DSA lab Assignment

Linear Search

Q1:-)

```
//program for linear search
#include<stdio.h>
#include<math.h>

int main(){

    int n; //n is size of array.

    int i, key, flag; //i is the index that we will traverse and key is the
 //number we want to search with flag as set as a variable for saying bool fun.

    printf("Enter The Total number of elements of the array: ");
    scanf("%d", &n);
    int arr[n]; //array of size of elements with size n.
    printf("Enter the elements of the array: \n");
    for (i=0; i<n; i++)
     {
      scanf("%d", &arr[i]); //scanning all the elements of the array.
     }
    printf("Enter the Element to be searched "); //Enter the element we want
                                                   to search inside the
                                                   array
    scanf ("%d, &key);

    for (i=0; i<n; i++)
     {
         if (key==arr[i]) //If the element is found inside the array.
          {   flag=1; // the variable is set to one and then we break
                                                        from the loop.
              break;
          }
     }
    if (flag==1){ //If the element is found inside the array.
       printf("Element found in the array at index %d", i);
    }
    else{ //If the element is not found inside the array then we print element
                                                                   is not
      printf("Element is not found in the array.");                found
    }
    return0;
}
```

Q2.) Binary Search by recursion

```
//program for implementing of the binary search in the recursive way.
#include <stdio.h>
# include <math.h>

void binary_search (int [], int, int, int); //definition of fxn.
 int main (){

    int key, n, i; // n is total number of elements of the array, key is
                    the element we need to search with i as the index we
                       need to go through all of the array.
   printf ("Enter size of a array you want : ");
   scanf ("%d", &n);
   int arr[n]; // defining the array with size of n elements.
   printf("Enter elements of the array in sorted array with increasing
                                                          values : \n");
   for (i=0 ; i<n; i++ )
     {
        scanf ("%d", &arr[i]); //scanning of all the elements of the
                                array and take inside the input.
     }
   printf ("\n");
   printf("Enter key to search inside the array. \n"), // key we
           want to search for inside the array.
   scanf("%d"), &key);
   binary_search(arr, 0, n-1, key); //calling of the function..
   return 0;
 }
void binary_search (int arr[], int low, int high, int key)
  {
     int middle ; //taking middle element
     if (low > high)
       { printf("key is not found inside the array. \n");
         return 0;
       }
```

```
middle =(ceil (low +high)/2 );
 if (arr[middle ]== key) // key is found
   {
     printf ("Key %d found at index %d\n", key,middle );
   }
   else if(arr[middle ]>key)
     {
       binary_search (arr, low, middle -1,key) //if the element at
     } //middle is more than the key then decrease the middle by position
                                                  one so that middle
                                                  changes.
     else if (arr[middle ] < key )
       {
         binary_search(arr,middle+1, high,key);
     }   // If the element at middle is less than the key
          // then, increase the middle by position one so that
           middle changes.
 }
```

Q3.) Binary search in iterative way.

```
//program for implementing the binary search in iterative way.
#include<stdio.h>
# include <math.h>

int main() {

    int n, key, i, middle, high, low, flag=0; //variables we have used.

    printf("Enter the size of the array: \n");
    scanf("%d", &n);

    int arr[n]; //defining the array.
     printf("Enter The Elements Of array one by one: \n");
     for (i=0; i<n; i++)
       {
         scanf("%d", &arr[i]); //scanning all the array elements.
     }
     low=0;
     high=n-1;
     printf("Enter The Key You want To Search: \n");
     scanf("%d", &key);
      while (low <= high)
     {
        middle = ceil((high+low)/2);
        if (key==arr[middle])
         { flag=1; //element found.
           break;
        }
        else if (key<arr[middle]){
                  high=middle-1; //decrease high
        }
       else {  low=middle+1; //increase low
     }  }
If (flag = =0) //If element is not found
        {
          printf ("Element Is Not Found in The Array! \n");
      }
 else {  //If element is not found
       printf ("Key %d is found at index %d \n", key, middle);
      }
  return 0;
}
```