



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

Siddharth Nagar, Narayanavanam 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**

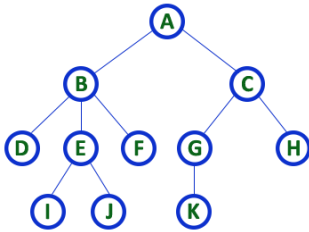
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|----|--|-----------|-------|
| 1 | a) What is an Algorithm? Explain its specifications. | [L1][CO1] | [6M] |
| | b) What are the steps required to find sum of two numbers. | [L1][CO1] | [6M] |
| 2 | a) What is a Data Structure? Explain its advantages. | [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
int square(int a) { return a*a; } | [L5][CO1] | [6M] |
| | b) What is time complexity? Evaluate time complexity for the following code
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. | [L3][CO1] | [6M] |
| | 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. | [L2][CO2] | [6M] |
| | b) Apply various operations that can perform on array. | [L3][CO2] | [6M] |
| 7 | a) Explain Linear and Non Linear Data structure with examples | [L2][CO1] | [6M] |
| | b) Differentiate linear and non-linear data structure. | [L4][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**

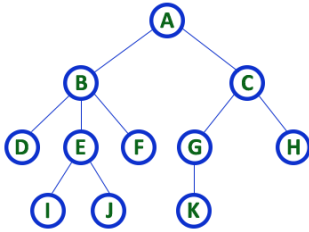
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|-----------|--|-----------|--------------|
| 1 | a) Prepare an algorithm to insert an element at the end of doubly linked list. | [L3][CO2] | [6M] |
| | b) Prepare an algorithm to delete an element at the end of doubly linked list. | [L3][CO2] | [6M] |
| 2 | Explain different ways for inserting an element into a Single Linked List with example. | [L2][CO2] | [12M] |
| 3 | Develop Circularly Linked List with various operations. | [L6][CO2] | [12M] |
| 4 | 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] |
| 5 | 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] |
| 6 | 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] |
| 7 | Develop various stack operations using arrays. With example | [L6][CO2] | [12M] |
| 8 | Develop various queue operations using arrays. With example | [L6][CO2] | [12M] |
| 9 | What is an expression? Explain various types of expressions with example. | [L2][CO2] | [12M] |
| 10 | 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
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graph TD
 A((A)) --- B((B))
 A --- C((C))
 B --- D((D))
 B --- E((E))
 C --- G((G))
 C --- H((H))
 E --- I((I))
 E --- J((J))
 G --- K((K))

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- 9 Identify the following terms from the given tree [L3][CO3] [12M]  
 i) Parent  
 ii) Child  
 iii) Siblings  
 iv) Path  
 v) Sub Tree
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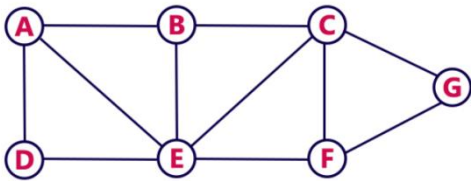
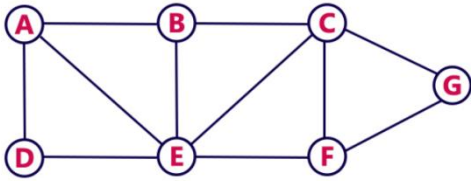
graph TD
  A((A)) --- B((B))
  A --- C((C))
  B --- D((D))
  B --- E((E))
  C --- G((G))
  C --- H((H))
  E --- I((I))
  E --- J((J))
  G --- K((K))
  
```
- 10 a) Prepare an algorithm to insert an element into B+ Tree. [L3][CO3] [6M]
 b) Prepare an algorithm to delete an element in B+ Tree. [L3][CO3] [6M]

UNIT –IV**SEARCHING AND SORTING**

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

UNIT –V

GRAPHS & GRAPH ALGORITHMS

- 1 a) Define Graph. List out various graph operations? [L1][CO5] [4M]
 b) What are the various applications and properties of Graphs? [L1][CO5] [8M]
- 2 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]
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- 3 What is a Graph? Explain various Graph terminologies. [L2][CO5] [12M]
- 4 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]
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- 5 a) What is minimum – cost spanning tree? [L1][CO5] [4M]
 b) Prepare an algorithm for Prim's with example. [L3][CO5] [8M]
- 6 a) Discuss how to represent Graph storage using Adjacency matrix. [L2][CO5] [7M]
 b) Briefly explain about Adjacency List with example. [L2][CO5] [5M]
- 7 Illustrate the steps for Dijkstra's algorithm with an example. [L3][CO5] [12M]
- 8 Explain about shortest path problem with an algorithm and example. [L2][CO5] [12M]
- 9 Explain in detail about various minimum cost spanning tree algorithms. [L2][CO5] [12M]
- 10 Discuss and compare various graph traversals. [L5][CO5] [12M]

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