

# **S V COLLEGE OF ENGINEERING:: Tirupati**

## **DATA STRUCTURES**

### **UNIT -1**

- 1) Array is a group of elements of \_\_\_\_\_ [ b ]  
a) Different Data Types      b) Same Data Type      c) Both      d) None
- 2) Number of elements of two-dimension array of order 3 X 4 [ c ]  
a) 3      b) 4      c) 12      d) 7
- 3) The array name itself is a [ b ]  
a) Value      b) Base Address      c) Data Type      d) None
- 4). The correct initialization of two-dimensional array of order 3 X 2 is [ b ]  
a) `int A[3][2] = {{ 10,20,30}{40,50,60}}`      b) `int A[3][2] = {{ { 10,20},{30,40},{50,60}}`  
c) Both      d) None
- 5) Which of the following is a two-way list? [ c ]  
a. grounded header list  
b. circular header list  
c. linked list with header and trailer nodes  
d. none of the above
- 6) Which of the following statement is false? [ c ]  
a. Arrays are dense lists and static data structure  
b. data elements in a linked list need not be stored in adjacent space in memory  
c. pointers store the next data element of a list  
d. linked lists are a collection of the nodes that contain information part and next pointer
- 7) Two-dimensional arrays are also called [ c ]  
a. tables arrays  
b. matrix arrays  
c. both of above  
d. none of the above
- 8) Which of these best describes an array? [ b ]  
a) A data structure that shows a hierarchical behaviour  
b) Container of objects of similar types  
c) Arrays are immutable once initialised  
d) Array is not a data structure
- 9) How do you initialize an array ? [ c ]  
a) `intarr[3] = (1,2,3);`  
b) `intarr(3) = {1,2,3};`  
c) `intarr[3] = {1,2,3};`  
d) `intarr(3) = (1,2,3);`

10) What are the advantages of arrays? [ d ]

- a) Objects of mixed data types can be stored
- b) Elements in an array cannot be sorted
- c) Index of first element of an array is 1
- d) Easier to store elements of same data type

11. What are the disadvantages of arrays? [ b ]

- a) Data structure like queue or stack cannot be implemented
- b) There are chances of wastage of memory space if elements inserted in an array are lesser than the allocated size
- c) Index value of an array can be negative
- d) Elements are sequentially accessed

12. In general, the index of the first element in an array is \_\_\_\_\_ [ a ]

- a) 0
- b) -1
- c) 2
- d) 1

13. Elements in an array are accessed \_\_\_\_\_ [ b ]

- a) randomly
- b) sequentially
- c) exponentially
- d) logarithmically

14. A linear collection of data elements where the linear node is given by means of pointer is called? [ a ]

- a) Linked list
- b) Node list
- c) Primitive list
- d) Unordered list

15. n linked list each node contain minimum of two fields. One field is data field to store the data second field is? [ c ]

- a) Pointer to character
- b) Pointer to integer
- c) Pointer to node
- d) Node

16. What would be the asymptotic time complexity to add a node at the end of singly linked list, if the pointer is initially pointing to the head of the list? [ c ]

- a)  $O(1)$
- b)  $O(n)$
- c)  $\theta(n)$
- d)  $\theta(1)$

17. What would be the asymptotic time complexity to find an element in the linked list? [ b ]

- a)  $O(1)$
- b)  $O(n)$
- c)  $O(n^2)$
- d)  $O(\log n)$

18. What would be the asymptotic time complexity to insert an element at the second position in the linked list? [ a ]

- a)  $O(1)$
- b)  $O(n)$
- c)  $O(n^2)$
- d)  $O(n^3)$   $O(n^4)$

19. Consider the following definition in c programming language

[ a ]

```
struct node
{
    int data;
    struct node * next;
}
typedef struct node NODE;
NODE *ptr;
```

Which of the following c code is used to create new node?

- a) ptr = (NODE\*)malloc(sizeof(NODE));
- b) ptr = (NODE\*)malloc(NODE);
- c) ptr = (NODE\*)malloc(sizeof(NODE\*));
- d) ptr = (NODE)malloc(sizeof(NODE));

20. What differentiates a circular linked list from a normal linked list?

[ c ]

- a) You cannot have the 'next' pointer point to null in a circular linked list
- b) It is faster to traverse the circular linked list
- c) You may or may not have the 'next' pointer point to null in a circular linked list
- d) Head node is known in circular linked list

21. Which of the following is the asymptotic notation defined as  $f(n) = \Theta(g(n))$  iff  $c_1 \& c_2 \& n_0$  exist such that  $c_1 g(n) \leq f(n) \leq c_2 g(n) \forall n \geq n_0$ .

[ b ]

- a) O
- B)  $\Theta$
- C)  $\Omega$
- D) None

22. Which of the following are the components of Space Complexity [ d ]

- a) Instruction Space
- b) Data Space
- c) Environment Stack
- d) all

23. The elements of a matrix are stored on a row-by-row basis is called [ a ]

- a) Row-major order
- b) Column major order
- c) un-order
- d) none

24. The time complexity is the total time needed for [ c ]

- a) compiling the program
- b) executing the program
- c) compiling & executing the program
- d) none

25. Which of the following is the upper bound of the function  $f(n)$

[ b ]

- a)  $\Omega(f(n))$
- b)  $O(f(n))$
- c)  $\Theta(f(n))$
- d) all

26. Which of the following storage allocation strategy finds a suitable block whose size is closer to the size block size of request [ c ]

a) First-Fit allocation b) Worst-Fit allocation

c) Best-Fit Allocation d) Next-Fit Allocation

27. Asymptotic Notations are based on \_\_\_\_\_ [ a ]

a) Theory of approximation b) Theory of science

c) Theory of mathematics d) None

28. Which is not an example for memory allocation function in C? [ b ]

a) malloc() b) alloc() c) free() d) calloc()

29. Which of the following is the lower bound of the function  $f(n)$  [ a ]

a)  $\Omega(f(n))$  b)  $O(f(n))$  c)  $\Theta(f(n))$  d) all

30. Which of the following notation is used to represent average case performance: [ c ]

a)  $\Omega$  notation b)  $O$  notation c)  $\Theta$  notation d) none

31. A finite, ordered and collection of homogeneous data elements is called [ a ]

a) Array b) point c) Pointer d) none

32. In the worst case, the number of comparisons needed to search a singly linked list of length  $n$  for a given element is [ c ]

a)  $2n$  b)  $\log n/2$  c)  $n$  d)  $n/2$

33. Which of the following operations is not  $O(1)$  for an array of sorted data. You may assume that array elements are distinct. [ b ]

a) Find the  $i$ th largest element b) Delete an element

c) Find the  $i$ th smallest element d) All of the above

34. Consider an array consisting of -ve and +ve numbers. What would be the worst case time complexity of an algorithm to segregate the numbers having same sign altogether i.e all +ve on one side and then all -ve on the other ? [ a ]

a)  $O(n)$  b)  $O(\log n)$  c)  $O(n \log n)$  d)  $O(n^2)$

35. Which of the following correctly declares an array? [ a ]

a) datatype var[size]; b) var[size]; c) datatype var; d) none

## **UNIT -2**

1. Stack is a linear data structure which follows \_\_\_\_\_ [B]

A) FIFO B) LIFO C) Both D) None

2. Queue is a linear data structure which follows \_\_\_\_\_ [A]  
A) FIFO      B) LIFO      C) both      D) none

3. When element is deleted from the queue [C]  
A) Rear is incremented      B) Front is decremented  
C) Front is incremented      D) Rear is decremented

4. To evaluate the recursive function \_\_\_\_\_ Data Structure is used [B]  
A) Queue      B) Stack      C) Tree      D) Graph

5. What is the value of the postfix expression  $6\ 3\ 2\ 4\ +\ -\ *$ : [A]  
a) 1  
b) 40  
c) 74  
d) -18

6. Here is an infix expression:  $4 + 3*(6*3-12)$ . Suppose that we are using the usual stack algorithm to convert the expression from infix to postfix notation.

The maximum number of symbols that will appear on the stack AT ONE TIME during the conversion of this expression? [D]

a) 1      b) 2      c) 3      d) 4

7. The postfix form of the expression  $(A + B)*(C*D - E)*F / G$  is? [C]

a)  $AB + CD * E - FG /**$       b)  $AB + CD * E - F ** G /$   
c)  $AB + CD * E - * F * G /$       d)  $AB + CDE * - * F * G /$

8. The postfix form of  $A*B+C/D$  is? [B]

a)  $*AB/CD+$   
b)  $AB*CD/+$   
c)  $A*BC+/D$   
d)  $ABCD+/*$

9. Which data structure is needed to convert infix notation to postfix notation? [D]

a) Branch      b) Tree      c) Queue      d) Stack

10. The prefix form of an infix expression  $(p + q) - (r * t)$  is? [C]

a)  $+ pq - *rt$       b)  $- +pqr * t$       c)  $- +pq * rt$       d)  $- + * pqrt$

11. Convert the following infix expressions into its equivalent postfix expressions [A]

$(A + B \wedge D)/(E - F) + G$

a)  $(A B D \wedge + E F - / G +)$

b)  $(A B D + \wedge E F - / G +)$

c)  $(A B D \wedge + E F / - G +)$

d)  $(A B D E F + \wedge / - G +)$

12 Which of the following statement(s) about stack data structure is/are NOT correct?

- a) Linked List are used for implementing Stacks
- b) Top of the Stack always contain the new node
- c) Stack is the FIFO data structure
- d) Null link is present in the last node at the bottom of the stack

13. Which of the following statement(s) about stack data structure is/are NOT correct? [C]

- a) Linked List are used for implementing Stacks
- b) Top of the Stack always contain the new node
- c) Stack is the FIFO data structure
- d) Null link is present in the last node at the bottom of the stack

14. Consider the following operation performed on a stack of size 5. [A]

Push(1);

Pop();

Push(2);

Push(3);

Pop();

Push(4);

Pop();

Pop();

Push(5);

After the completion of all operation, the number of elements present in stack are

- a) 1
- b) 2
- c) 3
- d) 4

15. . Which of the following is not an inherent application of stack? [D]

- a) Reversing a string
- b) Evaluation of postfix expression
- c) Implementation of recursion
- d) Job scheduling

16) The type of expression in which operator succeeds its operands is? [C]

- a) Infix Expression
- b) Prefix Expression
- c) Postfix Expression
- d) Both Prefix and Postfix Expressions

17. If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, in what order will they be removed? [A]

- a) ABCD
- b) DCBA
- c) DCAB
- d) ABDC

18. A data structure in which elements can be inserted or deleted at/from both the ends but not in the middle is? [C]

- a) Queue
- b) Circular queue
- c) Dequeue
- d) Priority queue

19. The essential condition which is checked before insertion in a linked queue is? [B]

- a) Underflow
- b) Overflow
- c) Front value
- d) Rear value

20. Which of the following is true about linked list implementation of queue? [A]

- a) In push operation, if new nodes are inserted at the beginning of linked list, then in pop operation, nodes must be removed from end
- b) In push operation, if new nodes are inserted at the beginning, then in pop operation, nodes must be removed from the beginning
- c) In push operation, if new nodes are inserted at the end, then in pop operation, nodes must be removed from end
- d) In push operation, if new nodes are inserted at the end, then in pop operation, nodes must be removed from beginning

21. What is a dequeue? [A]

- a) A queue with insert/delete defined for both front and rear ends of the queue
- b) A queue implemented with a doubly linked list
- c) A queue implemented with both singly and doubly linked lists
- d) A queue with insert/delete defined for front side of the queue

22. How many stacks are required for applying evaluation of infix expression algorithm? [B]

- a) one
- b) two
- c) three
- d) four

23. Which of the following statement is incorrect with respect to evaluation of infix expression algorithm? [B]

- a) Operand is pushed on to the stack

- b) If the precedence of operator is higher, pop two operands and evaluate
- c) If the precedence of operator is lower, pop two operands and evaluate
- d) The result is pushed on to the operand stack

24. Evaluation of infix expression is done based on precedence of operators. [A]

- a) True
- b) False

25. Of the following choices, which operator has the lowest precedence? [d]

- a) ^
- b) +
- c) /
- d) #

26. Which indicates stack overflow if stack size is max & stack variable is top [b]

- a)  $\text{top} == -1$
- b)  $\text{top} == \text{max}$
- c)  $\text{top} == 0$
- d) none

27. Which of the following are the applications of the stack [d]

- a) Balancing symbols
- b) converting infix to postfix
- c) evaluating post fix
- d) all

28. Insertion will take place in a queue at \_\_\_\_\_ [a]

- a) rear
- b) front
- c) top
- d) none

29. The TOP pointer in the stack is used to point always the \_ [a]

- a) Top element
- b) Middle element
- c) bottom element
- d) none

30. The operator comes in between the operands is called \_\_\_ Expression [c]

- a) Pre-fix
- b) post-fix
- c) in-fix
- d) no fix

31. The post-fix expression of  $(A+B)*C-D$  is [b]

- a)  $ABCD+*-$
- b)  $AB+C*D-$
- c)  $AB+*CD-$
- d)  $ABC+D*-$

32. The value of the expression  $2+3*5/3-1$  is [a]

- a) 6
- b) 10
- c) 16
- d) 22

33. Queue delete the element from the \_\_\_\_\_ [b]

- a) front
- b) Rear
- c) both a & b
- d) none

34. Which of the following data structure allows insertion and deletion of element from both the ends [c]

- a) Stack
- b) queue
- c) Deque
- d) Circular Queue

35. Allocation of more than one key value in one location in the hash table is called [b]



- a) Mapping              b) collision              c) queing      d) all
36. which of the following states represent Queue full status              [ b ]
- a) FRONT=0 , REAR=0    b) FRONT=1, REAR=N
- c) FRONT=N, REAR=N    d) FRONT=1, REAR=1
37. N elements Stack overflow condition is              [ c ]
- a) TOP = -1              b) TOP = 0    c) TOP = N    d) TOP = 1
38. Stack can be implemented using              [ c ]
- a) One Dimensional array              b) Single linked list
- c) both a & b                              d) none

### UNIT-III

- 1) If all the nodes except leaf nodes in the binary tree have maximum number of possible nodes then the binary tree is called              [ b ]
- a) Partial binary tree                      b) Complete binary tree
- c) normal tree                              d) not a binary tree
- 2) A skew binary tree is a tree having\_\_\_\_\_              [ c ]
- a) two path    b) minimum one path              c) only one path              d) no path
- 3) In a binary tree, the maximum number of nodes on level L              [ d ]
- a)  $2^L$                       b)  $2/L$               c)  $2+L$               d)  $2^L$
- 4) Which traversal of tree visit **left** subtree, then right subtree & finally root              [ b ]
- a) inorder                      b) postorder                      c) preorder                      d) all
- 5) In a linked representation of a binary tree, if there are n number of nodes then the number of null links are              [ c ]
- a) n                              b) n-1                              c) n+1                              d) n+2
- 6) Which traversal of tree visit root , **left** subtree, then finally right subtree              [ c ]

- a) inorder                      b) postorder                      c) preorder                      d) all

7) Which of the following is false about a binary search tree? [ d ]

- a) The left child is always lesser than its parent
- b) The right child is always greater than its parent
- c) The left and right sub-trees should also be binary search trees
- d) In order sequence gives decreasing order of elements

8) What is the speciality about the inorder traversal of a binary search tree?

[ b ]

- a) It traverses in a non increasing order
- b) It traverses in an increasing order
- c) It traverses in a random fashion
- d) It traverses based on priority of the node

9) What are the worst case and average case complexities of a binary search tree? [ d ]

- a)  $O(n)$ ,  $O(n)$    b)  $O(\log n)$ ,  $O(\log n)$    c)  $O(\log n)$ ,  $O(n)$    d)  $O(n)$ ,  $O(\log n)$

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

- a)  $\log(n)$  where  $n$  is the number of nodes
- b)  $n$  where  $n$  is the number of nodes
- c) 0 or 1
- d) at most 1

11) What is the maximum height of an AVL tree with  $p$  nodes? [ b ]

- a)  $p$    b)  $\log(p)$    c)  $\log(p)/2$    d)  $p/2$

12) Which of the following is the most widely used external memory data structure? [ b ]

- a) AVL tree   b) B-tree   c) Red-black tree   d) Both AVL tree and Red-black tree

13) B-tree of order  $n$  is a order- $n$  multiway tree in which each non-root node contains \_\_\_\_\_ [ d ]

- a) at most  $(n - 1)/2$  keys
- b) exact  $(n - 1)/2$  keys
- c) at least  $2n$  keys
- d) at least  $(n - 1)/2$  keys

14) A B-tree of order 4 and of height 3 will have a maximum of \_ keys. [a]

- a) 255      b) 63                      c) 127                      d) 188

15) B-tree and AVL tree have the same worst case time complexity for insertion and deletion. [a]

- a) True      b) False

16) The maximum number of nodes that is possible in a path from root node to a leaf node called the \_\_\_\_\_ of a tree [c]

- a) length      b) depth      c) height      d) order

17) The immediate predecessor of a node in a tree is \_\_\_\_\_ [a]

- a) parent      b) child      c) sibling      d) grand parent

18) The maximum number of nodes possible in a binary tree of height  $h$  is [b]

- a)  $2^{h+1}$       b)  $2^h - 1$       c)  $2^h$       d)  $2^{h-1}$

19) External node of a tree is called as \_\_\_\_\_ [d]

- a) root      b) leaf node      c) terminal node      d) b & c

20) A binary tree is a \_\_\_\_\_ if it contains the maximum possible no. of nodes at all levels. [d]

- a) Partial binary tree      b) Complete binary tree  
c) normal tree      d) full binary tree

21) A graph can be represented as [c]

- a) set representation      b) Linked representation  
c) Sequential representation      d) all

22) a vertex is isolated if there is \_\_\_\_\_ connected from any other vertex [a]

- a) no edge      b) one edge      c) two edges      d) 3 edges

23) How many undirected graphs (not necessarily connected) can be constructed out of a given set  $V = \{V_1, V_2, \dots, V_n\}$  of  $n$  vertices? [d]

- a)  $n(n-1)/2$       b)  $2^n$       c)  $n!$       d)  $2^{n(n-1)/2}$

24) Given an undirected graph  $G$  with  $V$  vertices and  $E$  edges, the sum of the degrees of all vertices is [ b ]

- A)  $E$       b)  $2E$       c)  $V$       d)  $2V$

25) What is the maximum number of edges in an acyclic undirected graph with  $n$  vertices? [ a ]

- a)  $n-1$       b)  $n$       c)  $2n+1$       d)  $2n-1$

26) Let  $G$  be a simple graph with 20 vertices and 8 components. If we delete a vertex in  $G$ , then number of components in  $G$  should lie between \_\_\_\_\_. [ c ]

- a) 8,20      b) 8,19      c) 7,19      d) 7,20

27) Which of the following data structure is useful in traversing a given graph by breadth first search? [ c ]

- a) stack      b) list      c) queue      d) all

28) Which of the following data structure is useful in traversing a given graph by depth first search? [ a ]

- a) stack      b) list      c) queue      d) all

29) What is the worst case time complexity for search, insert and delete operations in a general Binary Search Tree? [ a ]

- a)  $O(n)$  for all      b)  $O(\log n)$  for all  
c)  $O(\log n)$  for search and insert, and  $O(n)$  for delete  
d)  $O(\log n)$  for search, and  $O(n)$  for insert and delete

30) How many distinct binary search trees can be created out of 4 distinct keys? [ b ]

- a) 4      b) 14      c) 24      d) 40

31) Which of the following traversal outputs the data in sorted order in a BST? [ c ]

- a) pre order      b) post order      c) in order      d) level order

32) What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. [ b ]

- a) 2              b) 3              c) 4              d) 7

33) Which of the following is a self-adjusting or self-balancing Binary Search Tree [ d ]

- a) splay tree              b) AVL tree              c) Red Black tree      d) all

34) What is common in three different types of traversals (Inorder, Preorder and Postorder)? [ b ]

- a) Root is visited before right subtree  
b) Left subtree is always visited before right subtree  
c) Root is visited after left subtree  
d) All of the above

35) Which traversal of tree resembles the breadth first search of the graph? [ d ]

- a) pre order              b) post order              c) in order              d) level order

36) Which of the following tree traversal uses a queue data structure? [ d ]

- a) pre order              b) post order              c) in order              d) level order

37) The array representation of a complete binary tree contains the data in sorted order. Which traversal of the tree will produce the data in sorted form? [ b ]

- a) pre order              b) level order              c) in order              d) post order

38) Level order traversal of a rooted tree can be done by starting from the root and performing [ d ]

- a) preorder      b) in order              c) DFS              d) BFS

#### Unit 4:

1. Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this: [ A ]

2 5 1 7 9 12 11 10

Which statement is correct?

- A) The pivot could be either the 7 or the 9.
- B) The pivot could be the 7, but it is not the 9
- C) The pivot is not the 7, but it could be the 9
- D) Neither the 7 nor the 9 is the pivot.

2. Which of the following is a stable sorting algorithm? [A]

- A) Merge sort
- B) Heap sort
- C) Selection sort
- D) Typical in-place quick sort

3. Which of the following is not a non comparison sort? [D]

- A) Counting sort
- B) Bucket sort
- C) Radix sort
- D) Shell Sort

4. Time complexity of heap sort in worst case is: [C]

- A)  $O(\log n)$
- B)  $O(n)$
- C)  $O(n \log n)$
- D)  $O(n^2)$

5. Time complexity of bubble sort in best case is [A]

- A)  $\theta(n)$
- B)  $\theta(n \log n)$
- C)  $\theta(n^2)$

D)  $\theta(n(\log n)^2)$

6. Which of the following algorithm design technique is used in the quick sort algorithm?[c]

- a) Dynamic programming
- b) Backtracking
- c) Divide-and-conquer
- d) Greedy method

7. In the following scenarios, when will you use selection sort? [c]

- a) The input is already sorted
- b) A large file has to be sorted
- c) Large values need to be sorted with small keys
- d) Small values need to be sorted with large keys

8. The given array is  $arr = \{3,4,5,2,1\}$ . The number of iterations in bubble sort and selection sort respectively are, [a]

- a) 5 and 4
- b) 4 and 5
- c) 2 and 4
- d) 2 and 5

9. The complexity of sorting algorithm measures the ..... as a function of the number  $n$  of items to be sorted. [B]

- A) average time
- B) running time
- C) average-case complexity
- D) case-complexity

10. State True or False for internal sorting algorithms. [B]

- i) Internal sorting are applied when the entire collection of data to be sorted is small enough that the sorting can take place within main memory.
- ii) The time required to read or write is considered to be significant in evaluating the performance of internal sorting.

- A) i-True, ii-True
- B) i-True, ii-False
- C) i-False, ii-True
- D) i-False, ii-False

11. .... is putting an element in the appropriate place in a sorted list yields a larger sorted order list. [A]

- A) Insertion
- B) Extraction
- C) Selection
- D) Distribution

12. .... is rearranging pairs of elements which are out of order, until no such pairs remain. [B]

- A) Insertion
- B) Exchange
- C) Selection
- D) Distribution

13. The given array is  $arr = \{1, 2, 4, 3\}$ . Bubble sort is used to sort the array elements. How many iterations will be done to sort the array? [A]

- A) 4
- B) 2
- C) 1
- D) 0

14. Which of the following sorting algorithms is the fastest? [B]

- A) Merge sort
- B) Quick sort
- C) Insertion sort
- D) Shell sort

15. Which of the following methods is the most effective for picking the pivot element?[C]

- A) first element
- B) last element
- C) median-of-three partitioning
- D) random element

16. Find the pivot element from the given input using median-of-three partitioning method.  
8, 1, 4, 9, 6, 3, 5, 2, 7, 0. [D]

- A) 8
- B) 7
- C) 9
- D) 6

17. What is the other name for a shell sort algorithm? [A]

- A) Diminishing increment sort
- B) Diminishing decrement sort
- C) Insertion sort
- D) Selection sort

18. What is the general form of Shell's increments? [B]

- A)  $1, 2, 3, \dots, n$
- B)  $1, 3, 7, \dots, 2k-1$
- C)  $1, 3, 5, 7, \dots, k-1$
- D)  $1, 5, 10, 15, \dots, k-1$



19. Shell sort is an improvement on \_\_\_\_ [A]

- A) insertion sort  
B) selection sort  
C) binary tree sort  
D) quick sort

20. If the number of records to be sorted is small, then ..... sorting can be efficient. [ C ]

- A) Merge  
B) Heap  
C) Selection  
D) Bubble

21. All internal sorting techniques are based on the following principles [ c ]

- a) sorting by comparison                      b) sorting by distribution  
c) both a & b                                      d) none

22. Which of the following sorting technique is exchange sort technique [ d ]

- a) Bubble sort      b) Shell sort      c) Quick sort      d) all

23.  $A[\text{Parent}(i)] \geq A[i]$  for all nodes  $i$  except the root node, is the property of **[ a ]**

- a) Max Heap      b) Min Heap    c) Tree      d) Graph

24. The worst case time complexity of straight selection sorting algorithm is [ b ]

- a)  $T(n)=O(n)$       b)  $T(n)=O(n^2)$     c)  $T(n)=O(n\log_2 n)$     d) none

25. Maximum number of recursive calls used by Quick sort to sort n elements is [ a ]

- a)  $2n-1$                       b)  $2n$                       c)  $n$                       d)  $n+1$

26. Average case time complexity of Quick sort is [ a ]

- a)  $T(n) = O(n \log_2 n)$     b)  $T(n) = O(n^2)$     c)  $T(n) = O(n)$     d)  $T(n) = O(n+1)$

27. Best case time complexity of Bubble sort is [ b ]

- a)  $T(n) = O(n \log_2 n)$     b)  $T(n) = O(n^2)$     c)  $T(n) = O(n^3)$     d)  $T(n) = O(n+1)$

28. Which of the following sorting algorithm uses sorting by comparison principle [ d ]

- a) Insertion sort      b) Exchange sort      c) Selection sort d) All

29. Worst case time complexity of Binary Insertion sort is [ b ]

- a)  $T(n) = O(n \log_2 n)$     b)  $T(n) = O(n^2)$     c)  $T(n) = O(n^3)$     d)  $T(n) = O(n+1)$

30. Best case time complexity of List Insertion sort is [ d ]

- a)  $T(n) = O(n \log_2 n)$     b)  $T(n) = O(n^2)$     c)  $T(n) = O(n^3)$     d)  $T(n) = O(n)$

31) Distribution of items is based on which of the following? [ d ]

- a) Hashing      b) counting      c) radix      d) all

32. selection sort uses \_\_\_ and \_\_\_ as basic operations [c]  
 a) select    b) swap    c) both a&b d) none
33. A \_\_\_\_\_ is a complete binary tree and sorted in an array [a]  
 a) heap tree b) BST    c) AVL tree d) B-tree
34. The worst case time complexity of Shell sort is [b]  
 a)  $T(n)=O(n\log_2 n)$     b)  $T(n)=O(n^2)$     c)  $T(n)=O(n^3)$     d)  $T(n)=O(n+1)$
35. Worst case complexity of Straight selection Sort is [a]  
 a)  $T(n)=O(n\log_2 n)$     b)  $T(n)=O(n^2)$     c)  $T(n)=O(n^3)$     d)  $T(n)=O(n+1)$
36. Best case complexity of Tree selection Sort is [a]  
 a)  $T(n)=O(n\log_2 n)$     b)  $T(n)=O(n^2)$     c)  $T(n)=O(n^3)$     d)  $T(n)=O(n+1)$
37. Minimum number of recursive calls used by Quick sort to sort n elements is n [a]  
 a) true    b) false    c) depends on elements    d) depends on algorithm
38. Bucket sort belongs to sorting by [b]  
 a) selection    b) distribution    c) insertion    d) exchange
39. Heap sort is the example of sorting by selection [a]  
 a) selection    b) distribution    c) insertion    d) exchange
40. Merge sort is the example of sorting by selection [a]  
 a) external    b) distribution    c) insertion    d) exchange

### **Unit 5:**

1. Where is linear searching used? [d]  
 a) When the list has only a few elements  
 b) When performing a single search in an unordered list  
 c) Used all the time  
 d) When the list has only a few elements and When performing a single search in an unordered list
2. What is the best case for linear search? [d]  
 a)  $O(n\log n)$   
 b)  $O(\log n)$   
 c)  $O(n)$   
 d)  $O(1)$

3. Which of the following is not an application of binary search? [d]
- a) To find the lower/upper bound in an ordered sequence
  - b) Union of intervals
  - c) Debugging
  - d) To search in unordered list
4. Given an array  $arr = \{5, 6, 77, 88, 99\}$  and  $key = 88$ ; How many iterations are done until the element is found? [d]
- a) 1
  - b) 3
  - c) 4
  - d) 2
5. In the sequential search, we start searching for the target at the beginning of the list and continue until we find the target. [a]
- a) True
  - b) False
6. What is a hash table? [b]
- a) A structure that maps values to keys
  - b) A structure that maps keys to values
  - c) A structure used for storage
  - d) A structure used to implement stack and queue
7. If several elements are competing for the same bucket in the hash table, what is it called? [c]
- a) Diffusion
  - b) Replication
  - c) Collision
  - d) Duplication
8. What is the load factor? [c]
- a) Average array size
  - b) Average key size
  - c) Average chain length
  - d) Average hash table length
9. What is simple uniform hashing? [a]
- a) Every element has equal probability of hashing into any of the slots
  - b) A weighted probabilistic method is used to hash elements into the slots
  - c) Elements has Random probability of hashing into array slots
  - d) Elements are hashed based on priority
10. What data organization method is used in hash tables? [c]
- a) Stack
  - b) Array
  - c) Linked list
  - d) Queue

11. Which of the following is not a collision resolution technique? [d]

- a) Separate chaining
- b) Linear probing
- c) Quadratic probing
- d) Hashing

12. In a hash table of size 10, where is element 7 placed? [b]

- a) 6
- b) 7
- c) 17
- d) 16

13. What should be the load factor for separate chaining hashing? [b]

- a) 0.5
- b) 1
- c) 1.5
- d) 2

14. Which of the following operations are done in a hash table? [c]

- a) Insert only
- b) Search only
- c) Insert and search
- d) Replace

15. Which of the following is the hashing function for separate chaining? [c]

- a)  $H(x) = (\text{hash}(x) + f(i)) \bmod \text{table size}$
- b)  $H(x) = \text{hash}(x) + i \bmod \text{table size}$
- c)  $H(x) = x \bmod \text{table size}$
- d)  $H(x) = x \bmod (\text{table size} * 2)$

16. Which of the following is a disadvantage of using separate chaining using linked lists? [a]

- a) It requires many pointers
- b) It requires linked lists
- c) It uses array
- d) It does not resolve collision

17. From the given table, find '?'. [c]

Given:  $\text{hash}(x) = x \bmod 10$

0	
1	
2	→ ?
3	
4	

- a) 13
- b) 16

- c) 12
- d) 14

18. Which of the following technique stores data in the hash table itself in case of a collision? [a]

- a) Open addressing
- b) Chaining using linked list
- c) Chaining using doubly linked list
- d) Chaining using binary tree

19. Collision is caused due to the presence of two keys having the same value. [a]

- a) True
- b) False

20. In open addressing the hash table can never become full. [b]

- a) True
- b) False

21. Best case time complexity of Linear search is [ d ]

- a)  $T(n)=O(n)$
- b)  $T(n)=O(n^2)$
- c)  $T(n)=O(n^3)$
- d)  $T(n)=O(1)$

22. Worst case time complexity of an unsuccessful Binary search is [ a ]

- a)  $T(n)=O(\log n)$
- b)  $T(n)=O(n^2)$
- c)  $T(n)=O(n^3)$
- d)  $T(n)=O(n)$

23. In case of successful search, worst case time complexity of linear search with array is [ a ]

- a)  $O(n)$
- b)  $O(1)$
- c)  $O(\log n)$
- d) all

24. If the target element is the  $k^{\text{th}}$  element in the list, then the best case time complexity of Linear search is [ c ]

- a)  $k+1$
- b)  $k-1$
- c)  $k$
- d) 5

25. Average case time complexity of linear search in unsuccessful case is [ a ]

- a)  $O(n)$
- b)  $O(1)$
- c)  $O(\log n)$
- d) all

26. Interval between probes in linear probing are [ a ]

- a) Fixed
- b) not fixed
- c) no interval
- d)  $n$

27. The hash function in the division method is [ a ]

- a)  $h(x)=x \bmod M$
- b)  $h(x)=x \div M$
- c)  $h(x)=x + M$
- d) none

28. A hash function is any function that can be used to map data of arbitrary size to data of \_\_\_\_\_ [ a ]

- a) Fixed size
- b) Variable size
- c) Semi Variable size
- d) all

29. In which of the Hash implementation, we can fill only one value in one slot [ a ]

- a) In Array                      b) linked list    c) Both a & b    d) none

30. A special field by which each record can be uniquely identified is called the [ a ]

- a) key field                      b) non-key field                      c) constant                      d) none

31. The fundamental operation of a computer is \_\_\_\_\_ [ c ]

- a) Information storage                      b) Information Retrieval

- c) a & b    d) none

32. Group of files is called a [ b ]

- a) frame                      b) database                      c) list                      d) tree

33. If the key does not exist, then the number of comparisons needed by linear search algorithm are [ d ]

- a)  $T(n) = O(\log n)$                       b)  $T(n) = O(n^2)$     c)  $T(n) = O(n^3)$     d)  $T(n) = O(n)$

34. We will consider the Decision tree for analyzing the complexity of [ b ]

- a) linear search                      b) binary search                      c) both                      d) none

35. Best case time complexity of Binary search in case of unsuccessful search is [ a ]

- a)  $T(n) = O(\log_2 n)$                       b)  $T(n) = O(n^2)$     c)  $T(n) = O(n^3)$     d)  $T(n) = O(n)$