

/* Assignment 01 :- Write a program for Max heap insert.. Lab :DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
class heap
{
private:
    int a[1000],n;
public:
    void getdata();
    void insert();
    void disp();
};
void heap::getdata()
{
    cout<<"\n...Program for Max Heap Insert...\n\n";
    cout<<"Enter the Size := " ;
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(20000);
    }
}
void heap::insert()
{
    for(int j=1;j<=n;j++)
    {
        int i=j;
        int item=a[i];
        while((i>1) && (a[i/2]<item))
        {
            a[i]=a[i/2];
            i=i/2;
        }
        a[i]=item;
    }
}
void heap::disp()
{
    for(int i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void main()
{
    clrscr();
    clock_t e,s;
    heap h;
```

```

h.getdata();
cout<<"\n\n Befor Insert :: ";
h.disp();
s=clock();
h.insert();
e=clock();
cout<<"\n\n After Insert ::\n";
h.disp();
cout<<"\n\nThe Time Complexity is ::"<<((e-s)/CLK_TCK);
getch();
}

```

/* OUTPUT :-

...Program for Max Heap Insert...

Enter the Size := 10

Befor Insert :: 211 79 6702 665 7114 4343 10739
3915 14006 18997

After Insert ::

18997 14006 7114 6702 10739 211 4343
79 3915 665

The Time Complexity is ::0

*/

/* Assignment 02 :- Write a program for Min Heap Insert.. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
class heap
{
private:
    int a[1000],n;
public:
    void getdata();
    void insert();
    void disp();
};
void heap::getdata()
{
    cout<<"\n...Program for Min Heap Insert...\n\n";
    cout<<"Enter the Size := " ;
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(20000);
    }
}
void heap::insert()
{
    for(int j=1;j<=n;j++)
    {
        int i=j;
        int item=a[i];
        while((i>1) && (a[i/2] > item))
        {
            a[i]=a[i/2];
            i=i/2;
        }
        a[i]=item;
    }
}
void heap::disp()
{
    for(int i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void main()
{
    clrscr();
    clock_t e,s;
    heap h;
    h.getdata();
```

```

cout<<"\n\n Befor Insert :: ";
h.disp();
s=clock();
h.insert();
e=clock();
cout<<"\n\n After Insert ::\n";
h.disp();
cout<<"\n\nThe Time Complexity is ::"<<((e-s)/CLK_TCK);
getch();
}

```

/* OUTPUT :-

...Program for Min Heap Insert...

Enter the Size := 10

Befor Insert :: 211 79 6702 665 7114 4343 10739
3915 14006 18997

After Insert ::

79 211 4343 665 7114 6702 10739
3915 14006 18997

The Time Complexity is ::0

*/

/* Assignment 03:-Program for MAX heap using Heapify/Adjust Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int a[1000],n;
class heap
{
    int i,j,item;
    public:
    void get();
    void show();
    void adjust(int [],int i,int j);
    void heapify(int [],int);
};
void heap::get()
{
    cout<<"Program for Max Heap using Heapify/Adjust..." ;
    cout<<"\n\nEnter the size of array :";
    cin>>n;
    for(i=1;i<=n;i++)
        a[i]=random(1000);
}
void heap::show()
{
    cout<<"\n The element is:= \n";
    for(i=1;i<=n;i++)
        cout<<a[i]<<"\t";
}
void heap::adjust(int a[],int i,int n)
{
    j=2*i;
    item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j]<a[j+1]))
            j++;
        if(item>=a[j])
            break;
        a[j/2]=a[j];
        j=2*j;
    }
    a[j/2]=item;
}
void heap::heapify(int a[],int n)
{
    for(i=n/2;i>=1;i--)
        adjust(a,i,n);
}
void main()
{
    clrscr();
```

```

        clock_t e,s;
        heap h;
        h.get();
        h.show();
        s=clock();
        h.heapify(a,n);
        e=clock();
        h.show();
        cout<<"\n The Time complexityis => "<<(e-s)/CLK_TCK;
        getch();
    }

```

/* OUTPUT :-

Program for Max Heap using Heapify/Adjust...

Enter the size of array :7

The element is:=

10 3 335 33 355 217 536

The element is:=

536 355 335 33 3 217 10

The Time complexityis => 0

*/

/* Assignment 04:-Program for MIN heap using Heapify/Adjust Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int a[1000],n;
class heap
{
    int i,j,item;
    public:
    void get();
    void show();
    void adjust(int [],int i,int j);
    void heapify(int [],int);
};
void heap::get()
{
    cout<<"Program for Min Heap using Heapify/Adjust..." ;
    cout<<"\n\nEnter the size of array :";
    cin>>n;
    for(i=1;i<=n;i++)
        a[i]=random(1000);
}
void heap::show()
{
    cout<<"\n The element is:= \n";
    for(i=1;i<=n;i++)
        cout<<a[i]<<"\t";
}
void heap::adjust(int a[],int i,int n)
{
    j=2*i;
    item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j]>a[j+1]))
            j++;
        if(item<=a[j])
            break;
        a[j/2]=a[j];
        j=2*j;
    }
    a[j/2]=item;
}
void heap::heapify(int a[],int n)
{
    for(i=n/2;i>=1;i--)
        adjust(a,i,n);
}
void main()
{
    clrscr();
```

```

        clock_t e,s;
        heap h;
        h.get();
        h.show();
        s=clock();
        h.heapify(a,n);
        e=clock();
        h.show();
        cout<<"\n The Time complexityis => "<<(e-s)/CLK_TCK;
        getch();
    }

```

//OUTPUT :-

/*

Program for Min Heap using Heapify/Adjust...

Enter the size of array :7

The element is:=

10 3 335 33 355 217 536

The element is:=

3 10 217 33 355 335 536

The Time complexityis => 0

*/

/* Assignment 05:- Write a program for HeapSort Ascending Using Insert/Delete Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<time.h>
#include<stdlib.h>
class heap
{
    int item,i,b[1000];
private:
    int a[1000],n;
public:
    void getdata();
    int delheap();
    void insert(int);
    void adjust(int[],int,int);
    void heapsort();
    void disp();
    void disp1();
};
void heap::getdata()
{
    cout<<"Program for HeapSort for Descending using Insert/Delete...\n";
    cout<<"\nEnter Size :=";
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(20000);
    }
}
void heap::insert(int i)
{
    int item=a[i];
    while((i>1) && (a[i/2]>item))
    {
        a[i]=a[i/2];
        i=i/2;
    }
    a[i]=item;
}
void heap::adjust(int a[],int i,int n)
{
    int j=2*i;
    item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j] > a[j+1]))
            j=j+1;
        if(item<=a[j])
            break;
        a[j/2]=a[j];
        j=2*j;
    }
    a[j/2]=item;
}
```

```

}
int heap::delheap()
{
    if(n==0)
    {
        cout<<"heap is empty :";
    }
    int x=a[1];
    a[1]=a[i];
    adjust(a,1,i-1);
    return x;
}
void heap::heapsort()
{
    for(i=1;i<=n;i++)
        insert(i);
    disp();
    for(i=n;i>=1;i--)
        b[i]=delheap();
}
void heap::disp()
{
    for(i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void heap::disp1()
{
    for(i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<b[i]<<"\t";
    }
}
void main()
{
    clrscr();
    clock_t e,s;
    heap h;
    h.getdata();
    cout<<"\n\n Before Sort :\n";
    s=clock();
    h.heapsort();
    e=clock();
    cout<<"\n\n After Sort :\n";
    h.disp1();
    cout<<"\n\n Time Complexity ::"<<((e-s)/(CLK_TCK));
    getch();
}

```

/*OUTPUT :

Program for HeapSort for Descending using Insert/Delete...

Enter Size :=50

Before Sort :

79 211 2179 665 3596 3273 9020
830 2428 6889 4388 4343 6702 10739 11286
3915 2279 8123 9497 11284 9821 5288 7114
8535 12909 16790 18464 16217 13964 12094 13233
11994 10983 14400 3303 16309 13710 14006 13424
18997 15287 16552 17374 19190 5495 8461 13895
8885 10765 19051

After Sort :

19190 19051 18997 18464 17374 16790 16552
16309 16217 15287 14400 14006 13964 13895 13710
13424 13233 12909 12094 11994 11286 11284 10983
10765 10739 9821 9497 9020 8885 8535 8461
8123 7114 6889 6702 5495 5288 4388 4343
3915 3596 3303 3273 2428 2279 2179 830
665 211 79

Time Complexity ::0

*/

/*Assignment 06:- Write a program for HeapSort Descending Using Insert/Delete Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<time.h>
#include<stdlib.h>
class heap
{
    int item,i,b[1000];
private:
    int a[1000],n;
public:
    void getdata();
    int delheap();
    void insert(int);
    void adjust(int[],int,int);
    void heapsort();
    void disp();
    void disp1();
};
void heap::getdata()
{
    cout<<"Program for HeapSort for Ascending using Insert/Delete...\n";
    cout<<"\nEnter Size :=";
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(20000);
    }
}
void heap::insert(int i)
{
    int item=a[i];
    while((i>1) && (a[i/2]<item))
    {
        a[i]=a[i/2];
        i=i/2;
    }
    a[i]=item;
}
void heap::adjust(int a[],int i,int n)
{
    int j=2*i;
    item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j]<a[j+1]))
            j=j+1;
        if(item>=a[j])
            break;
        a[j/2]=a[j];
        j=2*j;
    }
    a[j/2]=item;
}
```

```

}
int heap::delheap()
{
    if(n==0)
    {
        cout<<"heap is empty :";
    }
    int x=a[1];
    a[1]=a[i];
    adjust(a,1,i-1);
    return x;
}
void heap::heapsort()
{
    for(i=1;i<=n;i++)
        insert(i);
    disp();
    for(i=n;i>=1;i--)
        b[i]=delheap();
}
void heap::disp()
{
    for(i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void heap::disp1()
{
    for(i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<b[i]<<"\t";
    }
}
void main()
{
    clrscr();
    clock_t e,s;
    heap h;
    h.getdata();
    cout<<"\n\n Before Sort :\n";
    s=clock();
    h.heapsort();
    e=clock();
    cout<<"\n\n After Sort :\n";
    h.disp1();
    cout<<"\n\n Time Complexity ::"<<((e-s)/(CLK_TCK));
    getch();
}

```

```
//OUTPUT
```

```
/*
```

```
Program for HeapSort for Ascending using Insert/Delete...
```

```
Enter Size :=50
```

```
Before Sort :
```

```
19190 18997 19051 14400 17374 18464 16217
14006 13710 16552 16309 12909 16790 11286 13233
10983 11994 8123 13424 11284 15287 5495 13895
8535 10765 2179 13964 4343 9020 8885 12094
79 3303 830 2279 3915 2428 6702 9497
665 9821 6889 10739 5288 3596 4388 8461
211 3273 7114
```

```
After Sort :
```

```
79 211 665 830 2179 2279 2428
3273 3303 3596 3915 4343 4388 5288 5495
6702 6889 7114 8123 8461 8535 8885 9020
9497 9821 10739 10765 10983 11284 11286 11994
12094 12909 13233 13424 13710 13895 13964 14006
14400 15287 16217 16309 16552 16790 17374 18464
18997 19051 19190
```

```
Time Complexity ::0
```

```
*/
```

```

#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int b[5000];
class heap
{
    public:
        void heapsort(int a[],int n);
        void heapify(int a[],int n);
        void adjust(int a[],int i, int n);
};
void heap::heapsort(int a[],int n)
{
    heapify(a,n);
    for(int i=n;i>=2;i--)
    {
        int t=a[i];
        a[i]=a[1];
        a[1]=t;
        adjust(a,1,i-1);
    }
}
void heap::heapify(int a[],int n)
{
    int i;
    for(i=n/2;i>=1;i--)
    {
        adjust(a,i,n);
    }
}
void heap::adjust(int a[],int i,int n)
{
    int j=2*i;
    int item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j]<a[j+1]))
            j=j+1;
        if(item>=a[j])
            break;
        else
        {
            a[j/2]=a[j];
            j=2*j;
        }
    }
    a[j/2]=item;
}
void main()
{

```

```

clrscr();
clock_t e,s;
int n,i;
heap h;
cout<<"..Program For HeapSort Ascending using Adjust/Heapify..\n\n";
cout<<"\n Enter Size Of The Array :->";
cin>>n;
for(i=1;i<=n;i++)
{
    if(i%8==0)
        cout<<"\n";
    b[i]=random(n);
    cout<<"\t"<<b[i];
}
s=clock();
h.heapsort(b,n);
e=clock();
cout<<"\n After Heap Sorting : \n";
for(i=1;i<=n;i++)
{
    if(i%8==0)
        cout<<"\n";
    cout<<"\t"<<b[i];
}
cout<<"\n\n The Time Complexity Is :="<<((e-s)/CLK_TCK);
getch(); }
/*OUTPUT :-
..Program For HeapSort Ascending using Adjust/Heapify..

```

Enter Size Of The Array :->50

0	0	16	1	17	10	26	9
35	47	13	22	5	34	28	2
8	40	34	38	41	47	10	21
47	41	46	40	22	30	33	29
27	36	5	20	6	33	23	24
28	17	43	13	8	21	34	8
26	32						

After Heap Sorting :

0	0	1	2	2	5	8	8
9	10	13	16	17	20	20	21
21	22	22	23	24	26	26	26
26	27	27	28	28	29	30	32
33	33	34	34	34	34	36	38
40	40	40	41	41	41	43	46
47	47						

The Time Complexity Is :=0

*/

/* Assignment 08 :- Program for Heapsort Descending using Adjust/Heapify... Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int b[5000];
class heap
{
    public:
        void heapsort(int a[],int n);
        void heapify(int a[],int n);
        void adjust(int a[],int i, int n);
};
void heap::heapsort(int a[],int n)
{
    heapify(a,n);
    for(int i=n;i>=2;i--)
    {
        int t=a[i];
        a[i]=a[1];
        a[1]=t;
        adjust(a,1,i-1);
    }
}
void heap::heapify(int a[],int n)
{
    int i;
    for(i=n/2;i>=1;i--)
    {
        adjust(a,i,n);
    }
}
void heap::adjust(int a[],int i,int n)
{
    int j=2*i;
    int item=a[i];
    while(j<=n)
    {
        if((j<n) && (a[j]>a[j+1]))
            j=j+1;
        if(item<=a[j])
            break;
        else
        {
            a[j/2]=a[j];
            j=2*j;
        }
    }
    a[j/2]=item;
}
void main()
{
    clrscr();
    clock_t e,s;
```

```

int n,i;
heap h;
cout<<"..Program For HeapSort Descending using Adjust/Heapify..\n\n";
cout<<"\n Enter Size Of The Array :->";
cin>>n;
for(i=1;i<=n;i++)
{
    if(i%8==0)
        cout<<"\n";
    b[i]=random(n);
    cout<<"\t"<<b[i];
}
s=clock();
h.heapsort(b,n);
e=clock();
cout<<"\n After Heap Sorting : \n";
for(i=1;i<=n;i++)
{
    if(i%8==0)
        cout<<"\n";
    cout<<"\t"<<b[i];
}
cout<<"\n\n The Time Complexity Is :="<<((e-s)/CLK_TCK);
getch();
}

```

/* OUTPUT :-

..Program For HeapSort Descending using Adjust/Heapify..

Enter Size Of The Array :->50

0	0	16	1	17	10	26	
9	35	47	13	22	5	34	28
2	8	40	34	38	41	47	10
21	47	41	46	40	22	30	33
29	27	36	5	20	6	33	23
24	28	17	43	13	8	21	34
8	26	32					

After Heap Sorting :

47	47	47	46	43	41	41	
40	40	38	36	35	34	34	34
33	33	32	30	29	28	28	27
26	26	24	23	22	22	21	21
20	17	17	16	13	13	10	10
9	8	8	8	6	5	5	2
1	0	0					

The Time Complexity Is :=0

*/

```

/* Assignment 09 :- Program for Union And Find   Lab:DAA */
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
int p[100];
class heap
{
    int n,a,b,c,no;
public:
    void menu();
    void read_e();
    void s_union(int,int);
    int find(int);
    void print();
};
void heap::menu()
{
    int ch;
    cout<<"..... Program for Union And Find .....\\n\\n";
    cout<<"1:Read_ele 2:Simple union 3:Find 4:Print 5:Exit"<<endl;
    while(ch!=5)
    {
        switch(ch)
        {
            case 1:
                read_e();
                break;
            case 2:
                cout<<"\\n Enter root of two set node: ";
                cin>>a>>b;
                s_union(a,b);
                break;
            case 3:
                cout<<"\\n Find the node :";
                cin>>no;
                c=find(no);
                cout<<"root node is :";
                cout<<c;
                break;
            case 4:
                print();
                break;
            case 5:
                exit(0);
        }
        cout<<"\\n Enter the choice :";
        cin>>ch;
    }
}
void heap::read_e()
{
    cout<<"\\n Enter the Number of elements :";
    cin>>n;
}

```

```

        cout<<"\n Enter Elements :";
        for(int i=1;i<=n;i++)
            cin>>p[i];
    }
    void heap::s_union(int i,int j)
    {
        p[i]=j;
    }
    int heap::find(int i)
    {
        while(p[i]>=0)
        {
            i=p[i];
        }
        return i;
    }
    void heap::print()
    {
        cout<<"\n Union of Two set :";
        for(int i=1;i<=n;i++)
        {
            cout<<p[i]<<" ";
        }
    }

    void main()
    {
        clrscr();
        heap h;
        h.menu();
        getch();
    }

```

/* OUTPUT :-

..... Program for Union And Find

1:Read_ele 2:Simple union 3:Find 4:Print 5:Exit

```

Enter the choice :1
Enter the Number of elements :6
Enter Elements :-1 1 1 -1 4 4
Enter the choice :2
Enter root of two set node: 1 4
Enter the choice :4
Union of Two set :4 1 1 -1 4 4
Enter the choice :3
Find the node :6
root node is :4
Enter the choice :5
*/

```

/* Assignment 10:- Program for Weighted Union & Collapsing Find. Lab:DAA */

```
#include<conio.h>
#include<iostream.h>
#include<process.h>
class TreeOp
{
    int a[100],n,i,j,k,l,r;
    public:

void get()
{
    cout<<".... Program for Weighted Union & Collapsing Find.... \n\n ";
    cout<<"Enter The size :";
    cin>>n;
    cout<<"Enter the Elements :";
    for(i=1;i<=n;i++)
    {
        cin>>a[i];
    }
    cout<<"\n";
    for(i=1;i<=n;i++)
    {
        cout<<a[i]<<" ";
    }
}

void wunion()
{
    cout<<"\n Enter the two roots for union :\n";
    cin>>j>>k;
    int temp;
    temp=a[j]+a[k];
    if(a[j]>a[k])
    {
        a[j]=k;
        a[k]=temp;
    }
    else
    {
        a[k]=j;
        a[j]=temp;
    }
    cout<<"\n";
    for(i=1;i<=n;i++)
    {
        cout<<a[i]<<" ";
    }
}

void wfind()
{
    cout<<"\n Enter the element to find root :";
    cin>>l;
    r=l;
    while(a[r]>0)
```

```

        {
            r=a[r];
        }
        cout<<"Root is : "<<r;
        while(l!=r)
        {
            int s=a[l];
            a[l]=r;
            l=s;
        }
    }
};

void main()
{
    TreeOp t;
    clrscr();
    t.get();
    int ch;
    while(ch!=3)
    {
        cout<<"\n 1: Weighted Union 2: Collapsing Find 3: Exit ";
        cout<<"\nEnter your choice :";
        cin>>ch;
        switch(ch)
        {
            case 1:t.wunion();
                break;
            case 2:t.wfind();
                break;
            case 3:exit(0);
                break;
        }
    }
    getch();
}

```

/*OUTPUT :-

.... Program for Weighted Union & Collapsing Find....

Enter The size :10

Enter the Elements : -4 1 -4 1 3 2 3 5 -2 9

-4 1 -4 1 3 2 3 5 -2 9

1: Weighted Union 2: Collapsing Find 3: Exit

Enter your choice :2

Enter the element to find root :8

Root is : 3

1: Weighted Union 2: Collapsing Find 3: Exit

Enter your choice :1

Enter the two roots for union :

1 3

-8 1 1 1 3 2 3 3 -2 9

1: Weighted Union 2: Collapsing Find 3: Exit

Enter your choice :3 */

/* Assignment 11 :- Program for searching element from given array using Binary Search. Lab:DAA*/

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int a[1000];
class binary
{
int n,l,h,mid,x;
public:
void get();
void put();
int bsearch(int x);
void sort();
};
void binary::get()
{
cout<<"\n Enter the number of elements : " ;
cin>>n;
for(int i=1;i<=n;i++)
a[i]=random(20000);
}
void binary::put()
{
for(int i=1;i<=n;i++)
{
if(i%8==0)
cout<<endl;
cout<<a[i]<<"t';
}
}
int binary::bsearch(int x)
{
l=1;
h=n;
while(l<=h)
{
mid=(l+h)/2;
if(x<a[mid])
h=mid-1;
else if(x>a[mid])
l=mid+1;
else
{
return mid;
}
}
return 0;
}
void binary::sort()
{
for(int j=1;j<=n;j++)
```

```

for(int i=j;i<=n;i++)
{
if(a[i]<a[j])
{
int temp=a[i];
a[i]=a[j];
a[j]=temp;
}
}
}
void main()
{
clrscr();
cout<<"\n*** Program for Binary Search ***\n";
int x,y,i,yes,no;
clock_t e,s;
binary b;
b.get();
b.sort();
cout<<"\n Sorted elements are : "<<endl;
b.put();
cout<<"\n Enter elements You want to find : "<<endl;
cin>>x;
s=clock();
y=b.bsearch(x);
cout<<"find at Position : "<<y<<endl;
b.put();
e=clock();
cout<<"\n Time Complexity is :- "<<((e-s)/CLK_TCK);
getch();
}

```

/* Output :-

*** Program for Binary search ***

Enter the number of elements :10

Sorted elements are :

79 211 665 3915 4343 6702 7114
10739 14006 18997

Enter elements You want to find :

79

find at Position : 1

79 211 665 3915 4343 6702 7114
10739 14006 18997

Time Complexity is :- 0

*/

/* Assignment 12 :- Program for to find maximum and minimum from a given array using maxmin.

Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int max,min,n;
class sai
{
    int a[100];
    public:
    int j,i;
    void get();
    void put();
    void maxmin(int,int,int &,int &);
    void show();
};
void sai::get()
{
    cout<<"\n Enter the Size of array :- ";
    cin>>n;
    for(i=1;i<=n;i++)
    {
        a[i]=random(1000);
    }
}
void sai::put()
{
    cout<<"\n show The Element of array :- \n";
    for(i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}

void sai::maxmin(int i,int j,int &max,int &min)
{
    int mid,max1,min1,max2,min2;
    if(i==j)
    {
        max=min=a[i];
    }
    else if(i==j-1)
    {
        // cout<<a[i]<<" "<<a[j];
        if(a[i]<a[j])
        {
            max=a[j];
            min=a[i];
        }
    }
}
```

```

        else
        {
            max=a[i];
            min=a[j];
        }

    }
    else
    {
        mid=(i+j)/2;
        maxmin(i,mid,max1,min1);
        maxmin(mid+1,j,max2,min2);
        max=max1>max2?max1:max2;
        min=min1<min2?min1:min2;
    }
}

void sai::show()
{
    cout<<"\n The maximum element is :- "<<max;
    cout<<"\n The Minimum element is :- "<<min;
}

void main()
{
    clrscr();
    cout<<"\n\t*** Program for to find maximum and minimum from a given array using maxmin ***\n\t";
    sai s;
    clock_t e,l;
    s.get();
    s.put();
    e=clock();
    s.maxmin(1,n,max,min);
    l=clock();
    s.show();
    cout<<"\n The Time Complexity is :- "<<(l-e)/CLK_TCK;
    getch();
}

```

/* OUTPUT :-

```

*** Program for to find maximum and minimum from a given array using max
min ***

```

Enter the Size of array :- 5

show The Element of array :-

10 3 335 33 355

The maximum element is :- 355

The Minimum element is :- 3

The Time Complexity is :- 0 */

/* Assignment 13 :- Program for Ascending Merge Sort ... Lab :DAA */

```
#include<iostream.h>
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int n;
class Merge
{
int a[1000],i,j;
public:
void read();
void merge_sort(int l,int h);
void merge1(int l,int m,int h);
void disp();
};
void Merge::read()
{
for(i=0;i<n;i++)
{
a[i]=random(20000);
}
}
void Merge::merge_sort(int l,int h)
{
int m1;
if(l<h)
{
m1=int((l+h)/2);
merge_sort(l,m1);
merge_sort(m1+1,h);
merge1(l,m1,h);
}
}

void Merge::merge1(int l,int m,int h)
{
int h1=l,b[1800];
int i=l;
j=m+1;
while((h1<=m)&&(j<=h))
{
if(a[h1]<=a[j])
{
b[i]=a[h1];
i++;
h1++;
}
else
{
b[i]=a[j];
i++;
j++;
}
```

```

    }
    }
    if(h1<=m)
    {
        while(h1<=m)
        {
            b[i]=a[h1];
            i++;
            h1++;
        }
    }
    else
    {
        while(j<=h)
        {
            b[i]=a[j];
            i++;
            j++;
        }
    }
    for(int k=l;k<=h;k++)
    a[k]=b[k];
}

void Merge::disp()
{
    for(i=0;i<n;i++)
    {
        cout<<a[i]<<"\t";
        if((i+1)%9==0)
            cout<<endl;
    }
}

void main()
{
    clrscr();
    randomize();
    clock_t s,e;
    int l,h;
    Merge m;
    cout<<"Program for Ascending Merge Sort ...\n\n";
    cout<<"Enter the Element:";
    cin>>n;
    h=n-1;
    l=0;
    m.read();
    cout<<"\n\nDisplay the ArrayElement=\n\n";
    m.disp();
    s=clock();
    m.merge_sort(l,h);
    e=clock();
    cout<<"\nAfter Sorting=\n";
    m.disp();
    cout<<"\nTime Complexity is:= "<<((e-s)/CLK_TCK);

```

```
getch();
```

```
}
```

```
/* OUTPUT :-
```

```
Program for Ascending Merge Sort ...
```

```
Enter the Element:20
```

```
Display the ArrayElement=
```

```
1217  2426  16497  2396  1635  1326  17865  18869  9981  
18029  3826  1749  9149  5263  17811  5421  3775  19800  
6145  17186
```

```
After Sorting=
```

```
1217  1326  1635  1749  2396  2426  3775  3826  5263  
5421  6145  9149  9981  16497  17186  17811  17865  18029  
18869  19800
```

```
Time Complexity is:= 0
```

```
*/
```

/* Assignment 14 :- Program for Descending Merge Sort ... Lab:DAA */

```
#include<iostream.h>
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int n;
class Merge
{
int a[1000],i,j;
public:
void read();
void merge_sort(int l,int h);
void merge1(int l,int m,int h);
void disp();
};
void Merge::read()
{
for(i=0;i<n;i++)
{
a[i]=random(20000);
}
}
void Merge::merge_sort(int l,int h)
{
int m1;
if(l<h)
{
m1=int((l+h)/2);
merge_sort(l,m1);
merge_sort(m1+1,h);
merge1(l,m1,h);
}
}
void Merge::merge1(int l,int m,int h)
{
int h1=l,b[1800];
int i=l;
j=m+1;
while((h1<=m)&&(j<=h))
{
if(a[h1]>=a[j])
{
b[i]=a[h1];
i++;
h1++;
}
else
{
b[i]=a[j];
i++;
j++;
}
}
```

```

}
if(h1<=m)
{
while(h1<=m)
{
b[i]=a[h1];
i++;
h1++;
}
}
else
{
while(j<=h)
{
b[i]=a[j];
i++;
j++;
}
}
for(int k=l;k<=h;k++)
a[k]=b[k];
}
void Merge::disp()
{
for(i=0;i<n;i++)
{
cout<<a[i]<<"\t";
if((i+1)%9==0)
cout<<endl;
}
}
void main()
{
clrscr();
randomize();
clock_t s,e;
int l,h;
Merge m;
cout<<"Program For Descending Merge Sort ....\n\n";
cout<<"Enter the Element:";
cin>>n;
h=n-1;
l=0;
m.read();
cout<<"\n\nDisplay the ArrayElement=\n\n";
m.disp();
s=clock();
m.merge_sort(l,h);
e=clock();
cout<<"\nAfter Sorting=\n";
m.disp();
cout<<"\nTime Com.= "<<((e-s)/CLK_TCK);
getch();

```

```
}
```

```
/* OUTPUT :-
```

```
Program For Descending Merge Sort ....
```

```
Enter the Element:20
```

```
Display the ArrayElement=
```

```
10358 1643 9472 3864 102 5807 4162 15154 16666  
9315 15129 6801 8252 4668 8776 12038 2719 966  
5570 6927
```

```
After Sorting=
```

```
16666 15154 15129 12038 10358 9472 9315 8776 8252  
6927 6801 5807 5570 4668 4162 3864 2719 1643  
966 102
```

```
Time Com.= 0
```

```
*/
```


/* Assignment 15:- Program for Ascending Quick Sort. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int n,a[1000];
class q_sort
{
    public:
    void get();
    void put();
    void quick_sort(int,int);
    int partition(int,int);
};
void q_sort::get()
{
    cout<<"\n Enter the Size Of Array := ";
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(2000);
    }
}
void q_sort::put()
{
    for(int i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void q_sort::quick_sort(int p,int q)
{
    int j;
    if(p<q)
    {
        j=partition(p,q);
        quick_sort(p,j-1);
        quick_sort(j+1,q);
    }
}
int q_sort::partition(int m,int p)
{
    int v=a[m];
    int i=m+1;
    int j=p;
    while(i<=j)
    {
        while(a[i]<=v)
            i=i+1;

        while(a[j]>=v)
```

```

        j=j-1;
        if(i<j)
        {
            p=a[i];
            a[i]=a[j];
            a[j]=p;
        }
    }
    a[m]=a[j];
    a[j]=v;
    return j;
}
void main()
{
    clrscr();
    clock_t e,s;
    q_sort q;
    cout<<"\n.... Program For Ascending Quick Sort ..... \n\n";
    q.get();
    cout<<"\n Display the element of array before sort :=\n\n";
    q.put();
    s=clock();
    q.quick_sort(1,n);
    e=clock();
    cout<<"\n Display the element of array before sort :=\n";
    q.put();
    cout<<"\n The time Complexity := "<<(e-s)/CLK_TCK;
    getch();
}

```

/*OUTPUT :-

.... Program For Ascending Quick Sort

Enter the Size Of Array := 10

Display the element of array before sort :=

21 7 670 66 711 434 1073
391 1400 1899

Display the element of array before sort :=

7 21 66 391 434 670 1073
711 1400 1899

The time Complexity :=0

*/

/* Assignment 16:- Program for Descending Quick Sort. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
#include<time.h>
int n,a[1000];
class q_sort
{
    public:
    void get();
    void put();
    void quick_sort(int,int);
    int partition(int,int);
};
void q_sort::get()
{
    cout<<"\n Enter the Size Of Array := ";
    cin>>n;
    for(int i=1;i<=n;i++)
    {
        a[i]=random(2000);
    }
}
void q_sort::put()
{
    for(int i=1;i<=n;i++)
    {
        if(i%8==0)
            cout<<"\n";
        cout<<a[i]<<"\t";
    }
}
void q_sort::quick_sort(int p,int q)
{
    int j;
    if(p<q)
    {
        j=partition(p,q);
        quick_sort(p,j-1);
        quick_sort(j+1,q);
    }
}
int q_sort::partition(int m,int p)
{
    int v=a[m];
    int i=m+1;
    int j=p;
    while(i<=j)
    {
        while(a[i]>=v)
            i=i+1;

        while(a[j]<=v)
```

```

        j=j-1;
        if(i<j)
        {
            p=a[i];
            a[i]=a[j];
            a[j]=p;
        }
    }
    a[m]=a[j];
    a[j]=v;
    return j;
}
void main()
{
    clrscr();
    clock_t e,s;
    q_sort q;
    cout<<"\n.... Program For Descending Quick Sort ..... \n\n";
    q.get();
    cout<<"\n Display the element of array before sort :=\n\n";
    q.put();
    s=clock();
    q.quick_sort(1,n);
    e=clock();
    cout<<"\n Display the element of array before sort :=\n";
    q.put();
    cout<<"\n The time Complexity :="<<(e-s)/CLK_TCK;
    getch();
}

```

/*OUTPUT :-

.... Program For Descending Quick Sort

Enter the Size Of Array := 10

Display the element of array before sort :=

21 7 670 66 711 434 1073
391 1400 1899

Display the element of array before sort :=

1899 1400 1073 670 711 434 391
66 21 7

The time Complexity :=0

*/

/* Assignment 17 :- Program for Strassen's matrix multiplication. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<time.h>
class mmul
{
int a[3][3],b[3][3],c[3][3],p,q,r,s,t,u,v,i,j;
public:
void get();
void put();
void formula();
};
void mmul::get()
{
cout<<"\nEnter the matrix 1 :- ";
for(i=1;i<=2;i++)
for(j=1;j<=2;j++)
cin>>a[i][j];

cout<<"\nEnter the matrix 2 :- ";
for(i=1;i<=2;i++)
for(j=1;j<=2;j++)
cin>>b[i][j];
}
void mmul::formula()
{
p=((a[1][1]+a[2][2])*(b[1][1]+b[2][2]));
q=((a[2][1]+a[2][2])*(b[1][1]));
r=((a[1][1])*(b[1][2]-b[2][2]));
s=((a[2][2])*(b[2][1]-b[1][1]));
t=((a[1][1]+a[1][2])*(b[2][2]));
u=((a[2][1]-a[1][1])*(b[1][1]+b[1][2]));
v=((a[1][2]-a[2][2])*(b[2][1]+b[2][2]));
c[1][1]=p+s - t+v;
c[1][2]=r+t;
c[2][1]=q+s;
c[2][2]=p+r - q+u;
}
void mmul::put()
{
for(int i=1;i<=2;i++)
{
for(int j=1;j<=2;j++)
cout<<c[i][j]<<" ";
cout<<"\n";
}
}
void main()
{
clrscr();
cout<<"\n\t*** Program for Strassen's Matrix Multiplication ***\n\t";
mmul m;
clock_t e,s;
```

```

m.get();
s=clock();
m.formula();
cout<<"\nOutput :- "<<endl;
m.put();
e=clock();
cout<<"\n Time complexity :- "<<((e-s)/CLK_TCK);
getch();
}
/*OUTPUT :-

```

*** Program for Strassen's Matrix Multiplication ***

Enter the matrix 1 :-

```

1 1
1 1

```

Enter the matrix 2 :-

```

2 2
2 2

```

Output :-

```

4 4
4 4

```

Time complexity :- 0 */

/* Assignment 18 :- Program for Knapsack solutions. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<time.h>
int m,n;
class knapsack
{
float p[20],w[20],x[20],i,j,sum;
public:
void get();
void order();
void knap(int,int);
void show();
};
void knapsack::get()
{
cout<<"\nEnter the element size & sack size :- \n";
cin>>n>>m;

cout<<"\nEnter the profit :- \n";
for(i=1;i<=n;i++)
cin>>p[i];

cout<<"\nEnter the weight :- \n";
for(i=1;i<=n;i++)
cin>>w[i];
}
void knapsack::order()
{
for(i=1;i<=n;i++)
for(j=1;j<=n;j++)
{
if((p[j]/w[j])<=(p[j+1]/w[j+1]))
{
int temp=p[j];
p[j]=p[j+1];
p[j+1]=temp;

temp=w[j];
w[j]=w[j+1];
w[j+1]=temp;
}
}
}
void knapsack::knap(int m,int n)
{
int u;
sum=0.0;
for(i=1;i<=n;i++)
x[i]=0.0;
u=m;
for(i=1;i<=n;i++)
{
```

```

    if(w[i]>u)
    break;
    x[i]=1.0;
    u=u-w[i];
}
if(i<=n)
x[i]=u/w[i];
for(i=1;i<=n;i++)
sum=sum+(p[i]*x[i]);
}
void knapsack::show()
{
    for(i=1;i<=n;i++)
    cout<<x[i]<<" ";
    cout<<"\n-----\n";
    cout<<"Profit :- "<<sum<<"\n";
    cout<<"\n-----\n";
}
void main()
{
    clrscr();
    cout<<"\n\t*** Program for Knapsack Solution ***\n\t";
    knapsack k;
    k.get();
    k.order();
    k.knap(m,n);
    k.show();
    getch();
}
/* OUTPUT :-

```

*** Program for Knapsack Solution ***

Enter the element size & sack size :-

7 15

Enter the profit :-

10 5 15 7 6 8 3

Enter the weight :-

2 3 5 7 1 4 1

1 1 1 1 1 0.666667 0

Profit :- 45.333332

*/

/* Assignment 19:-Minmum cost spanning tree using prims algorithm Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
int g[100][100],tree[100],n;
class spanning
{
    public:
    void get()
    {
        cout<<"Enter the number of nodes :";
        cin>>n;
        cout<<"\n Enter the graph \n";
        for(int i=1;i<=n;i++)
        {
            for(int j=1;j<=n;j++)
            {
                cin>>g[i][j];
            }
        }
    }
    void dis()
    {
        cout<<"\n The Graph Is :\n";
        for(int i=1;i<=n;i++)
        {
            cout<<"\n";
            for(int j=1;j<=n;j++)
            {
                cout<<g[i][j]<<" ";
            }
        }
    }
    void prims()
    {
        int total=0,v1,v2;
        for(int l=1;l<=n;l++)
        {
            tree[l]=0;
        }
        tree[1]=1;
        cout<<"\n V1 V2 min_dist : ";
        for(int k=2;k<=n;k++)
        {
            int min_dist=30000;
            for(int i=1;i<=n;i++)
            {
                for(int j=1;j<=n;j++)
                {
                    if(g[i][j] && ((tree[i] && !tree[j])||(!tree[i]&&tree[j])))
                    {
                        if(g[i][j]<min_dist)
                        {

```

```

        min_dist=g[i][j];
        v1=i;
        v2=j;
    }
}
}
cout<<"\n"<<v1<<" "<<v2<<" "<<min_dist;
tree[v1]=1;
tree[v2]=1;
total=total+min_dist;
}
cout<<"\n Cost of spanning tree is : "<<total;
}
};
void main()
{
    spanning s;
    clrscr();
    cout<<"\n\t. Program For Minimum cost spanning tree Usin Prims Algorithm .\t\n\n";
    s.get();
    s.dis();
    s.prims();
    getch();
}

```

/* OUTPUT :-

Enter the number of nodes :6

Enter the graph

```

0 3 0 0 2 0
3 0 2 4 0 0
0 2 0 0 5 2
0 4 0 0 1 0
2 0 5 1 0 6
0 0 2 0 6 0

```

The Graph Is :

```

0 3 0 0 2 0
3 0 2 4 0 0
0 2 0 0 5 2
0 4 0 0 1 0
2 0 5 1 0 6
0 0 2 0 6 0
V1 V2 min_dist :
1 5 2
4 5 1
1 2 3
2 3 2
3 6 2

```

Cost of spanning tree is : 10

*/

```

/* Assignment 20 :- Program for demonstrate Kruskal Algorithm.    Lab:DAA */
#include<iostream.h>
#include<conio.h>
#define INFINITY 999
typedef struct Graph
{
int v1;
int v2;
int cost;
}GR;
GR G[20];
int tot_edges,tot_nodes;
void create();
void spanning_tree();
int Minimum(int);
void main()
{
clrscr();
cout<<"\n\t Graph Creation by adjacency matrix ";
create();
spanning_tree();
getch();
}
void create()
{
int k;
cout<<"\n Enter Total number of nodes: ";
cin>>tot_nodes;
cout<<"\n Enter Total number of edges: ";
cin>>tot_edges;
for(k=1;k<=tot_edges;k++)
{
cout<<"\n Enter Edge in (V1 V2)form ";
cin>>G[k].v1>>G[k].v2;
cout<<"\n Enter Corresponding Cost ";
cin>>G[k].cost;
}
}
void spanning_tree()
{
int count,k,v1,v2,i,j,tree[10][10],pos,parent[10];
int sum;
int Find(int v2,int parent[]);
void Union(int i,int j,int parent[]);
count=0;
k=1;
sum=0;
for(i=1;i<=tot_nodes;i++)
parent[i]=i;
while(count!=tot_nodes-1)
{
pos=Minimum(tot_edges);//finding the minimum cost edge
if(pos==-1)//Perhaps no node in the graph

```

```

break;
v1=G[pos].v1;
v2=G[pos].v2;
i=Find(v1,parent);
j=Find(v2,parent);
if(i!=j)
{
tree[k][1]=v1;//storing the minimum edge in array tree[]
tree[k][2]=v2;
k++;
count++;
sum+=G[pos].cost;//accumulating the total cost of MST
Union(i,j,parent);
}
G[pos].cost=INFINITY;
}
if(count==tot_nodes-1)
{
cout<<"\n Spanning tree is...";
cout<<"\n-----\n";
for(i=1;i<=tot_nodes-1;i++)
{
cout<<tree[i][1];
cout<<" - ";
cout<<tree[i][2];
cout<<"]";
}
cout<<"\n-----";
cout<<"\nCost of Spanning Tree is = "<<sum;
}
else
{
cout<<"There is no Spanning Tree";
}
}
int Minimum(int n)
{
int i,small,pos;
small=INFINITY;
pos=-1;
for(i=1;i<=n;i++)
{
if(G[i].cost<small)
{
small=G[i].cost;
pos=i;
}
}
return pos;
}
int Find(int v2,int parent[])
{
while(parent[v2]!=v2)

```

```

{
v2=parent[v2];
}
return v2;
}
void Union(int i,int j,int parent[])
{
if(i<j)
parent[j]=i;
else
parent[i]=j;
}

```

/* Output :-

Enter Edge in (V1 V2)form 1 4

Enter Corresponding Cost 4

Enter Edge in (V1 V2)form 1 3

Enter Corresponding Cost 2

Enter Edge in (V1 V2)form 2 4

Enter Corresponding Cost 3

Enter Edge in (V1 V2)form 2 3

Enter Corresponding Cost 1

Enter Edge in (V1 V2)form 3 4

Enter Corresponding Cost 4

Spanning tree is...

2 - 3]1 - 3]2 - 4]

Cost of Spanning Tree is = 6

*/

/* Assignment 21:- Program for single source shortest path. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
int n;
class single
{
int v,cost[10][10],i,j,s[10];
float dist[10];
public:
void get();
void sisource();
void display();
};
void single::get()
{
cout<<"\nEnter the no. of vertices :- \n";
cin>>n;
cout<<"\nEnter the adjacency matrix :- \n";
for(i=1;i<=n;i++)
for(j=1;j<=n;j++)
{
cin>>cost [i][j];
if(cost [i][j]==-1)
cost [i][j]=9999;
}
}
void single::sisource()
{
v=1;
for(i=1;i<=n;i++)
{
s[i]=0;
dist[i] = cost [v][i];
}
s[v]=1;
dist[v]=0.0;
int minu,u;
for(int num=2;num<=n;num++)
{
for(i=1;i<=n;i++)
if(s[i]==0)
minu=dist[i];
for(i=1;i<=n;i++)
{
if(s[i]==0 && dist[i]<minu)
{
minu=dist[i];
u=i;
}
}
s[u]=1;
for(i=1;i<=n;i++)
{
```

```

if(cost [u][i]>0 && cost [u][i] < 9999 && s[i]==0) {
if(dist[i] > (dist [u] + cost[u][i]))
{
dist [i]= dist [u] + cost [u][i];
}
}
}
}
}
void single::display()
{
cout<<endl;
for(i=1;i<=n;i++)
{
cout<<"distance from 1----->"<<i<<"\t";
cout<<dist[i]<<" ";
cout<<endl;
}
}
void main()
{
clrscr();
single g;
g.get();
g.sisource();
g.display();
getch();
}

```

/* Output :-

Enter the no. of vertices :- 6

Enter the adjacency matrix :-

```

0 50 45 10 -1 -1
-1 0 10 15 -1 -1
-1 -1 0 -1 30 -1
20 -1 -1 0 15 -1
-1 20 35 -1 0 -1
-1 -1 -1 -1 3 0

```

```

distance from 1----->1  0
distance from 1----->2  45
distance from 1----->3  45
distance from 1----->4  10
distance from 1----->5  25
distance from 1----->6  9999

```

*/

```

/* Assignment 22 :- Implementation of 0/1 knapsack. Lab:DAA */
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
int table[10][10];
int w[100],v[100];
int W,n;
class knap
{
public:
knap()
{
cout<<"\n\t\t 0/1 Knapsack Problem using Dynamic Programming"; /*initialization of table*/
for(int i=0;i<=n;i++)
{
for(int j=0;j<=W;j++)
{
table[i][j]=0;
}
}
}
void get()
{
cout<<"\n Enter how many products you want to declare :- \n"; cin>>n;
cout<<"\n Enter Knapsack size :\n";
cin>>W;
cout<<"\n Enter "<<n<<" products weight and profit :- \n"; for(int i=1;i<=n;i++)
{ cout<<"\n Enter Product "<<i<<" weight :- \t";
cin>>w[i];
cout<<"\n Enter Product "<<i<<" profit :- \t";
cin>>v[i];
}
}
int max(int a,int b)
{
if(a>b)
return a;
else
return b;
}
void find_item(int i,int k,int w[5])
{
cout<<"\nFor the Knapsack...\n";
while(i>0 && k>0)
{
if(table[i][k]!=table[i-1][k])
{
cout<<"\nItem "<<i<<" is selected\n";
k=k-w[i];
i=i-1;
}
else
i=i-1;
}
}
}

```



```

    }
    }
    void DKP(int n,int W,int w[5],int v[5])
    {
    int i,j;
    int val1,val2;
    for(i=0;i<=n;i++)
    {
    for(j=0;j<=W;j++)
    {
    table[i][0]=0;
    table[0][j]=0;
    }
    }
    for(i=1;i<=n;i++)
    {
    for(j=1;j<=W;j++)
    {
    if(w[i]<=j)
    {
    val1=table[i-1][j];
    val2=v[i]+table[i-1][j-w[i]];
    table[i][j]=max(val1,val2);
    }
    else
    table[i][j]=table[i-1][j];
    }
    }
    cout<<"\n Table constructed using dynamic programming is...\n";
    for(i=0;i<=n;i++)
    {
    for(j=0;j<=W;j++)
    cout<<table[i][j]<<"\t";
    cout<<"\n";
    }
    find_item(n,W,w);
    }
    };
    void main()
    {
    knap k;
    clrscr();
    k.get();
    k.DKP(n,W,w,v);
    getch();
    }

```

/* Output :-

Enter how many products you want to declare :- 4

Enter knapsack size :- 5

Enter 4 product weight and profit :-

Enter product 1 weight :- 2

Enter product 1 weight :- 3

Enter Product 2 weight :- 3

Enter Product 2 profit :- 4

Enter Product 3 weight :- 4

Enter Product 3 profit :- 5

Enter Product 4 weight :- 5

Enter Product 4 profit :- 6

Table constructed using dynamic programming is...

0	0	0	0	0	0
0	0	3	3	3	3
0	0	3	4	4	7
0	0	3	4	5	7
0	0	3	4	5	7

For the Knapsack...

Item 2 is selected

Item 1 is selected

*/

/* Assignment 23 :- Program for longest common subsequence. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<string.h>
#include<stdio.h>
void print_lcs(char b[][20],char x[],int i,int j)
{
if(i==0 || j==0)
return;
if(b[i][j]=='c')
{
print_lcs(b,x,i-1,j-1);
cout<<x[i-1]<<"\t";
}
else
if(b[i][j]=='u')
print_lcs(b,x,i-1,j);
else
print_lcs(b,x,i,j-1);
}
void lcs_length(char x[],char y[])
{
int m,n,i,j,c[20][20];
char b[20][20];
m=strlen(x);
n=strlen(y);
for(i=0;i<=m;i++)
c[i][0]=0;
for(i=0;i<=n;i++)
c[0][i]=0;
for(i=1;i<=m;i++)
for(j=1;j<=n;j++)
{
if(x[i-1]==y[j-1])
{
c[i][j]=c[i-1][j-1]+1;
b[i][j]='c'; //c stands for left up cross
}
else
if(c[i-1][j]>=c[i][j-1])
{
c[i][j]=c[i-1][j];
b[i][j]='u'; //u stands for upright or above
}
else
{
c[i][j]=c[i][j-1];
b[i][j]='l'; //l stands for left
}
}
print_lcs(b,x,m,n);
}
void lcs()
```

```

{
int i,j;
char x[20],y[20];
cout<<"1st sequence :- ";
gets(x);
cout<<"2nd sequence :- ";
gets(y);
cout<<"\nLCS are :- ";
lcs_length(x,y);
cout<<"\n";
// lcs_length(y,x);
}
void main()
{
clrscr();
char ch;
do
{
lcs();
cout<<"\nContinue(y/n) :- ";
cin>>ch;
}
while(ch=='y'||ch=='Y');
getch();
}

/*Output :-
1st sequence :- BAAADC
2nd sequence :- ABAADC

LCS are :- B  A  A  D  C

Continue(y/n) :- n

*/

```

/* Assignment 24 :- Implantation of matrix chain multiplication. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#define INF 30000
int p[100],m[100][100],s[100][100],k,n,j,q,i,l;
class matrix_chain
{
public:
void get()
{
cout<<"\n Enter total matrix count :\n";
cin>>n;
cout<<"\n Enter Matrix Orders :\n";
for(int i=0;i<=n;i++)
{
cout<<"\nP["<<i<<"]="";
cin>>p[i];
}
matrix_chain1(p,n);
}
void matrix_chain1(int p[],int n)
{
for (i=1;i<=n;i++)
m[i][i]=0;
for (l=2;l<=n;l++)
{
for (i=1;i<=n-l+1;i++)
{
j=i+l-1;
m[i][j]=INF;
for (k=i;k<=j-1;k++)
{
q=m[i][k]+m[k+1][j]+p[i-1]*p[k]*p[j];
if(q<m[i][j])
{
m[i][j]=q;
s[i][j]=k;
}
}
}
}
cout<<"\n Total Optimal Scalar Multiplication needed are :- "<<m[1][n];
cout<<"\n Array M[i][j] is \n";
for(i=1;i<=n;i++)
{
cout<<"\n";
for(j=1;j<=n;j++)
cout<<m[i][j]<<"\t";
}
cout<<"\n Array S[i][j] is :- \n";
for(i=1;i<=n;i++)
{
cout<<"\n";
```

```

for(j=1;j<=n;j++)
cout<<s[i][j]<<"\t";
}
}
void print_optimal(int i,int j)
{
if (i==j)
cout<<" A "<<i;
else
{
cout<<" ( ";
print_optimal(i,s[i][j]);
print_optimal(s[i][j]+1,j);
cout<<" ) ";
}
}
};
void main()
{
clrscr();
matrix_chain m1;
m1.get();
m1.print_optimal(1,n);
getch();
}

```

/* Output :-

Enter total matrix count :- 3

Enter Matrix Orders :

P[0]=10

P[1]=100

P[2]=5

P[3]=50

Total Optimal Scalar Multiplication needed are :- 7500

Array M[i][j] is

0	5000	7500
0	0	25000
0	0	0

Array S[i][j] is :-

0	1	2
0	0	2
0	0	0

optimal sequence is :-

((A 1 A 2) A 3)

*/

/* Assignment 25 :- Program for All pair shortest path. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
class all
{
int s[10][10],a[10][10],i,j,k,n,m;
public:
void get();
int min(int,int);
void find();
void display();
};
int all::min(int m,int n)
{
return(m<n ?m:n);
}
void all::get()
{
cout<<"\n Enter the size of element :- \n";
cin>>n;
cout<<"\nEnter the element in array :- \n";
for(i=1;i<=n;i++)
{
for(j=1;j<=n;j++)
{
cin>>a[i][j];
if(a[i][j]==-1)
{
s[i][j]=9999;
}
else
{
s[i][j]=a[i][j];
}
}
}
}
void all::find()
{
for(i=1;i<=n;i++)
for(j=1;j<=n;j++)
for(k=1;k<=n;k++)
{
if(i==j)
{
s[i][j]=0;
}
else
s[i][j]=min(s[i][j],s[i][k]+s[k][j]);
if(s[i][j]>=9999)
s[i][j]=0;
}
}
```

```

}
void all::display()
{
cout<<"\n display the element after perform operation find :- \n";
for(i=1;i<=n;i++)
{
for(j=1;j<=n;j++)
{
cout<<s[i][j]<<"\t";
}
cout<<endl;
}
}
void main()
{
clrscr();
all a;
a.get();
a.find();
a.display();
getch();
}

```

/*Output :-

Enter the size of element :- 3

Enter the element in array :-

0 4 11

6 0 2

3 -1 0

display the element after perform operation find :-

0 4 6

5 0 2

3 7 0

*/


```

/* Assignment 26 :- Program to demonstrate breath first traversal.  Lab:DAA */
#include<iostream.h>
#include<conio.h>
class bfstree
{
int reach[20],a[20][20],q[20],n,i,j,f,r,index;
public:
bfstree()
{
f=r=0;
index=1;
}
void get();
void bfs(int);
};
void bfstree::get()
{
cout<<"\nEnter number of vertices :- ";
cin>>n;
cout<<"\nEnter Adjacency matrix :- ";
for(i=1;i<=n;i++)
for(j=1;j<=n;j++)
{
reach[i]=0;
cin>>a[i][j];
}
for(i=1;i<=n;i++)
if(reach[i]==0)
bfs(i);
}
void bfstree::bfs(int index)
{ f=r=0;
reach[index]=1;
f++;
r++;
q[r]=index;
while(f<=r)
{
index=q[f];
f++;
cout<<index<<"\t";
for(j=1;j<=n;j++)
{
if(a[index][j]==1 && reach[j]!=1)
{
reach[j]=1;
r++;
q[r]=j;
}
}
}
}
void main()

```

```
{  
clrscr();  
bfstree b;  
b.get();  
getch();  
}
```

/* Output :-

Enter number of vertices :- 6

Enter Adjacency matrix :-

0 1 1 0 0 0

1 0 0 1 0 0

1 0 0 0 0 1

0 1 0 0 1 1

0 0 0 1 0 0

0 0 1 1 0 0

1 2 3 4 6 5

*/

/* Assignment 27 :- Program to demonstrate depth first traversal. Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
class dfstree
{
int a[20][20], visited[20],n,i,j;
public:
void dfs(int);
void get();
};
void dfstree::get()
{
cout<<"\nEnter the number of node :- ";
cin>>n;
for(i=1;i<=n;i++)
visited[i]=0;
cout<<"\nEnter the adjancy matrix :- ";
for(i=1;i<=n;i++)
{ for(j=1;j<=n;j++)
cin>>a[i][j];
}
for(i=1;i<=n;i++)
if(visited[i]==0)
dfs(i);
}
void dfstree::dfs(int v)
{
int k;
visited[v]=1;
cout<<"\t"<<v;
for(k=1;k<=n;k++)
if(a[v][k]==1)
if(visited[k]==0)
dfs(k);
}
void main()
{ clrscr();
dfstree d;
d.get();
getch();
}
/*Output :-
Enter the number of node :- 5
Enter the adjancy matrix :-
0 1 1 0 0
1 0 0 1 1
1 0 0 1 0
0 1 1 0 1
0 1 0 1 0

      1    2    4    3    5
*/
```

```

/* Assignment 28 :- program for n Queen for all solution   Lab:DAA*/
#include<iostream.h>
#include<conio.h>
#include<math.h>
int x[100],n;
class nqueen
{
int z;
public:
void get();
void show();
void queen(int,int);
int place(int,int);
};
void nqueen::get()
{
cout<<"Enter the no of queens :- \n";
cin>>n;
for(int i=1;i<=n;i++)
x[i]=0;
z=0;
queen(1,n);
}
void nqueen::queen(int k,int n)
{
for(int i=1;i<=n;i++)
{
if(place(k,i))
{
x[k]=i;
if(k==n)
{
cout<<endl;z++; cout<<z<<":->";
for( i=1;i<=n;i++)
cout<<x[i]<<"\t";
}
else
queen(k+1,n);
}
}
}
int nqueen::place(int k,int i)
{
for(int j=1;j<=k-1;j++)
{
if((x[j]==i) || abs(x[j]-i)==(abs(j-k)))
return 0;
}
return 1;
}
void main()
{

```

```

clrscr();
nqueen n;
n.get();
getch();
}
/* OutPut :-
Enter the no of queens :-
4

1:->2  4    1    3
2:->3  1    4    2

*/

```

/* Assignment 29 :- program for n Queen for in equivalent solution Lab:DAA */

```
#include<iostream.h>
#include<conio.h>
#include<math.h>
class nqueen
{
int n,x[200],cnt;
public :
nqueen(int);
void putdata();
int place(int);
void NQueen();
};
nqueen :: nqueen(int no)
{
n = no;
cnt = 0;
for(int i = 1;i <= n;i++)
x[i] = 0;
}
void nqueen :: putdata()
{
cout<<"\n";
for(int j = 1;j <= n;j++)
{
cout<<x[j]<<"\t";
}
}

void nqueen :: NQueen()
{
int k = 1;
x[k] = 0;
while(k > 0)
{
x[k] = x[k] + 1;
if( k == 1 && x[k] > (n/2) )
{
break;
}
while( x[k] <= n && place(k) == 0)
{
x[k] = x[k] + 1;
}
if(x[k] <= n)
{
if( k == n)
{
cnt++;
cout<<"\nSolution Number "<<cnt<<" : \n";
putdata();
}
else
```

```

{
k++;
x[k] = 0;
}
}
else
{
k--;
}
}
}
int nqueen :: place(int k)
{
for(int j = 1;j < k;j++)
{
if( x[j] == x[k] || abs(x[j] - x[k]) == abs(j - k) )
return(0);
}
return(1);
}
void main()
{
clrscr();
int no;
cout<<"\nEnter number of queen : ";
cin>>no;
if( no == 2 || no == 3)
{
cout<<"\nSolution is not possible.";
}
else
{
nqueen n(no);
n.NQueen();
}
getch();
}
/* OUTPUT :-

```

Enter number of queen : 4

Solution Number 1 :

```

2    4    1    3
*/

```

```

/* Assignment 30 :- program for graph coloring   Lab:DAA */
#include<iostream.h>
#include<conio.h>
#include<time.h>
int c[10][10],n,m;
class graph
{
int i,j,x[100];
public:
void get();
void color(int);
void show();
void nextvalue(int);
};
void graph::get()
{
cout<<"Enter the size of array\n";
cin>>n;
cout<<"Enter the color for graph\n";
cin>>m;
cout<<"Enter the adjancy matrix\n";
for(i=1;i<=n;i++)
{
for(j=1;j<=n;j++)
{
cin>>c[i][j];
}
}
for(i=1;i<=n;i++)
x[i]=0;
color(1);
}
void graph::nextvalue(int k)
{
do
{
x[k]=((x[k]+1)%(m+1));
if(x[k]==0)
return ;
for(j=1;j<=n;j++)
if((c[k][j]!=0)&&(x[k]==x[j]))
break;
if(j==n+1)
return;
}while(1);
}
void graph::color(int k)
{
do
{
nextvalue(k);
if(x[k]==0)
return;
}
}

```



```

if(k==n)
{
cout<<"\nColour of graph is :";
for(i=1;i<=n;i++)
cout<<x[i]<<"\t";
}
else
color(k+1);
}while(1);
}
void main()
{
clrscr();
graph g;
g.get();
getch();
}

```

/*OUTPUT :-

Enter the size of array

3

Enter the color for graph

2

Enter the adjancy matrix

0 1 0

1 0 1

0 1 0

Colour of graph is :1 2 1

Colour of graph is :2 1 2

*/