**Course Code: 23CS0504** **R23**

**SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY:: PUTTUR**

Siddharth Nagar, Narayanavanam Road – 517583

**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code :** Data Structure(23CS0504) **Year &Sem:** I-B.Tech & II-Sem

**Course & Branch:** CSE(Common to All) Regulation: **R23**

## UNIT-I

## Introduction to Linear Data Structure

| | | | | |
|---|---|---|---|---|
| **1** | a) | What is a data structure? | [L1, CO1] | **[2M]** |
| | b) | Define ADT (Abstract Data Type). | [L1, CO1] | **[2M]** |
| | c) | Compare binary search and linear search techniques | [L2, CO1] | **[2M]** |
| | d) | What is the need of data structures? | [L2, CO1] | **[2M]** |
| | e) | List some common data structures | [L1, CO1] | **[2M]** |
| **2** | a) What do you mean by Searching? Explain sequential search. | | [L3,CO1] | **[5M]** |
| | b) Explain about binary search. | | [L2, CO1] | **[5M]** |
| **3** | a) How data structures are classified? | | [L6,CO1] | **[5M]** |
| | b) Differentiate linear and non-linear data structure. | | [L2, CO2] | **[5M]** |
| **4** | a) Define sorting. Explain any one sorting techniques? of sorting. | | [L1,CO1] | **[5M]** |
| | b) Define ADT (Abstract Data Type) Mention the advantages of ADT. | | [L4,CO1 | **[5M]** |
| **5** | Discuss the algorithm to sort the elements using Bubble sort. | | [L2,CO1] | **[10M]** |
| **6** | A | Sort the following numbers using Bubble sort : 14,33,27,35,10. | [L4,CO1] | **[5M]** |
| | B | Explain insertion sort with an example. | [L3,CO1] | **[5M]** |
| **7** | Sort the following numbers using selection sort : 45, 25, 10, 2, 9, 85, 102, 1 | | [L4,CO1] | **[10M]** |
| **8** | a) | Explain about Space Complexities. | [L2,CO1] | **[5M]** |
| | b) | Explain about Time Complexities. | [L2,CO1] | **[5M]** |
| **9** | Explain about classification of Data Structures | | [L2,CO1] | **[10M]** |
| **10** | A | Write a C program to sort the elements using bubble sort. | [L5,CO1] | **[5M]** |
| | B | Sort the following numbers using Insertion sort : 24,9,29,14.19,27,50,10,30 | [L4,CO1] | **[5M]** |
| **11** | A | Write a C program to sort the elements using selection sort. | [L5, CO1] | **[5M]** |
| | b) | Write a C program to sort the elements using insertions sort. | [L5, CO1] | **[5M]** |

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## UNIT-II
## Linked List

| | | | | |
|---|---|---|---|---|
| **1** | a) | What are the ways of implementing linked list? | [L1, CO2] | **[2M]** |
| | b) | What are the types of linked lists? | [L1, CO2] | **[2M]** |
| | c) | How the singly linked lists can be represented? | [L2, CO2] | **[2M]** |
| | d) | How the doubly linked list can be represented? | [L2, CO2] | **[2M]** |
| | e) | What are the advantages of linked list? | [L1, CO2] | **[2M]** |
| **2** | a) Explain the operations of singly linked lists. | | [L3, CO2] | **[5M]** |
| | b) What are the advantages of linked list? | | [L2, CO2] | **[5M]** |
| **3** | a) Explain the insertion operation in Single linked list. How nodes are inserted after a specified node | | [L6, CO2] | **[5M]** |
| | b) Illustrate the use of linked list. | | [L3, CO2] | **[5M]** |
| **4** | a) Explain the operations of doubly linked lists | | [L1, CO2] | **[5M]** |
| | b) Explain the operations of circularly linked lists. | | [L4, CO2] | **[5M]** |
| **5** | Explain the applications of linked lists in detail. | | [L2, CO2] | **[10M]** |
| **6** | a) | Advantages of Linked List over Array. | [L4, CO2] | **[5M]** |
| | b) | Explain Representation of linked list. | [L3, CO2] | **[5M]** |
| **7** | What is the draw backs of single linked list? Explain how to implement insert and traverse operations in circular linked list | | [L4, CO2] | **[10M]** |
| **8** | a) Create a Doubly linked list by inserting following elements in a list 13,45,23,20,25. | | [L6, CO2] | **[5M]** |
| | b) Write algorithm for insert and delete a node from doubly linked list. | | [L2, CO2] | **[5M]** |
| **9** | What is linked list? Write and explain the algorithm for crate, insertion and traverse operations in doubly linked list with example | | [L2, CO2] | **[10M]** |
| **10** | a) | Explain the circular linked list in detail. | [L5, CO2] | **[5M]** |
| | b) | List the advantages of circular linked list. | [L4, CO2] | **[5M]** |
| **11** | a) | Differentiate linked list and Array | [L2, CO2] | **[5M]** |
| | b) | Specify the use of Header node in a linked list. | [L2, CO2] | **[5M]** |

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## UNIT-III

## STACKS

| | | | | |
|---|---|---|---|---|
| **1** | a) | What are the various Operations performed on the Stack? | [L1, CO3] | **[2M]** |
| | b) | Define Stack. | [L1, CO3] | **[2M]** |
| | c) | Write the postfix form for the expression -A+B-C+D? | [L2, CO3] | **[2M]** |
| | d) | Give one example of a problem where backtracking algorithms are used | [L2, CO3] | **[2M]** |
| | e) | List any four applications of stack | [L1, CO3] | **[2M]** |
| **2** | Write an algorithm for Push and Pop operations on Stack using Arrays. | | [L3,CO3] | **[10M]** |
| **3** | Write an algorithm for Push and Pop operations on Stack using Linked list. | | [L6,CO3] | **[10M]** |
| **4** | Write an algorithm for converting an Infix to Postfix notation using stack. | | [L1,CO3] | **[5M]** |
| | Convert the following Infix into Postfix expression: A+(B*C)/D | | [L4,CO3] | **[5M]** |
| **5** | List the various operations that can be performed on stack? Explain with suitable example. | | [L2,CO3] | **[10M]** |
| **6** | a) | What do you mean by stack overflow and stack underflow? | [L4,CO3] | **[5M]** |
| | b) | List and explain the applications of stack | **[**L3,CO3] | **[5M]** |
| **7** | Discuss the use of stacks in backtracking algorithms, citing a problem like N-Queens or maze solving | | [L4,CO3] | **[10M]** |
| **8** | Explain how stacks are used in expression evaluation, specifically in converting infix to postfix notation. Provide an example. | | [L2,CO3] | **[10M]** |
| **9** | Investigate how stacks are used in backtracking algorithms. Give an example of a problem that can be solved using backtracking and explain how a stack helps in finding the solution. | | [L2,CO3] | **[10M]** |
| **10** | Describe how stacks can be made using arrays and linked lists. Explain how to add (push) and remove (pop) items from each type of stack. Discuss the benefits and drawbacks of using arrays versus linked lists for implementing stacks. | | [L5,CO3] | **[10M]** |
| **11** | Detail a stack-based algorithm for reversing a singly linked list. Analyze its time and space complexity. | | [L5, CO3] | **[10M]** |

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## UNIT-IV

## QUEUES AND DEQUES

| | | | | |
|---|---|---|---|---|
| 1 | a) | Define queue | **[L1,CO4]** | **[2M]** |
| | b) | Define priority queue | **[L1,CO4]** | **[2M]** |
| | c) | List the applications of queues | **[L1,CO5]** | **[2M]** |
| | d) | What is Deque | **[L1,CO4]** | **[2M]** |
| | e) | What are the types of queues | **[L1,CO4]** | **[2M]** |
| 2 | a) | Describe the properties of queues | **[L2,CO4]** | **[5M]** |
| | b) | Illustrate the operations on queues | **[L2,CO4]** | **[5M]** |
| 3 | | Describe the implementation of queues using arrays | **[L2,CO4]** | **[10M]** |
| 4 | | Represent the implementation of queues using linked lists | **[L2,CO5]** | **[10M]** |
| 5 | | Discuss the applications of queues in breadth first search | **[L2,CO4]** | **[10M]** |
| 6 | a) | Explain about scheduling | **[L2,CO4]** | **[5M]** |
| | b) | Discuss about Deques | **[L2,CO4]** | **[5M]** |
| 7 | a) | What are the operations on Deques | **[L1,CO4]** | **[5M]** |
| | b) | Explain the applications of Deques | **[L2,CO5]** | **[5M]** |
| 8 | a) | Define queue? Discuss about queue ADT? | **[L1,CO5]** | **[5M]** |
| | b) | Discuss about implementation of queues? | **[L2,CO4]** | **[5M]** |
| 9 | | What is circular queue? Discuss about circular queue in detail? | **[L2,CO4]** | **[10M]** |
| 10 | | Define queue.Explain Types of queues? | **[L2,CO4]** | **[10M]** |
| 11 | | Develop a program to simulate a simple printer queue system | **[L6,CO5]** | **[10M]** |

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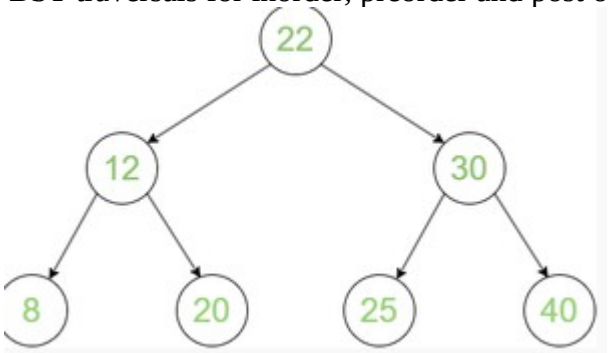
## UNIT-V

## TREES, HASHING AND HASH FUNCTION

| | | | | |
|---|---|---|---|---|
| 1 | a) | Define trees in data structure | **[L1,CO5]** | **[2M]** |
| | b) | What is Binary search tree | **[L1,CO5]** | **[2M]** |
| | c) | Define Graph. | **[L1,CO5]** | **[2M]** |
| | d) | List out types of Graph. | **[L1,CO5]** | **[2M]** |
| | e) | Give any Two Applications of Graph. | | **[2M]** |
| 2 | a) | Explain the Representation of Trees in data structure | **[L2,CO5]** | **[5M]** |
| | b) | Define Trees and explain types of trees with example | **[L1,CO5]** | **[5M]** |
| 3 | | Examine the operations of trees in data structures | **[L3,CO5]** | **[10M]** |
| 4 | | Examine the operations of binary search trees | **[L3,CO5]** | **[10M]** |
| 5 | a) | Classify BST traversals for inorder, preorder and post order.   | **[L4,CO5]** | **[5M]** |
| | b) | Explain BST traversals ? | **[L2,CO5]** | **[5M]** |
| 6 | a) | Create a C program for traversing BST | **[L6,CO5]** | **[5M]** |
| | b) | Create an algorithm for Binary search trees | **[L6,CO5]** | **[5M]** |
| 7 | a) | Examine Operations of AVL Tree? | **[L3,CO5]** | **[5M]** |
| | b) | Examine Rotations of AVL Tree? | **[L3,CO5]** | **[5M]** |
| 8 | a) | Discuss RR and LL Rotations in AVL Tree? | **[L2,CO5]** | **[5M]** |
| | b) | Describe Applications of Graphs? | **[L2,CO6]** | **[5M]** |
| 9 | a) | Define Graph and Explain Representation of Graph? | **[L2,CO6]** | **[5M]** |
| | b) | Explain Types of Graph? | **[L2,CO6]** | **[5M]** |
| 10 | | Explain Breadth First Traversal with Example? | **[L2,CO6]** | **[10M]** |
| 11 | | Explain Depth First Traversal with example? | **[L2,CO6]** | **[10M]** |

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**BITBANK (OBJECTIVE)**

**Subject with Code: Data Structures (23CS0504)** **Course & Branch**: CSE &Allied

**Year &Sem:** I-B.Tech & II-Sem **Regulation: R23**

# UNIT –I

1. What is the main characteristic of linear data structures? [ ]
   A) Elements are arranged sequentially B) Elements are arranged randomly
   C) Elements are arranged hierarchically D) Elements are arranged circularly

2. Why are linear data structures important? [ ]
   A) They offer simplicity in organization B) They are difficult to implement
   C) They require complex algorithms D) They are rarely used in programming

3. What defines linear data structures? [ ]
   A) Sequential organization B) Random access
   C) Complex arrangements D) Numerical values only

4. Which is an example of a linear data structure? [ ]
   A) Binary tree B) Hash table C) Stack D) Graph

5. What is an Abstract Data Type (ADT)? [ ]
   A) Concrete implementation B) Set of operations
   C) Programming language feature D) Space optimization

6. ADTs separate which two aspects? [ ]
   A) Time and space B) Implementation and interface
   C) Insertion and deletion D) Linear and non-linear

7. Example of an ADT? [ ]
   A) Linked list B) Priority queue C) Binary search tree D) Heap

8. What does O(n) denote in time complexity? [ ]
   A) Constant time B) Linear time C) Logarithmic time D) Exponential time

9. Linear data structures' time complexity? [ ]
   A) Constant B) Varying C) Logarithmic D) Irrelevant

10. Space complexity in linear data structures? [ ]
A) Memory required B) Time taken C) Element arrangement D) Algorithm efficiency

11. Common notation for time complexity? [ ]
A) O(n) B) Θ(n) C) Ω(n) D) All

12. What's O(n) in time complexity? [ ]
A) Best-case B) Worst-case C) Average-case D) Upper bound

13. Which operation typically has the highest time complexity in linear data structures? [ ]
A) Search B) Insertion C) Deletion D) Traversal

14. What does the notation Θ(n) represent in time complexity analysis? [ ]
A) Best-case time B) Worst-case time C) Average-case time D) Tight bound on time

15. Which linear data structure is best suited for implementing a Last-In-First-Out (LIFO) behavior? [ ]
A) Queue B) Stack C) Linked list D) Priority queue

16. What is the time complexity of searching for an element in an unsorted array, assuming worst-case scenari.. [ ]
A) O(1) B) O(log n) C) O(n) D) O(n^2)

17. Which linear data structure efficiently supports both insertion and deletion operations at the beginning and end? [ ]
A) Array b. Stack C) Queue D) Linked list

18. What is the primary purpose of using abstract data types? [ ]
A) To hide implementation details B) To make algorithms faster
C) To increase memory usage D) To improve user interface

19. In the above notation, which is not asymptotic notation [ ]
A) Bing – O(O) B) Big-Theta(Θ) C) Big-Omega(Ω) d) Big-n(n)

20. Which search technique involves scanning through each element until the target is found? [ ]
A) Linear search B) Binary search C) Bubble sort D) Insertion sort

21. What is the time complexity of linear search in the worst-case scenario? [ ]
A) O(1) B) O(log n) C) O(n) D) O(n^2)

22. Binary search can only be applied to which type of data structure? [ ]
A) Sorted arrays B) Unsorted arrays C) Linked lists D) Stacks

23. What is the time complexity of binary search? [ ]
A) O(1) B) O(log n) C) O(n) D) O(n^2)

24. Which sorting technique repeatedly steps through the list, compares adjacent elements, and swaps them if they are in the wrong order? [ ]
A) Bubble sort B) Selection sort C) Insertion sort D) Linear search

25. In bubble sort, what is the time complexity in the worst-case scenario? [ ]
A) O(1) B) O(log n) C) O(n) D) O(n^2)

26. Which sorting technique divides the input list into two parts: a sorted sublist and an unsorted sublist? [ ]
A) Bubble sort B) Selection sort C) Insertion sort D) Binary search

27. What is the time complexity of selection sort? [ ]
A).O(1) B) O(log n) C) O(n) D) O(n^2)

28. Which sorting technique is considered stable, meaning it does not change the relative order of equal elements [ ]
A) Bubble sort B) Selection sort C) Insertion sort D) Linear search

29. . In insertion sort, what is the time complexity in the worst-case scenario? [ ]

A) O(1) B) O(log n) C) O(n) D) O(n^2)

30. Linear search is efficient for: [ ]

A)Small data sets. B) Large data sets C) Sorted arrays D) Linked lists

31. . Binary search requires the elements to be: [ ]

A)Unsorted B) Sorted in descending order

C) Sorted in ascending order D) Randmly arranged

32. Bubble sort is an example of [ ]

A) Divide and conquer algorithm B) Greedy algorithm

B) Dynamic programming D) Comparison-based sorting algorithm

33. Selection sort repeatedly selects the: [ ]

A) Smallest element and places it at the beginning B) Largest element and places it at the beginning

C) Largest element and places it at the end D) Smallest element and places it atthe end

34. Insertion sort works by: [ ]

A) Swapping adjacent elements B) Dividing the list into sublists

C) Moving elements one at a time to their correct positions

D) Selecting the smallest element and placing it at the beginning

35. .In bubble sort, how many passes are required to sort an array of size n? [ ]

A) n B) n-1 C) 2n D) n^2

36. It performs two nested loops [ ]

A) It performs two nested loops B) It recursively divides the array

C) It randomly selects elements to swap D) It performs multiple comparisons beforeswapping

37. Insertion sort is considered efficient for [ ]

A) Large data sets B) Partially sorted arrays C) Randomly arranged elements

D) Arrays with unique elements only

38. Binary search is more efficient than linear search for large datasets because: [ ]

A) It requires fewer comparisons B) It always finds the element in the first attempt

C) It doesn't require the data to be sorted D) It has a time complexity of O(1)

40. Which sorting algorithm has the best time complexity in the average case? [ ]

A) Bubble sort B) Selection sort C) Insertion sort D) Quick sort

# UNIT –II

1. Which of the following is a correct representation of a singly linked list? [ ]A) [1, 2, 3, 4] B) (1) -> (2) -> (3) -> (4) C) {1, 2, 3, 4} D) <1, 2, 3, 4>
2. What operation is used to insert a new node at the beginning of a singly linked list? [ ]
   A) insertEnd() B) insertMiddle() C) insertBeginning() D) insertAfter()
3. Which type of linked list allows traversal in both forward and backward directions? [ ]
   A) Singly linked list B) Doubly linked list
   C) Circular linked list D) None of the above
4. In a doubly linked list, each node contains how many pointers? [ ]
   A) One b.Two C) Three D) Four
5. What operation is used to delete a node from the end of a doubly linked list? [ ]
   A) deleteEnd() B) deleteBeginning()
   C) deleteMiddle() D) deleteNode()
6. Circular linked lists are used for [ ]
   A) Implementing stacks B) Implementing queues
   C) Implementing hash tables D) All of the above
7. Which data structure allows constant time insertion and deletion at both ends? [ ]
   A) Arrays B) Singly linked lists C) Doubly linked lists D) Circular linked lists
8. Arrays have better_____access compared to linked lists [ ]
   A) Sequential B) Random C) Bi-directional D) None of the above
9. Which of the following is NOT an advantage of linked lists over arrays? [ ]
   A) Dynamic size B) Easy insertion and deletion
   C) Contiguous memory allocation D) None, all are advantages
10. Which application does NOT typically use linked lists? [ ]
    A) Browser history B) Undo functionality in text editors
    C) Implementing a matrix D) Music playlist management
11. How many pointers are required to implement a circular doubly linked list? [ ]
    A) 1 B) 2 C)3 D) 4
12. Which operation is used to insert a new node after a specific node in a doubly linked list? [ ]
    A) insertEnd() B) insertBeginning() C) insertAfter() D) insertBefore()
13. Which operation is used to access the last element in a singly linked list? [ ]
    A) getLast() B) getEnd() C) traverse() D) None of the above
14. What type of traversal is used to print the elements of a linked list? [ ]
    A) Depth-first B) Breadth-first C) In-order D) Linear
15. In a circular linked list, the last node points to the: [ ]
    A) First node B) Second node C) Null node D) None of the above
16. Which of the following operations cannot be performed efficiently on arrays? [ ]
    A) Insertion at the beginning B) Deletion at the end
    C) Searching for an element D) None of the above
17. Which of the following is a drawback of using linked lists? [ ]
    A) Wastage of memory B) Contiguous memory allocation C) Fixed size D) None of the above
18. Which of the following is NOT an application of a doubly linked list? [ ]
    A) Browser history B) Implementing a stack C) Implementing a queue D)Undo functionality in text editors

19. Which operation is used to delete a node from the middle of a singly linked list? [ ]

A) deleteBeginning() B) deleteEnd() C) deleteNode() D) deleteMiddle()

20. What is the time complexity for accessing an element in a linked list? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

21. Which of the following statements about circular linked lists is true? [ ]

A) They have a fixed size. B) They do not have a beginning or an enD)

C) They can be traversed only in one direction. D) They cannot be used to implement queues.

22. In a doubly linked list, how many pointers does each node have? [ ]A)

1 B) 2 C) 3 D) 4

23. Which operation is used to insert a new node at the end of a circular linked list? [ ]

A) insertBeginning() B) insertEnd() C) insertMiddle() D) insertAfter()

24. Which of the following operations on arrays can be performed in O(1) time? [ ]

A) Insertion at the end B) Deletion at the beginning

C) Accessing an element by index D) None of the above

25. Which of the following statements about linked lists is true? [ ]

A) They occupy contiguous memory. B) They allow for constant-time access to elements.

C) They have a fixed size. D) They are dynamic in size.

26. In a doubly linked list, how many pointers does the last node have? [ ]A)

1 B) 4 C) 3 D) 2

27. Which of the following is a disadvantage of using linked lists? [ ]

A) Efficient memory usage B) Random access

C) Sequential access D) Fixed size

28. Which of the following operations can be performed on a circular linked list? [ ]

A) Traversing from the beginning to the end B) Traversing from the end to the beginning.

C) Insertion at the end D) Deletion from the middle

29. Which data structure is most suitable for implementing a stack? [ ]

A) Array B) Singly linked list

C) Doubly linked list D) Circular linked list

30. Which operation is used to delete a node from the middle of a doubly linked list? [ ]

A) deleteBeginning() B) deleteEnd() C) deleteNode() D) deleteMiddle()

31. Which of the following is NOT a benefit of using linked lists? [ ]

A) Dynamic size B) Ease of insertion and deletion

C) Random access D) None of the above

32. Which type of linked list allows traversal only in one direction? [ ]

A) Singly linked list B) Doubly linked list

C) Circular linked list D) None of the above

33. Which of the following is an application of a circular linked list? [ ]

A) Implementing a stack B) Implementing a queue

C) Browser history D) Music playlistmanagement

34. Which operation is used to insert a new node before a specific node in a doubly linked list?[ ]

A) insertEnd() B) insertBeginning() C) insertAfter() D) insertBefore()

35. In a circular linked list, which node is considered the starting point? [ ]

A) First node B) Last node C) Middle node D)None of the above

36. Which of the following is a characteristic of arrays but not of linked lists? [ ]

A) Dynamic size B) Random access C) Ease of insertion and deletion D) None

37. Which operation is used to delete the last node from a circular linked list? [ ]

A) deleteBeginning() B) deleteEnd() C) deleteNode() D) None

38. Which data structure allows efficient insertion and deletion at any position? [ ]

A) Arrays B) Singly linked lists C) Doubly linked lists D) Circular linked lists

39. Which operation is used to delete the first node from a doubly linked list? [ ]

A) deleteBeginning() B) deleteEnd() C) deleteNode() D) None of the above

40. Which of the following is NOT an application of a singly linked list? [ ]

A) Undo functionality in text editors B) Browser history

C) Music playlist management D) Implementing a queue

## UNIT – III

1. What principle do stacks follow? [ ]

A) First In First Out (FIFO) B) Last In First Out (LIFO)

C) Last In Last Out (LILO) D) First In Last Out (FILO)

2. Which of the following is a primary operation on a stack? [ ]

A) Enqueue B) Dequeue C) Push D) Peek

3. What operation removes an item from the top of the stack? [ ]

A) Pop B) Push C) Peer D) Insert

4. How is a stack typically implemented using arrays? [ ]

A) Linked structure B) Dynamic resizing C) Fixed size D) Circular structure

5. What is the time complexity of the push and pop operations on a stack implemented using arrays? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

6. Which data structure can efficiently implement a stack with a dynamic size? [ ]

A) Array B) Linked List C) Tree D) Hash Table

7 . In a linked list implementation of a stack, where are new elements added? [ ]

A) Beginning of the list B) End of the list C) Middle of the list D) Random position

8. What is the time complexity of the push and pop operations on a stack implemented using linked lists? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

9. Which operation retrieves the top element of the stack without removing it? [ ]

A) Push B) Pop C) Peek D) Insert

10. What application uses stacks for evaluating mathematical expressions? [ ]

A) Searching algorithms B) Sorting algorithms C) Expression evaluation D) Memory allocation

11.In infix expression evaluation, which data structure is typically used? [ ]

A) Stack B) Queue C) Array D) Linked List

12. What algorithmic technique uses stacks for backtracking? [ ]

A) Greedy algorithms B) Divide and conquer C) Dynamic programming D) Backtracking

13. In backtracking, what operation is performed when reaching a dead end? [ ]

A) Push B) Pop C) Peek D) Delete

.14. Which operation reverses the order of elements in a stack? [ ]

A) Reverse B) Flip C) Pop D) Rotate

15. In reversing a list using a stack, what is the time complexity? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

16. What application uses stacks for maintaining function calls? [ ]

A) Memory allocation B) Function evaluation C) Backtracking D) Recursion

17. In recursive algorithms, what operation is used to return from a function call? [ ]

A) Push B) Pop C) Peek D) Return

18.Which operation is used to check if a stack is empty? [ ]

A) Empty B) Is Empty C) Check Empty D) Is Full

19. What is the result of popping from an empty stack? [ ]

A) Stack Underflow B) Stack Overflow C) Null D) Segmentation Fault

20. In postfix expression evaluation, which data structure is typically used? [ ]

A) Stack B) Queue C) Array D) Linked List

21. Which operation is used to add an element to the top of the stack without removing any existing elements? [ ]

A) Push B) Pop C) Peek D) Insert

22. What is the space complexity of a stack with n elements? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

23. What operation is used to remove all elements from a stack? [ ]

A) Clear B) Purge C) Empty D) Pop All

24. Which of the following is a disadvantage of using arrays to implement stacks? [ ]

A) Dynamic resizing B) Random access C) Fixed size D) Efficient push and pop

25. What is the primary use of stacks in the context of backtracking algorithms? [ ]

A) Storing intermediate results B) Sorting elements C) Searching elements D) Removing duplicates

26. In expression evaluation, what is the purpose of using a stack? [ ]

A) To store operators B) To store operands C) To store intermediate results D) To store parentheses

27. Which operation allows checking the element at the top of the stack without removing it? [ ]

A) Push B) Pop C) Peek D) Insert

28. What happens if an attempt is made to push an element onto a full stack? [ ]

A) Stack Underflow B) Stack Overflow C) Null D) Segmentation Fault

29. Which of the following applications does NOT typically involve the use of stacks? [ ]

A) Parsing expressions B) Recursion C) Queue management D) Undo functionality

30. What is the result of peeking into an empty stack? [ ]

A) Stack Underflow B) Stack Overflow C) Null D) Segmentation Fault

31. Which operation is used to remove all elements from a stack? [ ]

A) Empty B) Purge C) Clear D) Pop All

32. What data structure is commonly used in implementing undo functionality? [ ]

A) Stack B) Queue C) Linked List D) Tree

33. What is the primary use of stacks in the context of expression parsing? [ ]

A) Storing intermediate result B) Evaluating expressions

C) Storing parentheses D) Searching elements

34. In postfix expression evaluation, what is the role of a stack? [ ]

A) To store operators B) To store operands C) To store parentheses D) To store intermediate results

35. Which of the following operations on a stack has a time complexity of O(1)? [ ]

A) Push B) Pop C) Peek D) Clear

36. What is the main advantage of using linked lists to implement stacks? [ ]

A) Fixed size B) Dynamic resizing C) Random access D) Efficient push and pop

37. Which of the following is NOT a typical application of stacks? [ ]

A) Expression parsing B) Function call management C) Memory allocation D) Undo functionality

38. What operation is used to check if a stack is full? [ ]

A) Full B) Is Full C) Check Full D) Is Empty

39. What is the primary use of stacks in the context of function call management? [ ]

A) Storing intermediate results B) Evaluating expressions

C) Storing operands D) Storing function calls

40. In expression evaluation, what is the primary role of a stack? [ ]

A) To store operators B) To store operands

C) To store intermediate results D) To store parentheses

# UNIT – IV

1. What principle do queues follow? [ ]

A) Last In First Out (LIFO) B) First In First Out (FIFO)

C) Last In Last Out (LILO) D) First In Last Out (FILO)

2. Which of the following is a primary operation on a queue? [ ]

A) Push B) Pop C) En queue D) Peek

3. What operation removes an item from the front of the queue? [ ]

A) Pop B) Push C) De queue D) Insert

4 . How is a queue typically implemented using arrays? [ ]

A) Linked structure B) Circular structure C) Dynamic resizing D) Fixed size

5. What is the time complexity of the enqueue and dequeue operations on a queue implemented using arrays? [ ]

A) O(1) B) O(n) C) O(log n) D)O(n^2)

6. Which data structure can efficiently implement a queue with a dynamic size? [ ]

A) Array B) Linked List C) Tree D) Hash Table

7. In a linked list implementation of a queue, where are new elements added? [ ]

A) Beginning of the list B) End of the list C) Middle of the list D) Random position

8. What is the time complexity of the enqueue and dequeue operations on a queue implemented using linked lists? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

9. Which operation retrieves the front element of the queue without removing it? [ ]

A) Push B) Pop C) Peek D) Insert

10. What application uses queues for exploring nodes at the same level in a graph or tree? [ ]

A) Depth-First Search (DFS) B) Breadth-First Search (BFS)

C) Dijkstra's Algorithm D) Quick Sort

11. In BFS, what data structure is typically used? [ ]

A) Stack B) Queue C) Array D) Linked List

12. What is the main advantage of using linked lists to implement queues? [ ]

A) Fixed size B) Dynamic resizing C) Random access D) Efficient enqueue and dequeue

13. Which operation is used to add an element to the end of the queue without removing any existing elements? [ ]

A) Push B) Pop C) Enqueue D) Insert

14. What is the result of dequeuing from an empty queue? [ ]

A) Queue Underflow B) Queue Overflow C) Null D) Segmentation Fault

15. What application uses queues for managing tasks to be executed? [ ]

A) Searching algorithms B) Sorting algorithms C) Scheduling D) Memory allocation

16. In scheduling tasks, what data structure is typically used? [ ]

A) Stack B) Queue C) Arrays D) Linked List

17. Which operation is used to check if a queue is empty? [ ]

A) Empty B) IsEmpty C) CheckEmpty D) IsFull

18. What is the result of peeking into an empty queue? [ ]

A) Queue Underflow B) Queue Overflow C) Null D) Segmentation Fault

19. Which operation is used to remove all elements from a queue? [ ]

A) Clear B) Purge C) Empty D) DequeueAll

20. What data structure is commonly used in implementing task scheduling algorithms? [ ]

A) Stack B) Queue C) Linked List D) Tree

21. What is a deque? [ ]

A) Double-ended queue B) Dynamic queue C) Priority queue D) Circular queue

22. Which of the following operations are supported by deques? [ ]

A) Enqueue and dequeue B) Push and pop C) Insert and delete D) All of the above

23. . What is the result of popping from an empty deque? [ ]

A) Deque Underflow B) Deque Overflow C) Null D) Segmentation Fault

24. Which operation adds an element to the front of a deque? [ ]

A) Enqueue B) Dequeue C) PushFront D) PushBack

25. What application uses deques for maintaining a sliding window of elements? [ ]

A) Searching algorithms B) Sorting algorithms

C) Sliding window problems D) Memory allocation

26. Which operation removes an element from the back of a deque? [ ]

A) PopFront B) PopBack C) Dequeue D) Enqueue

27. In a deque, which end is typically considered the front? [ ]

A) Left end B) Right end C) Middle D) Both ends

28. What is the space complexity of a deque with n elements? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

29. What application uses deques for efficiently adding and removing elements from both ends? [ ]

A) Searching algorithms B) Sorting algorithms

C) Sliding window problems D) Memory allocation

30. Which operation retrieves the element at the front of a deque without removing it? [ ]

A) PeekFront B) PeekBack C) Peek D) PeekFirst

31. What is the time complexity of the pushFront and pushBack operations on a deque implemented using linked lists? [ ]

A) O(1) B) O(n) C) O(log n) D) O(n^2)

32. Which operation removes all elements from a deque? [ ]

A) Clear B) Purge C) Empty D) DequeueAll

33. What application uses deques for maintaining a collection of elements with efficient insertion and deletion at both ends? [ ]

A) Searching algorithms B) Sorting algorithms

C) Sliding window problems D) Memory allocation

34. What is the primary advantage of using deques over queues? [ ]

A) Faster insertion and deletion at both ends B) Lower space complexity

C) Simpler implementation D) Support for dynamic resizing

35. Which of the following is NOT a typical application of deques? [ ]

A) Sliding window problem B) Task scheduling

C) Implementation of stacks D) Expression parsing

36. In a deque, which operation adds an element to the back? [ ]

A) PushFront B) PushBack C) Enqueue D) Dequeue

37. What is the result of popping from an empty deque? [ ]

A) Deque Underflow B) Deque Overflow C) Null D) Segmentation Fault

38. Which of the following operations is NOT typically supported by deques? [ ]

A) PushFront B) PushBack C) Peer D) Pop

39. What is the result of peeking into an empty deque? [ ]

A) Deque Underflow B) Deque Overflow C) Null D) Segmentation Fault

40. Which of the following operations is NOT typically supported by deques? [ ]

A) PushFront B) PushBack C) Peek D) Pop

# UNIT –V

1. [ ]
   a. 2 B) any number of children C) 0 or 1 or 2 D) 0 or 1

2. [ ]
   a. $2^l$-1 B) l-1 C) l D) 21

3. [ ]
   a. Height B) Depth C) Length D) Width

4. [ ]
   a. Height B) Depth
   C) Length D) Width

5. [ ]
   a. h = O(loglogn) B) h = O(nlogn) C) h = O(n) D) h = O(log n

6. I n a full binary tree if number of internal nodes is I, then number of leaves L are? [ ]
   a. L = 2*I B) L = I + 1 C) L = I – 1 D) L = 2*I – 1

7. [ ]
   a. N = 2*I B) N = I + 1 C) N = I – 1 D) N = 2*I + 1

8. [ ]
   a. N = 2*L B) N = L + 1 C) N = L – 1 D) N = 2*L – 1

9. Which of the following traversing algorithm is not used to traverse in a tree?
   a. Post order b Pre order C) Post order D) Randomized

10. Level order traversal of a tree is formed with the help of [ ]
    a. breadth first search B) depth first search
    C) dijkstra's algorithm D) prims algorithm

11. What is the maximum number of children that a binary tree node can have? [ ]

a. 0 B) 1 C) 2 D) 3

12. How many common operations are performed in a binary tree? ? [ ]

a.1 B) 2 C) 3 D) 4

13. What is the traversal strategy used in the binary tree? [ ]

a. depth-first traversal B) breadth-first traversal

C) random traversal D) Priority traversal

14. How many orders of traversal are applicable to a binary tree (In General)? [ ]

a.1 B) 4 C) 2 D) 3

15. The average depth of a binary tree is given as? [ ]

a. O(N) B) O(√N) C) $O(N^2)$ D) O(log N)

16. If binary trees are represented in arrays, what formula can be used to calculate a left child, if the node has an index i? [ ]

a. 2i+1 B) 2i+2 C) 2i D) 4i

17. [ ]

a. (i+1)/2 B) (i-1)/2

C) i/2 D) 2i/2

18. Why we need to a binary tree which is height balanced? [ ]

a. to avoid formation of skew trees B) to save memory

C) to attain faster memory access D) to simplifystoring

1 9 . [ ]

a. p B) log(p) C) log(p)/2 D) p/2

20. What maximum difference in heights between the leafs of a AVL tree is possible? [ ]

a. log(n) where n is the number of nodes B) n where n is the number of nodes

C) 0 or 1 D) atmost 1

21. [ ]

a. (n*(n+1))/2 B) (n*(n-1))/2 C) n D) nformation given is insufficient

22. A connected planar graph having 6 vertices, 7 edges contains_____regions [ ]

a. 15 B) 3 C) 1 D) 1

23. If a simple graph G, contains n vertices and m edges, the number of edges in the Graph G'(Complte of G )is [ ]

a. (n*n-n-2*m)/2 B) (n*n+n+2*m)/2

C) (n*n-n-2*m)/2 D) (n*n-n+2*m)/2

24. Which of the following properties does a simple graph not hold? [ ]

a. Must be connected B) Must be unweighted C) Must have no loops or multiple edges D) Musthave no multiple edges

25. [ ]

a. 24 B) 21 C) 25 D) 16

26. For which of the following combinations of the degrees of vertices would the connected graph be eulerian? [ ]

a. 1,2,3 B) 2,3,4 C) 2,4,5 D) 1,3,5

27. [ ]

a. Multi Graph B) Regular Graph

C) Simple Graph Complete Graph

28. What is the maximum number of edges in an acyclic undirected graph with n vertices? [ ]

a. n-1 B) n C) n+1 D) 2n-1

29. An adjacency matrix representation of a graph cannot contain information of [ ]

a. Nodes B) Edges

C) Direction of Edges D) Parallel edges

30. If every node in a graph 'G' is adjacent to equal number of nodes, then the graph G is said to be [ ]

a. Regular B) Finite C) Complete D) Strongly Connected

31. Using the Cyclomatic complexity of a graph G having 13 vertices, 4 decision vertices, 1 connector, the number of edges in G is [ ]

a. 13 B) 9 C) 10 D) 8

32. The data structure required for Breadth First Traversal on a graph is [ ]
a. Queue B) array C) stack D) Tree

33. Consider an undirected graph G with 100 nodes. The maximum number of edges to be included in G so that the graph is not connected is
[ ]
a. 2451 B) 4851 C) 4950 D) 9801

34. A connected (all vertices have at least one neighbour), undirected graph of N vertices has (N-1) edges. Number of spanning tree that can be constructed are [ ]
a. 1 B) n C) n-1 D) n*(n-1)

35. The Data structure used in standard implementation of Breadth First Search is?
[ ]
a. Stack B) Queue
C) Linked List D) Tree

36. The Depth First Search traversal of a graph will result into?
[ ]
a. Linked list B) Tree C) Graph with back edge D) Array

37. In Depth First Search, how many times a node is visited? [ ]
a. Once B) Twice C) indegree of the node D) Thrice

38. A connected graph T without any cycles is called ..... [ ]
a. free graph B) no cycle graph
C) non cycle graph D) circular graph

39. A graph is a tree if and only if graph is…….
[ ]
a. Directed graph B) Contains no cycles
C) Planar d Completely connected

40. The number of edges in a complete graph of n vertices is…….
a. ) n(n+1)/2 b) n(n-1)/2 c) $n^2/2$ d) n