b) What is a Queue? What are the operations that perform on a Queue?                    | [L1][CO2] [6M]  |
| <b>7</b>  | Develop various stack operations using arrays. With example                             | [L6][CO2] [12M] |
| <b>8</b>  | Develop various queue operations using arrays. With example                             | [L6][CO2] [12M] |
| <b>9</b>  | What is an expression? Explain various types of expressions with example.               | [L2][CO2] [12M] |
| <b>10</b> | a) Convert the expression $(5 + 6) * (6 - 5)$ from infix to postfix                     | [L2][CO2] [6M]  |
|           | b) Evaluate the postfix expression $25*423-*+$ .  | [L5][CO2] [6M]  |

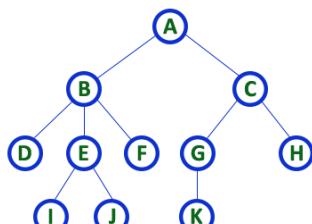
## UNIT -III

### TREES & MULTIWAY TREES

- 1** a) What are the different ways to define a tree? [L1][CO3] [4M]  
 b) Find various terminologies used in a tree. Explain any six terminologies [L3][CO3] [8M]
- 2** a) Define binary tree and give the binary tree node structure. [L1][CO3] [6M]  
 b) What are the various types of a binary tree? [L1][CO3] [6M]
- 3** a) What is the various representation of a binary tree? [L1][CO3] [6M]  
 b) List out and explain various binary tree traversals. [L2][CO3] [6M]
- 4** Describe different cases to delete an element in BST with an algorithm and examples. [L2][CO3] [12M]
- 5** a) Explain BFS Tree Traversal with an example. [L1][CO3] [6M]  
 b) Explain DFS Tree Traversal with an example. [L1][CO3] [6M]
- 6** Develop B – Tree with various operations. [L6][CO3] [12M]
- 7** a) Analyze the steps to insert elements into Binary Search Tree. [L4][CO3] [6M]  
 b) Analyze the steps to search element in Binary Search Tree. [L4][CO3] [6M]
- 8** Identify the following terms from the given tree [L3][CO3] [12M]  
 i) Internal Nodes  
 ii) External Nodes  
 iii) Depth  
 iv) Height  
 v) Level



- 9** Identify the following terms from the given tree [L3][CO3] [12M]  
 i) Parent  
 ii) Child  
 iii) Siblings  
 iv) Path  
 v) Sub Tree



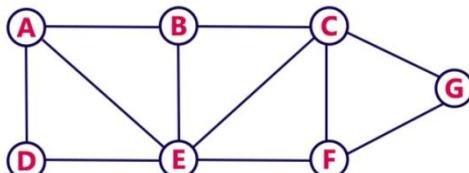
- 10** a) Prepare an algorithm to insert an element into B+ Tree. [L3][CO3] [6M]  
 b) Prepare an algorithm to delete an element in B+ Tree. [L3][CO3] [6M]

**UNIT -IV**  
**SEARCHING AND SORTING**

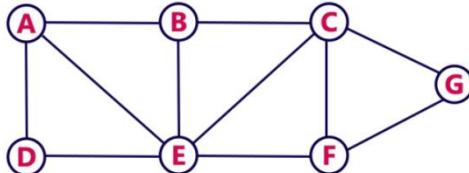
- |           |  |                 |
|-----------|--|-----------------|
| <b>1</b>  | a) What do you mean by searching? What are the types of searching? | [L1][CO4] [6M]  |
|           | b) Differentiate various searching techniques.                     | [L4][CO4] [6M]  |
| <b>2</b>  | a) Explain Linear Search with an algorithm and example.            | [L2][CO4] [6M]  |
|           | b) Design a program to demonstrate Linear Search.                  | [L3][CO4] [6M]  |
| <b>3</b>  | Explain about Hashing with an example.                             | [L2][CO4] [12M] |
| <b>4</b>  | a) Explain Binary Search with an algorithm and example.            | [L2][CO4] [6M]  |
|           | b) Develop a program to demonstrate Binary Search.                 | [L6][CO4] [6M]  |
| <b>5</b>  | a) Discuss Space and Time Complexity for Linear and Binary Search. | [L2][CO4] [6M]  |
|           | b) Distinguish between Linear Search and Binary Search.            | [L5][CO4] [6M]  |
| <b>6</b>  | a) Explain insertion sort with an algorithm and example.           | [L2][CO4] [5M]  |
|           | b) Design a program to demonstrate insertion sort.                 | [L3][CO4] [7M]  |
| <b>7</b>  | a) Explain bubble sort with an algorithm and example.              | [L2][CO4] [5M]  |
|           | b) Design a program to demonstrate bubble sort.                    | [L3][CO4] [7M]  |
| <b>8</b>  | a) Explain selection sort with an algorithm and example.           | [L2][CO4] [5M]  |
|           | b) Design a program to demonstrate selection sort.                 | [L3][CO4] [7M]  |
| <b>9</b>  | a) Prepare an algorithm for Quick sort with example.               | [L3][CO4] [6M]  |
|           | b) Prepare an algorithm for Merge sort with example.               | [L3][CO4] [6M]  |
| <b>10</b> | Differentiate various sorting techniques with time complexity.     | [L4][CO4] [12M] |

**UNIT –V**  
**GRAPHS & GRAPH ALGORITHMS**

- |          |  |                |
|----------|--|----------------|
| <b>1</b> | a) Define Graph. List out various graph operations?                | [L1][CO5] [4M] |
|          | b) What are the various applications and properties of Graphs?     | [L1][CO5] [8M] |
| <b>2</b> | a) Discuss BFS Graph Traversal with an algorithm.                  | [L2][CO5] [3M] |
|          | b) Explain BFS Graph traversal with steps for the following Graph. | [L2][CO5] [9M] |



- |          |  |                 |
|----------|--|-----------------|
| <b>3</b> | What is a Graph? Explain various Graph terminologies.              | [L2][CO5] [12M] |
| <b>4</b> | a) Discuss DFS Graph Traversal with an algorithm.                  | [L2][CO5] [3M]  |
|          | b) Explain DFS Graph traversal with steps for the following Graph. | [L2][CO5] [9M]  |



- |           |  |                 |
|-----------|--|-----------------|
| <b>5</b>  | a) What is minimum – cost spanning tree?                               | [L1][CO5] [4M]  |
|           | b) Prepare an algorithm for Prim's with example.                       | [L3][CO5] [8M]  |
| <b>6</b>  | a) Discuss how to represent Graph storage using Adjacency matrix.      | [L2][CO5] [7M]  |
|           | b) Briefly explain about Adjacency List with example.                  | [L2][CO5] [5M]  |
| <b>7</b>  | Illustrate the steps for Dijkstra's algorithm with an example.         | [L3][CO5] [12M] |
| <b>8</b>  | Explain about shortest path problem with an algorithm and example.     | [L2][CO5] [12M] |
| <b>9</b>  | Explain in detail about various minimum cost spanning tree algorithms. | [L2][CO5] [12M] |
| <b>10</b> | Discuss and compare various graph traversals.                          | [L5][CO5] [12M] |