



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR**  
Siddharth Nagar, Narayanavanam Road – 517583

**QUESTION BANK (DESCRIPTIVE)**

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

**Course & Branch:** MCA

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

**Regulation:** R20

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

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|----|---|-----------|-------|
| 1  | a) What is an Algorithm?  | [L2][CO1] | [4M]  |
|    | b) Write an Algorithm for sum of two numbers.   | [L1][CO1] | [8M]  |
| 2  | a) What is a Data Structure? Explain its advantages.  | [L2][CO1] | [4M]  |
|    | b) List and explain various types of Data Structures.   | [L4][CO1] | [8M]  |
| 3  | Find the $O(n)$ , $\Omega(n)$ and $\theta(n)$ values for the functions $f(n)=3n+2$ and $g(n)=n$ . | [L1][CO3] | [12M] |
| 4  | Explain Space Complexity Performance with example.  | [L5][CO1] | [12M] |
| 5  | Discuss about algorithm with an example algorithm and program.                                    | [L6][CO1] | [12M] |
| 6  | a) Describe an Array? With example.   | [L2][CO2] | [6M]  |
|    | b) Explain the representation of an array.  | [L4][CO2] | [6M]  |
| 7  | a) Explain Linear Data structure with examples  | [L2][CO1] | [6M]  |
|    | b) Explain Non Linear Data structure with examples  | [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.  | [L6][CO2] | [12M] |

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

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|-----------|--|-----------|--------------|
| <b>1</b>  | <b>a)</b> Write an algorithm to insert an element at the end of doubly linked list.            | [L3][CO5] | <b>[6M]</b>  |
|           | <b>b)</b> Write an algorithm to delete an element at specified position in single linked list. | [L3][CO5] | <b>[6M]</b>  |
| <b>2</b>  | Explain different ways for insert elements into a Single Linked List with example.             | [L5][CO5] | <b>[12M]</b> |
| <b>3</b>  | Discuss about Circularly Linked List with operations.  | [L6][CO5] | <b>[12M]</b> |
| <b>4</b>  | <b>a)</b> What is linked list? What are the different types of linked list?                    | [L1][CO5] | <b>[6M]</b>  |
|           | <b>b)</b> Explain the advantages of linked list over arrays.                                   | [L2][CO5] | <b>[6M]</b>  |
| <b>5</b>  | <b>a)</b> Write an algorithm to insert an element at beginning of circularly linked list.      | [L1][CO5] | <b>[6M]</b>  |
|           | <b>b)</b> Write an algorithm to delete an element at end of doubly linked list.                | [L2][CO5] | <b>[6M]</b>  |
| <b>6</b>  | <b>a)</b> What is a Stack? What are the operations that perform on a stack?                    | [L1][CO6] | <b>[6M]</b>  |
|           | <b>b)</b> What is a Queue? What are the operations that perform on a Queue?                    | [L1][CO6] | <b>[6M]</b>  |
| <b>7</b>  | <b>a)</b> Explain the implementation of stack operations using arrays.                         | [L4][CO6] | <b>[6M]</b>  |
|           | <b>b)</b> Explain the implementation of stack operations using linked list.                    | [L4][CO6] | <b>[6M]</b>  |
| <b>8</b>  | What is an expression? Explain various types of expressions with example.                      | [L2][CO6] | <b>[12M]</b> |
| <b>9</b>  | <b>a)</b> Analyze and implement queue operations using arrays.                                 | [L4][CO6] | <b>[6M]</b>  |
|           | <b>b)</b> Analyze and implement queue operations using linked list.                            | [L4][CO6] | <b>[6M]</b>  |
| <b>10</b> | <b>a)</b> Convert the expression $(5 + 6) * (6 - 5)$ from infix to postfix                     | [L2][CO6] | <b>[6M]</b>  |
|           | <b>b)</b> Write the steps for evaluating postfix expression.                                   | [L2][CO6] | <b>[6M]</b>  |

**UNIT –III****TREES & MULTIWAY TREES**

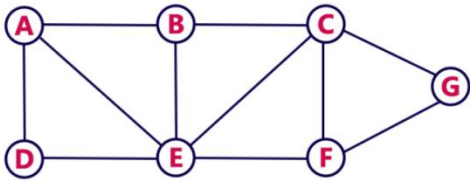
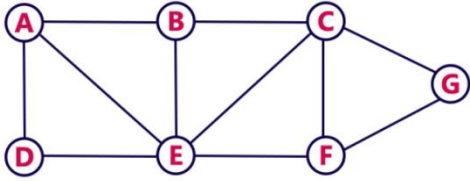
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|-----------|---|-----------|--------------|
| <b>1</b>  | <b>a)</b> Explain BFS Tree Traversal with an example.                                   | [L2][CO4] | <b>[6M]</b>  |
|           | <b>b)</b> Explain DFS Tree Traversal with an example.                                   | [L2][CO4] | <b>[6M]</b>  |
| <b>2</b>  | Explain Binary Tree with their types and representation.                                | [L2][CO4] | <b>[12M]</b> |
| <b>3</b>  | Identify different cases to delete an element in BST with an algorithm and examples.    | [L3][CO4] | <b>[12M]</b> |
| <b>4</b>  | Discuss about B – Tree with their operations.   | [L6][CO4] | <b>[12M]</b> |
| <b>5</b>  | <b>a)</b> Develop an algorithm to insert elements into Binary Search Tree.              | [L4][CO4] | <b>[6M]</b>  |
|           | <b>b)</b> Develop an algorithm to search element in Binary Search Tree.                 | [L4][CO4] | <b>[6M]</b>  |
| <b>6</b>  | Write the algorithms for inserting elements into B+ Tree with example.                  | [L2][CO4] | <b>[12M]</b> |
| <b>7</b>  | List out various terminologies of tree. With example.                                   | [L1][CO4] | <b>[12M]</b> |
| <b>8</b>  | Construct Binary Search Tree for the following nodes 43, 10, 79, 90, 12, 54, 11, 9 & 50 | [L3][CO4] | <b>[12M]</b> |
| <b>9</b>  | Write the algorithms for deleting elements from B+ Tree with example.                   | [L4][CO4] | <b>[12M]</b> |
| <b>10</b> | <b>a)</b> Define Multiway Tree. What are the different Multiway trees?                  | [L1][CO4] | <b>[6M]</b>  |
|           | <b>b)</b> Differentiate B-Tree with B+ Tree.  | [L4][CO4] | <b>[6M]</b>  |

**UNIT –IV****SEARCHING AND SORTING**

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

## UNIT –V

## GRAPHS &amp; GRAPH ALGORITHMS

- 1 a) Define Graph. List out various graph operations? [L2][CO4] [4M]  
 b) What are the various applications and properties of Graphs? [L1][CO4] [8M]
- 2 a) Explain BFS Graph Traversal with an algorithm. [L2][CO4] [3M]  
 b) Explain BFS Graph traversal with steps for the following Graph. [L5][CO4] [9M]
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- 3 What is a Graph? Explain various Graph terminologies. [L4][CO4] [12M]
- 4 a) Explain DFS Graph Traversal with an algorithm. [L2][CO4] [3M]  
 b) Explain DFS Graph traversal with steps for the following Graph. [L5][CO4] [9M]
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- 5 a) What is minimum –cost spanning tree? [L1][CO4] [4M]  
 b) Discuss Prim’s algorithm with example. [L6][CO4] [8M]
- 6 a) Discuss how to represent Graph storage using Adjacency matrix. [L6][CO4] [7M]  
 b) Briefly explain about Adjacency List with example. [L2][CO4] [5M]
- 7 Explain Dijkstra’s algorithm with an example. [L4][CO4] [12M]
- 8 Explain about shortest path problem with an algorithm and example. [L2][CO4] [12M]
- 9 Explain in detail about various minimum cost spanning tree algorithms. [L4][CO4] [12M]
- 10 Discuss and compare various graph traversals. [L6][CO4] [12M]

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