

UNIT - 1

2-marks questions

1. What is primitive and non-primitive data structure?
2. Define Array. Different types of array
3. Differentiate between i) Array and Structure ii) Structure and Union iii) Static and Dynamic memory allocation iv) Malloc() and calloc()
4. Explain malloc() function.(Ans:Syntax, Example)
5. What is pointer? Explain '&' and '*' operators
6. Explain realloc () & calloc () functions with example.
- 7.Explain sizeof() function.
8. what will be the output of following.

```
i> #include<stdio.h>
```

```
int main()
```

```
{
```

```
    int i=3, *j, k;
```

```
    j = &i;
```

```
    printf("%d\n", i**j*i+*j);
```

```
    return 0;
```

```
}
```

```
ii>. #include<stdio.h>
```

```
int main()
```

```
{
```

```
    char str[20] = "Hello";
```

```
    char *const p=str;
```

```
    *p='M';
```

```
    printf("%s\n", str);
```

```
    return 0;
```

```
}
```

```
iii>. #include <stdio.h >
```

```
int main()
```

```
{
```

```
    int arr[2][2][2] = {10, 2, 3, 4, 5, 6, 7, 8};
```

```
    int *p, *q;
```

```
    p = &arr[1][1][1];
```

```
    q = (int*) arr;
```

```

    printf("%d, %d\n", *p, *q);
    return 0;
}
iv>. #include < stdio.h >
int main()
{
    int i, a[] = {2, 4, 6, 8, 10};
    change(a, 5);
    for(i=0; i<=4; i++)
        printf("%d, ", a[i]);
    return 0;
}
void change(int *b, int n)
{
    int i;
    for(i=0; i < n; i++)
        *(b+i) = *(b+i)+5;
}

```

6- marks Questions

2. Define algorithm. Explain all the criteria every algorithm should satisfy.

Definition, 5 criterions with example & conceptual procedure.

3. What is the necessity of an ADT? Create an ADT for Array

4. what are various type of operation that can be performed on different data structure.

5. Develop a structure to represent the planets in the solar system. Each planet has fields for the planet's name, its distance from the sun (in miles) & the number of moons it has. Place items in each of the fields for the planets: Earth, Venus.

6. Write a C program to perform addition and multiplication of two n x n matrix.

7. Write a C program to swap two numbers using call by value and call by reference.

8. write C program to store information of student (Roll_no ,name ,& marks) using Structure.

Unit-2

2-marks questions

1. Define stack and Queue
2. Assume stack of size 2 and show the diagrammatically the action for following operations PUSH(20),PUSH(40),POP(),PUSH(50),PUSH(60).**indicate TOP point.**
3. What are the disadvantages of queue? How to overcome it?
4. Assume queue of size 3. Show representation of queue for following operations: add (30), add(40), delete(), add(50), add(60), add(70)
5. What is circular queue
6. Explain stack full & stack empty condition?
7. Explain Queue full &Queue empty condition?
8. Which data structure is used to perform recursion?
9. Expression tree: $(A + B) / (C * D)$
10. Consider stack of characters **stk: A, C, D, F, K**, size =8. Pop (), pop (), push (L), push (P),pop().
11. suppose stack is allocated $N=5$ memory cell .initially stack is empty and $top = -1$. Find output of following module:
 1. Set $x=2$ and $y=5$
 2. Call push (x)
 3. Call push (4)
 4. Call push($y+2$)
 5. Call push(9)
 6. Call push($x + y$)
 7. Repeat while $Top = -1$
Pop ()
End of loop.

6-8 marks:

1. Define stack. Explain role of top? Stack operations, role of top with diagram
2. Write a c program to implement stack using dynamic Array?
3. Define Queue. Explain the role of front & rear ends?
(Definition, role of front and rear with diagram.)
4. Write C program to implement Queue using static array. Give its drawbacks?
5. Write the postfix Form of the following expression using stack?
 1. $a * b * c$
 2. $-a + b - c + d$
 3. $a * -b + c$
 4. $(a + b) * d + e / (f + a * d) + c$
6. Evaluate $x = a/b - c + d * e - a * c$ Where $a=4, b=c=2, d=e=3$.

Unit-3

1. Linked list representation of queue. (Diagram, explanation.)
2. Write c function to perform following operation on linear linked list. Give one example for each.
 1. Inserting a node into front of list.
 2. Deleting a node from a list.
 3. Inserting a node at the end of a list.

(Diagrammatic representation is compulsory.)

3. Write a program to implement stack using linked representation? (Program & diagram.)
4. Write a program to implement Queue using linked representation?(Program & diagram.)
5. How to represent circular singly linked list? Explain insert & delete operation on circular singly linked list?

(Diagram, algorithms.)

6. Show how to represent polynomials using linked list. Add A & B using linked representation.

1. $A = 10x^4 + x^2 + x + 5$ $B = x^3 + x + 2$

2. $A = 5x^4 - 2x + 3$ $B = 6x^5 - 3x^4 + 2x^2 - 1$

3. $A = 8x^7 - x^6 + 5x^4 - 3x^2 - 10$ $B = 9x^7 + x^6 - 2x^2$

4. $A = 3x^{14} + 2x^8 + 1$ $B = 8x^{14} - 3x^{10} + 10x^6$

7. Can doubly linked list be implemented using a single pointer variable in every node.?

UNIT-4

- 1) write properties of binary tree (with example)
- 2) How to find out balance factor in AVL tree.
- 3) Array representation of a binary tree.
- 4) Construct a binary tree to satisfy the following traversal and traverse the tree in preorder and postorder : $A+(B+C*D+E)+F/G$
 $:(A>B) || (C>D)$
/*4) Construct binary tree for a given sequence of Preorder and inorder: i) Preorder : F A E K C D H G B

Inorder:: E A C K F H D B G

ii) Preorder : A B D G C E H I F

Inorder: D G B A H E I C F(452 Baluja)* /

- a) Explain height balanced tree.
- b) In AVL tree , at what condition the balancing to be done?
- c) What are some of the application for the tree .
- d) There are 8 , 15, 13, and 14 nodes in different trees. Which one of them can perform full binary tree
- e) How to check if a given binary tree is BST or not.

Q. 2] Explain following terms.

1) Tree. 2) Binary tree. 3) Subtree. 4) Root.5) Node. 6) Degree of node. 7) Terminal node.8) Non terminal node. 9) Parent. 10) Siblings. 11) Degree of tree. 12) Ancestor. 13) Level of node.14) Height of Tree.

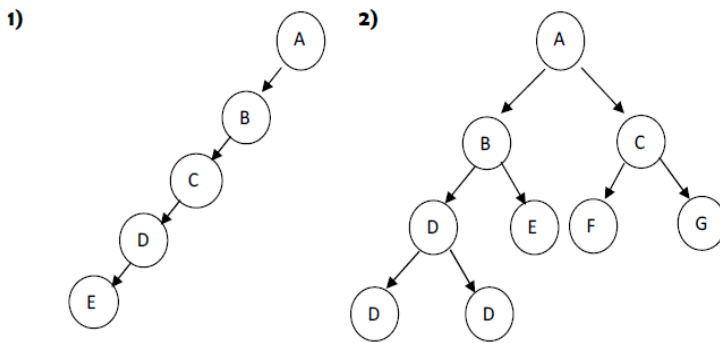
Assume one example.

Q.3] How to represent a tree using

1) List representation. 2) Left child right sibling representation.

Q.4] Write a note on Binary tree representation.

Q.5] Explain Inorder, Preorder, Postorder traversals for the binary tree.



Algorithms, traversals.

Q. 6] Define Height-balanced binary tree. Assume that insertions are made in the order –

i) March, May, Nov, Aug, Apr, Jan, Dec, Jul, Feb, Jun, Oct, Sep. Obtain balanced tree.

ii) Uranus, Earth, Venus, Mars, Mercury, Jupiter, Saturn, Neptune

iii) 14, 17, 11, 7, 53, 4, 13

iv) Build an AVL tree with the following values:

15, 20, 24, 10, 13, 7, 30, 36, 25

Q 7. Define Height-balanced binary tree. Assume that insertions are made in the order-Thu, Sun, Mon, Fri, Sat, Wed, Tue. Construct Height –balanced binary tree.(AVL)

Q.8] Define Binary search tree. Write a recursive function to search any key in BST. (Definition, function, example.)

Q.9] Explain insertion into a BST and deletion from BST with examples.(Insert, delete: all cases, example)

Q.10] write a algorithm to construct the binary tree with example.

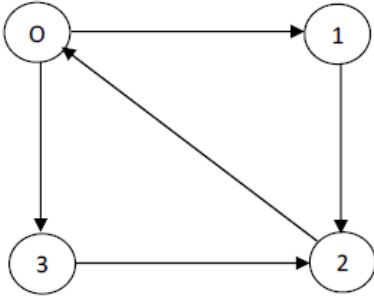
UNIT-5

Q.1] Explain the following terms.

1) Vertex, Edges. 2) Undirected graph. 3) Directed graph. 4) Tail & Head. 5) Self edges. 6) Multigraph. 7) Complete graph. 8) Cycle. 9) Strongly connected graph. 10) Indegree & Outdegree of a vertex.

Q.2] Explain graph representation techniques. 1) Adjacency matrices.

2) Adjacency lists. 3) Adjacency multi lists. Obtain the representation for the following graph.



Q.3 Which data structure are used for BFS and DFS of graph.

Q.4 What are the major data structure used in following areas :

- RDBMS.
- Network Data Model.
- Hierarchical data model .

Q.5) What are graph traversal technique ? Explain BFS with example.

UNIT-6

1. Sort the list 25,75,78,12, 90, 37,86, 57 by using

- Insertion sort
- Bubble sort
- Selection sort

2. Differentiate between linear search and binary search.

3. Using binary search find $x=15$ and $x=20$, and $x=70$

10,20,30,40,50,60,70,80

4. Suppose that we have the following key values : 7,16,49,82,5,31,6,2,44

- Write out the max heap after each value is inserted into the heap.
- Write out the min heap after each value is inserted into the heap. (Creation of a heap, logic).

5. Which data structure is used in heap sort.

6. Search element 5 in a given list using linear search: 10,2,70,40,5,12,50,60

7. What is property of min heap

Program List

2. Write a C program to implement stack using dynamic array.
3. Write a C program to implement 2 stacks in one static array.
4. Write a program to implement queue using static array.
5. Write a program to implement circular queue using dynamic array.
6. Write a program to convert infix expression into postfix expression.
7. Write a program to evaluate postfix expression.
8. Using linked representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
9. Maintenance of doubly linked list: Append, Insert at the beginning, Insert at the specific location, delete, search.
10. Write a program to invert a singly linear linked list and concatenate 2 LLLs.
11. Write a C program to construct binary tree & binary tree traversal.
12. Write a C program to construct binary search tree.
13. Write a C program to implement bubble sort ,insertion sort & Selection sort.