

MODULE WISE QUESTIONS & ANSWERS 2015-2016

DATA STRUCTURE USING C

BRANCH: ALL

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MODULE I

Short Questions

1. Define data structure. Differentiate between linear & non linear data structure.

Answer:

Mathematical or logical way of representing data is known as data structure.

- **Linear Data structure:** A data structure is said to be **linear** if its elements form a sequence. Examples: Array, Linked List, Stack, Queue.
- **Non linear Data structure:** A data structure is said to be **non linear** if its elements do not form a sequence. Examples: Tree and Graph.

2. Define array. What are its disadvantages?

Answer:

An array is a finite collection of similar elements stored in adjacent memory locations.

Disadvantages of array:

- It is a static data structure.
- Array may lead to inefficient utilization of memory space.
- Time complexity of insertion & deletion operation on an array is high.

3. Define linked list. What are its advantages over array?

Answer:

Linked list is a linear data structure consisting of group of nodes, where each node is composed of two fields i.e. data and address (or link). The data field holds the actual data or element and the address field holds the address of next node (or previous) in a linked list.

Advantages of linked list:

- It is a dynamic data structure.
- Efficient utilization of memory space.
- Time complexity of insertion & deletion operation on an array is low.

4. Define sparse matrix.

Answer:

The matrix containing maximum number of elements as 0 is known as sparse matrix.

5. Define stack. Why it is called a LIFO data structure?

A **stack** is a linear data structure (or more abstractly a sequential collection) in which addition of a new element or deletion of an existing element always takes place from same end. This end is often known as top of the stack. When an item is added to a stack, the operation is called **push** and when an item is removed from the stack, the operation is called **pop**.

Stack is also called LIFO data structure because the element added last on to the stack is the first element to be removed when pop operation is carried out.

6. Define Queue. Why it is called a FIFO data structure?

Answer:

Queue is a linear data structure in which insertion and deletion of elements takes place at two different ends. The end at which insertion takes place is known as **rear** and the end at which deletion takes place is known as **front**.

Queue is also called FIFO data structure because the element added first in to the queue is the first element to be removed when delete operation is carried out.

7. Write node definition of a linked list using C syntax.

Answer:

```
struct structure_name
{
    data type variable;
    struct strcure_name *addr;
};
```

8. Define circular list.

Answer:

Circular list is a single linked list in which the tail node holds the address of head node.

9. What are similarities & dissimilarities between stack & queue?

Answer:

Similarities	
Stack	Queue
<ul style="list-style-type: none">It is a linear data structure.Can be implemented using array & linked list.	<ul style="list-style-type: none">It is a linear data structure.Can be implemented using array & linked list.
Dissimilarities	
<ul style="list-style-type: none">It is LIFO data structureInsertion & deletion takes place from same end.	<ul style="list-style-type: none">It is FIFO data structureInsertion & deletion takes place from different end.

10. What are the applications of stack?

Answer:

Applications of stack are:

- It is used to convert infix expression into postfix expression.
- It is used to evaluate postfix expression.
- It is used in recursion.
- It is used to implement DFS traversal algorithm.

11. Define push & pop operation on a stack.

Answer:

When an item is added to a stack, the operation is called **push** and when an item is removed from the stack, the operation is called **pop**.

12. Represent the polynomial $xyz^3+x^2y^3-y^5$ using linked list.

Answer:



13. Write queue overflow & underflow condition for a circular queue.

Answer:

Overflow Condition:

front==0 && rear==N-1 or front == rear +1

Underflow Condition:

front== -1

14. Insertion & deletion operation on a linked list is efficient than on an array. Justify your answer.

Answer:

Insertion & deletion operation on a linked list is efficient than on an array because it does not require reorganization of whole list.

15. Define header node.

Answer:

A node containing the address of first node in a linked list is termed as header node.

Long Questions (Refer Lecture notes for the answers)

1. Define array. Write a menu driven program using c to perform traversal, insertion, deletion and reverse operation on an array.
2. Write algorithm in C to create a single linked list and insert a new node in the linked list.
3. Write an algorithm in C to count no of nodes in a linked list.
4. Define sparse matrix. Write a C program to reduce the number of zeros in a sparse matrix using 3-tuple method.
5. Write an algorithm to reverse a single linked list.
6. Write an algorithm to create a double linked list and insert a new node to the list.
7. Write algorithm in C for push and pop operation on a stack using array.
8. Write algorithm in C for insert and delete operation on a queue using array.
9. Write algorithm in C for insert and delete operation on a circular queue using array.
10. Write a menu driven program using C for push, pop and traversal operation on a stack.
11. Write algorithm to convert an infix expression into postfix expression. Apply the algorithm to convert following infix expression into postfix: $A+B*C-D/E^F-G$
12. Write algorithm to evaluate a postfix expression. Apply the algorithm to evaluate:
3, 4, 7, *, +, 2, 1, +, 16, /, 8, +
