CODERS LODGE

DATA STRUCTURE

IMPORTANT MCQ QUESTIONS

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1. **Each Node contain minimum two fields one field called data field to store data. Another field is of type __________.**
   a. Pointer to Character
   b. Pointer to Node
   c. Pointer to an Integer
   d. Pointer to Class

2. **In a circular linked list**
   a. Components are all linked together in some sequential manner.
   b. There is no beginning and no end.
   c. Components are arranged hierarchically.
   d. Forward and backward traversal within the list is permitted.

3. **A Linear Collection of Data Elements Where the Linear Node Is Given by Means of Pointer Is Called __________**
   a. Graph
   b. Array
   c. Linked List
   d. All of the above

4. Each node in a linked list has two pairs of ………….. and ……………….

   a. Link field and information field
   b. Link field and avail field
   c. Avail field and information field
   d. Address field and link field

5. **………… is very useful in situation when data have to stored and then retrieved in reverse order.**
   a. Stack
   b. Queue
   c. List
   d. Link list

6. **Which of the following is true in case of a null pointer?**
   a. Marks the end of a node.
   b. Is equal to '\0' in C.
   c. Is the address of some node.
   d. is also called the void pointer in C.

7. **Which of the following case does not exist in complexity theory?**
   a) Best case
   b) Worst case
   c) Average case
   d) Null case

8. **Two dimensional arrays are also called**
   A. tables arrays
   B. matrix arrays
   C. both of above
   D. none of above

9. The average case occurs in the Linear Search Algorithm when:

a. The item to be searched is in some where middle of the Array

b. The item to be searched is not in the array

c. The item to be searched is in the last of the array

d. The item to be searched is either in the last or not in the array

10. The operation of processing each element in the list is known as

a. Sorting

b. Merging

c. Inserting

d. Traversal

11. Which of the following sorting algorithm is of divide-and-conquer type?

a. Bubble sort

b. Insertion sort

c. Quick sort

d. All of above

12. The memory address of the first element of an array is called

a. base address

b. floor address

c. foundation address

d. first address

13. **Linear arrays are also called ……………….**
    a. Straight line array
    b. One-dimensional array
    c. Vertical array
    d. Horizontal array

14. **Arrays are best data structures**
    a. for relatively permanent collections of data
    b. for the size of the structure and the data in the structure are constantly changing
    c. for both of above situation
    d. for none of above situation

15. **The space factor when determining the efficiency of algorithm is measured by**
    a. Counting the maximum memory needed by the algorithm
    b. Counting the minimum memory needed by the algorithm
    c. Counting the average memory needed by the algorithm
    d. Counting the maximum disk space needed by the algorithm

16. **Which of the following best describes sorting?**
    a. Adding a new record to the data structure
    b. Arranging the data (record) in some given order
    c. Finding the location of the record with a given key
    d. Accessing and processing each record exactly once

17. A doubly linked list performs traversal in __________.

a. Any direction
b. Circular direction
c. Either direction
d. None of the above

18. The smallest element of an array's index is called its

a. lower bound
b. upper bound
c. range
d. extraction

19. Process of inerting n element in stack is called

a. Create
b. Push
c. Evaluation
d. Pop

20. Process of inerting n element in stack is called

e. Create
f. Push
g. Evaluation
h. Pop

21. .....allows insetion of elements at either ends but not in the middle.

a. Rear
b. Enqueue
c. Algebric expression

d. Dequeue

22. The order of evaluation of a postfix expression is from.......

a. Left

b. Right

c. Left to right

d. Right to left

23. The function that deletes values from a queue is called

a. Enqueue

b. Dequeue

c. Peek

d. Pop

24. Which of the following applications may use a stack?

a. A parentheses balancing program

b. Tracking of local variables at run time

c. Compiler syntax analyzer

d. All of the mentioned

25. The postfix form of A*B+C/D is?

a. *AB/CD+

b. AB*CD/+

c. A*BC+/D

d. ABCD+/*

26. What data structure is used when converting an infix notation to prefix notation?

a) Stack

b) Queue
c) B-Trees
d) Linked-list

27. What data structure would you mostly likely see in a non-recursive implementation of a recursive algorithm?

a. LinkList
b. Stack
c. Queue
d. Tree

28. The process of accessing data stored in a serial access memory is similar to manipulating data on a

a. Heap
b. Queue
c. Stack
d. Binary tree

29. A function is said to be....recursive if it explicitly calls itself

a. Directly
b. Indirectly
c. Key
d. Back

30. The Bellmann Ford algorithm returns _______ value.

a) Boolean
b) Integer

c) String
d) Double

31. The storage requirements of a linked stack with n elements is

a. 0
b. 1
c. Log
d. O(n)

32. A connected planar graph having 6 vertices, 7 edges contains _______ regions

a. 1
b. 14
c. 15
d. 3

33. Bellman ford algorithm was first proposed by

a. Alfonso Shimbel
b. Richard Bellman
c. Lester Ford Jr
d. None of these

34. Entries in a stack are "ordered". What is the meaning of this statement?

a. A collection of stack is sortable
b. Stack entries may be compared with the '<' operation.
c. The entries are sorted in a linked list.
d. There is a sequential entry one by one.

35. Bellmann Ford Algorithm can be applied for ______________

a) Undirected and weighted graphs

b) Undirected and unweighted graphs

c) Directed and weighted graphs

d) All directed graphs

36. An edge that has identical endpoints is called a

a. Loop

b. Multi-path

c. Cycle

d. Multi-edge

37. The number of edges that originate at u are called

a. In-degree

b. Out-degree

c. Degree

d. Source

38. A simple graph in which there exists a path between any two of its nodes is called

a. In-directed graph

b. Diagraph

c. Connected

d. Complete

39. Disks piled up one above the other represent a….

a. Stack

b. Queue
c. Array
d. Linked list

40. Which of the following is not an exchange sort?
a) Bubble Sort
b) Quick Sort
c) Partition-exchange Sort
d) Insertion Sort

PASSAGE BASED QUESTIONS

41. Given the base address of an array B[1300…..1900] as 1020 and size of each element is 2 bytes in the memory.

1. **Find the address of B[1700]**
   a. 1820
   b. 1020
   c. 1900
   d. None of these

2. **What is the type of this matrix?**
   a. Regular matrix
   b. Irregular matrix
   c. Both of these
   d. None of these

3. **How many total bytes will be allocated to entire array?**

   a. 1202
   b. 1020
   c. 1900
   d. None of these

4. **How many total elements are there in this array?**

   a. 600
   b. 601
   c. 1020
   d. None of these

5. **Find the address of B [1300].**

   a. 1220
   b. 1020
   c. 1900
   d. None of these

42. A company contains a membership file which contains following information about the employees in the company: ***Name. Address, Phone No, Age, Sex***

1. **Suppose an existing employee moves to a new home, what will happen with the membership file?**

a. Updation
b. Searching
c. Insertion
d. Deletion

2. **Suppose a new employee joins the company, what operation will be performed in membership file?**

    a. Traversal

    b. Searching

    c. Insertion

    d. Deletion

3. **Suppose the company wants to invite only one specific employees in a meeting, what is the operation that will be performed on the membership file for same?**

    a. Traversal

    b. Searching

    c. Insertion

    d. Deletion

4. **Suppose the company wants to invite all employees in a meeting, what is the operation that will be performed on the membership file for same?**

    a. Traversal

    b. Searching

    c. Insertion

    d. Deletion

5. **Suppose an employee exits/resigns from the company, what operation will be performed on memebrship file.**

    a. Traversal

    b. Searching

    c. Insertion

    d. Deletion

43. Consider below mentioned algorithm:

```
Step 1: IF HEAD= NULL
Write UNDERFLOW
  Go to Step 8
[END OF IF]
Step 2: SET PTR = HEAD
Step 3: Repeat Steps 4 and 5 while PTR -> NEXT!= NULL
Step 4: SET PREPTR = PTR
Step 5: SET PTR = PTR-> NEXT
[END OF LOOP]
Step 6: SET PREPTR-> NEXT = NULL
Step 7: FREE PTR
Step 8: EXIT
```

1. **When some node is deleted from the linkedlist what happens with memory which was allocated to that node?**
   a. Memory is put up in the AVAIL list
   b. that can be used by some other data structures
   c. Both 1 and 2
   d. none of these

2. **OVERFLOW condition is associated with which operation in the linked list?**
    a. ***Insertion***
    b. Deletion
    c. Searching
    d. None of these

3. **What is the operation performed by the given algorithm in the linked list?**
    a. Insertion
    b. ***Deletion***
    c. Searching
    d. None of these

4. **When will the UNDERFLOW statement be printed?**
    a. When there is no element in the linkedlist
    b. When user is trying to delete element from the linked list but it is already empty.
    c. **both of these**
    d. None of these

5. **UNDERFLOW condition is associated with which linked list operation?**
    a. Insertion
    b. ***Deletion***
    c. Searching
    d. None of these

44. Consider the code given below, which runs insertion sort:

```
void insertionSort(int arr[], int array_size)
{
  int i, j, value;
  for (i = 1; i < array_size; i++)
  {
        value = arr[i];
        j = i;
        while (________ )
        {
                arr[j] = arr[j – 1];
                j = j – 1;
        }
        arr[j] = value;
  }
}
```

1. Which condition will correctly implement the while loop?

a. (j > 0) || (arr[j – 1] > value)
b. (j > 0) && (arr[j – 1] > value)

c. (j > 0) && (arr[j + 1] > value)
d. (j > 0) && (arr[j + 1] < value)

2. Which of the following sorting algorithm is best suited if the elements are already sorted?

a. Heap Sort
b. Quick Sort
c. Insertion Sort
d. Merge Sort

3. How many passes does an insertion sort algorithm consist of?

a. N
b. N-1
c. N+1
d. N^2

4. What is the best-case time complexity of insertion sort algorithm?

a. O(n^2)
b. O(log n)
c. O(nlogn)
d. None of these

Explanation: *Best case of insertion sort is O(n) when array is already sorted.*

5. **In insertion sort, the average number of comparisons required to place the 7th element into its correct position is ____**

   a) 9

   b) 4

   c) 7

   d) 14

45. **Quick Sort algorithm was developed by a British computer scientist Tony Hoare in 1959. The name "Quick Sort" comes from the fact that, quick sort is capable of sorting a list of data elements significantly faster (twice or thrice faster) than any of the common sorting algorithms. It is one of the most efficient sorting algorithms and is based on the splitting of an array (partition) into smaller ones and swapping (exchange) based on the comparison with 'pivot' element selected. Due to this, quick sort is also called as "Partition Exchange" sort. Like Merge sort. Quick sort also falls into the category of divide and conquer approach of problem-solving methodology.**

1. **Which of the following, sorting algorithms is the fastest?**

   a. Merge Sort

   b. Quick Sort

   c. Insertion Sort

   d. None of these

2. **What is the worst-case time complexity of a quick sort algorithm?**

   a. O(log N)

b. O(N log)

c. O(N^2)

d. None of these

3. Which is the worst method of choosing a pivot element?

a. first element as pivot

b. last element as pivot

c. random element as pivot

d. None of these

4. Find the pivot element from the given input using median of three partitioning method. 8. 1, 4, 9, 6, 3, 5, 2.7.0.

a. 7

b. 8

c. 5

d. 6

5. What is the average running time of a quick sort algorithm?

a. O(log N)

b. O(N log)

c. O(N log N)

d. None of these

46. A circular queue is an abstract data type that contains a collection of data which allows addition of data at the end of the queue and removal of data at the beginning of the queue. Circular queues have a fixed size. Circular queue follows FIFO principle. Queue items are added at the rear end and the items are deleted at front end of the circular queue.

1. **In the circular array version of the queue (with a fixed-sized array), which operations require linear time for their worst case behaviour?**
   a. Front
   b. Push
   c. Empty
   d. None of these

2. **Circular Queue is also known as?**
   a. Ring Buffer
   b. Square Buffer
   c. Rectangle Buffer
   d. None of these

3. **in which queue we can utilize location of deleted element again is called**
   a. Stack
   b. Tree
   c. Circular Queue
   d. None of these

4. In the array implementation of circular queue, which of the following operation take worst case linear time?

a. Insertion

b. Deletion

c. To empty a queue

d. None of these

5. A circular queue is implemented using an array of size 10. The array index starts with 0. front is 6, and rear is 9. The insertion of next element takes place at the array index.

a. 0

b. 6

c. 3

d. 4

47. The tower of Hanoi is one of the main applications of recursion. It says, "If you can solve n-1 cases, then you can easily solve the nth case. The tower of Hanoi(also called the Tower of Brahma or Lucas' Tower and sometimes pluralized as Towers) is a mathematical game or puzzle. It consists of three rods and a number of disks of different sizes, which can slide onto any rod. The puzzle starts with the disks in a neat stack in ascending order of size on one rod, the smallest at the top, thus making a conical shape.

1. **Recurrence equation formed for the tower of Hanoi problem is given by….**
   a. T(n) = 2T(n-1) + n
   b. T(n) = 2T(n/2) +c
   c. T(n) = 2T(n-1) + c
   d. None of these

2. **Which of the following is NOT a rule of tower of Hanoi puzzle?**
   a. No disk should be placed over a smaller disk
   b. Disk can only be moved if it is the uppermost disk of the stack
   c. No disk should be placed over a larger disk
   d. None of these

3. **The optimal data structure used to solve Tower of Hanoi is …**
   a. Tree
   b. Circular Queue
   c. Heap
   d. Stack

4. **The time complexity of the solution tower of Hanoi problem using recursion is…**
   a. O(n^2)
   b. O(2^n)
   c. O(n log n)
   d. O(n)

5. **What is the objective of tower of Hanoi puzzle?**
   - **a. To move all disks to some other rod by following rules**
   - b. To divide the disks equally among the three rods by following rules.
   - c. To move all disks to some other rod in random order.
   - d. None of these

48. Kruskal's algorithm finds a minimum spanning forest of an undirected edge weighted graph. If the graph is connected, it finds a minimum spanning tree. (A minimum spanning tree of a connected graph is subset of the edges that forms a tree that includes every vertex, where the sum of the weights of all the edges in the tree is minimized. For a disconnected graph, minimum spanning forest is composed of a minimum spanning tree for each connected component). It is a greedy algorithm in graph theory as in each step it adds the next lowest-weight edge that will not form a cycle to the minimum spanning forest.

1. Kruskal's algorithm is a ______

a) divide and conquer algorithm
b) dynamic programming algorithm
c) greedy algorithm
d) approximation algorithm

2. What is the time complexity of Kruskal's algorithm?

a) O(log V)

b) O(E log V)
c) O(E2)
d) O(V log E)

3. **Which of the following is true?**
   a) Prim's algorithm can also be used for disconnected graphs
   b) Kruskal's algorithm can also run on the disconnected graphs
   c) Prim's algorithm is simpler than Kruskal's algorithm
   d) In Kruskal's sort edges are added to MST in decreasing order of their weights

4. **Which of the following is false about the Kruskal's algorithm?**
   a) It is a greedy algorithm
   b) It constructs MST by selecting edges in increasing order of their weights
   c) It can accept cycles in the MST
   d) It uses union-find data structure

5. **Kruskal's algorithm is used to ______**
   a) find minimum spanning tree
   b) find single source shortest path
   c) find all pair shortest path algorithm
   d) traverse the graph

49. **Infix, prefix, and postfix notations are three different but equivalent notations of writing algebraic expressions. In postfix notation, operators are placed after the operands, whereas in prefix notation, operators are placed before the operands, Postfix notations are evaluated using stacks. Every character of the postfix expression is scanned from left to right. If the character is an operand, it is pushed onto the stack. Else, if it is an operator, then the top two values are popped from the stack and the operator is applied on these values. The result is then pushed onto the stack.**

1. **What would be the Prefix notation for the given equation?**

   (a+(b/c)*(d^e)-f)

   a) -+a*/^bcdef
   b) -+a*/bc^def
   c) -+a*b/c^def
   d) -a+*/bc^def

2. **What would be the Prefix notation for the given equation?**

   a+b-c/d&e|f

   a) |&-+ab/cdef
   b) &|-+ab/cdef
   c) |&-ab+/cdef
   d) |&-+/abcdef

3. **What would be the Prefix notation for the given equation?**

   a|b&c

a) a|&bc
b) &|abc
c) |a&bc
d) ab&|c

4. What would be the Prefix notation and Postfix notation for the given equation?

A+B+C

a) ++ABC and AB+C+
b) AB+C+ and ++ABC
c) ABC++ and AB+C+
d) ABC+ and ABC+

5. What would be the Prefix notation for the given equation?

A^B^C^D

a) ^^^ABCD
b) ^A^B^CD
c) ABCD^^^
d) AB^C^D

50. A graph in which there exists a path between any two of its nodes is called a connected graph. An edge that has identical end-points is called a loop. The size of a graph is the total number of edges in it.

1. If for some positive integer k, degree of vertex d(v) = k for every vertex v of the graph G, then G is called -

A. K graph

B. K - regular graph

C. Empty graph

D. All of these

2. The degree of any vertex of graph is?

a. The number of edges incident with vertex

b. Number of vertex in a graph

c. Number of vertices adjacent to that vertex

3. A graph with no edges is called as empty graph. Empty graph also known as -

A. Trivial graphs

B. Regular graphs

C. Bipartite graphs

D. None of these