

School of Engineering

Subject Name:	DATA STRUCTURES AND ALGORITHMS
Subject Code:	
Department:	B.TECH IN COMPUTER SCIENCE AND ENGINEERING

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ASSIGNMENT 9

Q1. Write a program to sort an array using Bubble sort.

CODE:

```
//PROGRAM FOR BUBBLE SORT

#include<stdio.h>
#include<stdlib.h>

void bubblesort(int arr[], int size);
void swap(int *num1, int *num2);

int main()
{
    int i,j,temp;
    int n;
    int flag;
    system("cls");
    printf("Total number of elements: ");
    scanf("%d",&n);
    int a[n];
    printf("Enter %d elements: ",n);
    for(i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }

    bubblesort(a, n);

    printf("The Elements in sorted order: ");
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }
    printf("\n");
}

//function for sorting
void bubblesort(int arr[], int size)
{
    int i,j,flag = 0;
    for(i=0;i<size;i++) //for each element
    {
        flag = 0;
        for(j=0;j<size-i-1;j++) //for total comparisons for each element
        {
            if(arr[j]>arr[j+1])
            {
                flag = 1;
            }
        }
    }
}
```

```

        swap(&arr[j], &arr[j+1]);
    }
}
if(flag == 0)
{
    break;
}
}
}

//function for swapping
void swap(int *num1, int *num2)
{
    int temp = *num1;
    *num1 = *num2;
    *num2 = temp;
}

```

OUTPUT:

```

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

Total number of elements: 5
Enter 5 elements: 3 9 1 6 4
The Elements in sorted order: 1 3 4 6 9
PS C:\Users\CHANDREYEE SHOME\Desktop\C C++>

```

Q 2. Write a program to sort an array using Insertion sort

CODE:

```

//PROGRAM FOR INSERTION SORT

#include<stdio.h>
#include<stdlib.h>
void Insertionsort(int arr[], int size);

int main()
{
    int a[100];
    int n,i;

    system("cls");
    printf("Enter the total number of elements: ");
    scanf("%d",&n);
    printf("Enter the elements: ");
    for(i=0;i<n;i++)

```

```

    {
        scanf("%d",&a[i]);
    }
    printf("The Unsorted Elements: ");
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }
    printf("\n");

    Insertionsort(a,n);

    printf("The Sorted Elements: ");
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }
    printf("\n");
    return 0;
}

//function for sorting
void Insertionsort(int arr[], int size)
{
    int i,j,key;
    for(i=1;i<size;i++)
    {
        key=arr[i];
        j=i-1;
        while(j>=0 && key<arr[j])
        {
            arr[j+1]=arr[j];
            j--;
        }
        arr[j+1]=key;
    }
}
}

```

OUTPUT:

```

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

Enter the total number of elements: 5
Enter the elements: 3 8 1 9 2
The Unsorted Elements: 3 8 1 9 2
The Sorted Elements: 1 2 3 8 9
PS C:\Users\CHANDREYEE SHOME\Desktop\C C++> 

```

Q 3. Write a program to sort an array using Selection sort.

CODE:

```
//PROGRAM FOR SELECTION SORT

#include<stdio.h>
#include<stdlib.h>

void *swap(int *num1, int *num2);
void Selectionsort(int arr[], int size);

int main()
{
    int i;
    int n;
    int a[100];

    system("cls");
    printf("Enter number of elements to be sorted: ");
    scanf("%d",&n);
    printf("Enter %d elements to be sorted: ",n);
    for(i=0;i<n;i++)
    {
        scanf("%d", &a[i]);
    }

    Selectionsort(a,n);

    printf("The Elements in sorted order: ");
    for(i=0;i<n;i++)
    {
        printf("%d " ,a[i]);
    }
    printf("\n");
}

//function for sorting
void Selectionsort(int arr[], int size)
{
    int i,j,min_index;
    for(i=0; i<size-1; i++)
    {
        min_index = i;
        for(j=i+1; j<size; j++)
        {
            if(arr[min_index] > arr[j])
            {
```

```

        min_index = j;
    }
}
if(i != min_index)
{
    swap(&arr[i] , &arr[min_index]);
}
}
}

//function for sorting
void *swap(int *num1, int *num2)
{
    int temp;
    temp = *num1;
    *num1 = *num2;
    *num2 = temp;
}

```

OUTPUT:

```

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

Enter number of elements to be sorted: 5
Enter 5 elements to be sorted: 3 8 1 7 4
The Elements in sorted order: 1 3 4 7 8
PS C:\Users\CHANDREYEE SHOME\Desktop\C C++>

```

Q 4. Write a program to sort an array using Quick sort.

CODE:

```

#include<stdio.h>
#include<stdlib.h>

void swap(int *a, int *b);
int partition(int arr[], int low, int high);
void quicksort(int arr[], int low, int high);
void display(int arr[], int size);

int main()
{
    int arr[100];
    int i, size;

    system("cls");

```

```

    printf("\nEnter number of elements: ");
    scanf("%d",&size);
    printf("\nEnter the elements: ");
    for(i=0; i<size; i++)
    {
        scanf("%d",&arr[i]);
    }
    quicksort(arr, 0, size-1);
    display(arr, size);
}

//function for swapping
void swap(int *a, int *b)
{
    int temp;
    temp = *a;
    *a = *b;
    *b = temp;
}

//dividing elements around pivot
int partition(int arr[], int low, int high)
{
    int i,j,pivot;

    pivot = arr[high];
    i = low-1;
    for(j=low; j<=high-1; j++)
    {
        if(arr[j] < pivot)
        {
            i++;
            swap(&arr[i],&arr[j]);
        }
    }
    swap(&arr[i+1], &arr[high]);
    return (i+1);
}

//function for sorting elements
void quicksort(int arr[], int low, int high)
{
    if(low < high)
    {
        int pivot = partition(arr, low, high);
        quicksort(arr, low, pivot-1);
        quicksort(arr, pivot+1, high);
    }
}

```

```

}

//function to display sorted elements
void display(int arr[], int size)
{
    int i;

    printf("\nThe Sorted Elements: ");
    for(i=0; i<size; i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");
}

```

OUTPUT:

```

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

Enter number of elements: 7

Enter the elements: 10 80 30 90 40 50 70

The Sorted Elements: 10 30 40 50 70 80 90
PS C:\Users\CHANDREYEE SHOME\Desktop\C C++>

```

Q 5. Write a program to sort an array using Heap sort.

CODE:

```

//PROGRAM FOR HEAP SORT
#include<stdio.h>

//FUNCTION DECLARATION
void swap(int *a, int *b);
void heapify(int arr[], int n);
void heapsort(int arr[], int n);

int main()
{
    int arr[100];
    int i, size;
    system("cls");
    printf("Enter number of elements: ");
    scanf("%d",&size);
    printf("Enter the elements: ");

```



```

    for(i=0; i<size; i++)
    {
        scanf("%d",&arr[i]);
    }

    printf("The Unsorted elements: ");
    for(i=0; i<size; i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");

    heapsort(arr, size);

    //to display the sorted elements
    printf("The Sorted elements: ");
    for(i=0; i<size; i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");
}

//swap function
void swap(int *a, int *b)
{
    int temp;
    temp = *a;
    *a = *b;
    *b = temp;
}

//function to heapify a normal tree
void heapify(int arr[], int n)
{
    int i, parent, child;
    for(i = n/2 - 1; i>=0; --i)
    {
        parent = i;
        while(parent < n)
        {
            child = 2 * parent + 1;
            if(child >= n)
            {
                break;
            }
            if(child < n-1 && arr[child]<arr[child+1])
            {

```

```

        child = child + 1;
    }
    if(arr[parent] < arr[child])
    {
        swap(&arr[parent], &arr[child]);
        parent = child;
    }
    else
    {
        break;
    }
}
}

//function for sorting
void heapsort(int arr[], int n)
{
    heapify(arr,n);

    for(int j = n-1; j>0; j--)
    {
        swap(&arr[0], &arr[j]);
        heapify(arr,j);
    }
}

```

OUTPUT:

```

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

Enter number of elements: 8
Enter the elements: 35 83 73 96 103 48 57 104
The Unsorted elements: 35 83 73 96 103 48 57 104
The Sorted elements: 35 48 57 73 83 96 103 104
PS C:\Users\CHANDREYEE SHOME\Desktop\C C++>

```