Code :

```
#include <bits/stdc++.h>
using namespace std;
struct Student
{
    int roll_no;
    string name;
    double SGPA;
};
class Student_Data
{
public:
    int n;
    Student v[20];
    Student temp;
    void get_data();
    void display(int x);
    void roll_call();
    void alpha_name();
    int partition(int low, int high);
    void quickSort(int low, int high);
    void linearSearch();
    void binarySearch();
};
void Student_Data ::get_data()
{
    cout << "-----------------------------------------" << endl;
    cout << "Enter number of students : ";
    cin >> n;
    cout << "-----------------------------------------" << endl;
    for (int i = 0; i < n; i++)
    {
        cout << "::"
             << "Data Entry for Student " << i + 1 << "::" << endl;
        cout << "Enter Roll Number : ";
        cin >> v[i].roll_no;

        cout << "Enter name of Student : ";
        cin >> v[i].name;

        cout << "Enter SGPA of Student : ";
        cin >> v[i].SGPA;
```

```
        while (v[i].SGPA > 10)
        {
            cout << "Please enter less than 10 again" << endl;
            cout << "Enter the SGPA of Student: ";
            cin >> v[i].SGPA;
        }
        cout << "-----------------------------------------" << endl;
    }
}
void Student_Data ::display(int x)
{
    cout << "ROLL NO"
         << "\t\t\t\t\t\t"
         << "NAME"
         << "\t\t\t\t\t\t"
         << "SGPA" << endl;

    for (int i = 0; i < x; i++)
    {
        cout << v[i].roll_no << "\t\t\t\t\t\t" << v[i].name <<
"\t\t\t\t\t\t" << v[i].SGPA << endl;
    }
    cout << "-----------------------------------------" << endl;
}
void Student_Data ::roll_call()
{
    bool flag;
    for (int i = 0; i < n - 1; i++)
    {
        flag = false;
        for (int j = 0; j < n - 1 - i; j++)
        {
            if (v[j].roll_no > v[j + 1].roll_no)
            {
                swap(v[j], v[j + 1]);
                flag = true;
            }
        }

        if (flag == false)
        {
            break;
        }
```

```
    }
    cout << "Data according to roll call : " << endl;
    display(n);
}
void Student_Data ::alpha_name()
{
    for (int i = 1; i < n; i++)
    {
        temp = v[i];
        string key = v[i].name;
        int j = i - 1;
        while (j >= 0 && v[j].name > key)
        {
            v[j + 1] = v[j];
            j--;
        }
        v[j + 1] = temp;
    }
    cout << "Data according to name : " << endl;
    display(n);
}
int Student_Data ::partition(int low, int high)
{
    int pivot = v[low].SGPA;
    int i = low;
    int j = high;
    while (i < j)
    {
        while (v[i].SGPA >= pivot)
        {
            i++;
        }
        while (v[j].SGPA < pivot)
        {
            j--;
        }
        if (i < j)
        {
            swap(v[i], v[j]);
        }
    }
    swap(v[low], v[j]);
    return j;
```

```
}
void Student_Data ::quickSort(int low, int high)
{
    if (low < high)
    {
        int pivot = partition(low, high);
        quickSort(low, pivot - 1);
        quickSort(pivot + 1, high);
    }
}
void Student_Data ::linearSearch()
{
    string str;
    cout << "Enter the name of the student : ";
    cin >> str;
    bool flag = false;
    for (int i = 0; i < n; i++)
    {
        if (str == v[i].name)
        {
            flag = true;
            cout << "-------------------------------------------" <<
endl;
            cout << "DataSet of " << str << endl;
            cout << "ROLL NO"
                 << "\t\t\t\t\t\t"
                 << "NAME"
                 << "\t\t\t\t\t\t"
                 << "SGPA" << endl;
            cout << v[i].roll_no << "\t\t\t\t\t\t" << v[i].name <<
"\t\t\t\t\t\t" << v[i].SGPA << endl;
            cout << "-------------------------------------------" <<
endl;
        }
    }
    if (flag == false)
    {
        cout << "Element not found" << endl;
    }
}
void Student_Data ::binarySearch()
{
    cin.ignore();
```

```
    double key;
    cout << "Enter the SGPA : ";
    cin >> key;

    while (key > 10)
    {
        cout << "Please enter less than 10 again" << endl;
        cout << "Enter the SGPA : ";
        cin >> key;
    }
    int low = 0;
    int high = n - 1;
    bool flag = false;
    cout << "-----------------------------------------" << endl;

    while (low <= high)
    {
        int mid = low + (high - low) / 2;
        if (v[mid].SGPA == key)
        {
            flag = true;
            cout << "ROLL NO :    " << v[mid].roll_no << "\t\t\t\t\t\t
NAME :    " << v[mid].name << "\t\t\t\t\t\t  SGPA :    " << v[mid].SGPA
<< endl;
            break;
        }
        else if (key > v[mid].SGPA)
        {
            low = mid + 1;
        }
        else if (key < v[mid].SGPA)
        {
            high = mid - 1;
        }
    }

    cout << "-----------------------------------------" << endl;
}
int main()
{
    Student_Data obj;
    obj.get_data();
    int x = 1;
```

```
    while (x)
    {
        int choice;
        cout << "----------------------------------------" << endl;
        cout << "1. Sort data by Roll Call" << endl;
        cout << "2. Sort data by Alphabetical order" << endl;
        cout << "3. Sort data by SGPA" << endl;
        cout << "4. Access data by name" << endl;
        cout << "5. Access data by SGPA" << endl;
        cout << "0. To exit" << endl;
        cout << "----------------------------------------" << endl
             << endl;
        cout << "Choice : ";
        cin >> choice;
        switch (choice)
        {
        case 0:
            x = 0;
            cout << "Exit..." << endl;
            break;
        case 1:
            obj.roll_call();
            break;
        case 2:
            obj.alpha_name();
            break;
        case 3:
            obj.quickSort(0, obj.n - 1);
            if (obj.n <= 10)
            {
                obj.display(obj.n);
            }
            else
            {
                obj.display(10);
            }
            break;
        case 4:
            obj.linearSearch();
            break;
        case 5:
            obj.binarySearch();
            break;
```

```
        default:
            cout << "Wrong choice" << endl;
            break;
        }
    }

    return 0;
}
```

Output :

Enter number of students : 15

::Data Entry for Student 1::
Enter Roll Number : 2
Enter name of Student : ram
Enter SGPA of Student : 5.5

::Data Entry for Student 2::
Enter Roll Number : 1
Enter name of Student : tim
Enter SGPA of Student : 5.7

::Data Entry for Student 3::
Enter Roll Number : 3
Enter name of Student : kim
Enter SGPA of Student : 11
Please enter less than 10 again
Enter the SGPA of Student: 5.8

::Data Entry for Student 4::
Enter Roll Number : 5
Enter name of Student : tina
Enter SGPA of Student : 6

::Data Entry for Student 5::
Enter Roll Number : 4
Enter name of Student : sima
Enter SGPA of Student : 6.1

::Data Entry for Student 6::
Enter Roll Number : 6

```
Enter name of Student : naira
Enter SGPA of Student : 6.1
----------------------------------------
::Data Entry for Student 7::
Enter Roll Number : 7
Enter name of Student : krish
Enter SGPA of Student : 6.5
----------------------------------------
::Data Entry for Student 8::
Enter Roll Number : 9
Enter name of Student : ema
Enter SGPA of Student : 6.8
----------------------------------------
::Data Entry for Student 9::
Enter Roll Number : 8
Enter name of Student : riya
Enter SGPA of Student : 7.1
----------------------------------------
::Data Entry for Student 10::
Enter Roll Number : 10
Enter name of Student : tiya
Enter SGPA of Student : 7.1
----------------------------------------
::Data Entry for Student 11::
Enter Roll Number : 11
Enter name of Student : king
Enter SGPA of Student : 7.7
----------------------------------------
::Data Entry for Student 12::
Enter Roll Number : 13
Enter name of Student : sita
Enter SGPA of Student : 8
----------------------------------------
::Data Entry for Student 13::
Enter Roll Number : 12
Enter name of Student : rita
Enter SGPA of Student : 8.5
----------------------------------------
::Data Entry for Student 14::
Enter Roll Number : 14
Enter name of Student : lucky
Enter SGPA of Student : 9.1
----------------------------------------
::Data Entry for Student 15::
Enter Roll Number : 15
Enter name of Student : shivang
Enter SGPA of Student : 9.9
----------------------------------------
```

```
----------------------------------------
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit
----------------------------------------

Choice : 4
Enter the name of the student : shivang
----------------------------------------
DataSet of shivang
ROLL NO                 NAME                    SGPA
15                      shivang                 9.9
----------------------------------------
----------------------------------------
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit
----------------------------------------

Choice : 5
Enter the SGPA : 7.1
----------------------------------------
ROLL NO :   10              NAME :   tiya               SGPA: 7.1
----------------------------------------
----------------------------------------
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit
----------------------------------------

Choice : 1
Data according to roll call :
ROLL NO                 NAME                    SGPA
1                       tim                     5.7
2                       ram                     5.5
3                       kim                     5.8
4                       sima                    6.1
5                       tina                    6
6                       naira                   6.1
```

7	krish	6.5
8	riya	7.1
9	ema	6.8
10	tiya	7.1
11	king	7.7
12	rita	8.5
13	sita	8
14	lucky	9.1
15	shivang	9.9

---
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit

Choice : 2
Data according to name :

ROLL NO	NAME	SGPA
9	ema	6.8
3	kim	5.8
11	king	7.7
7	krish	6.5
14	lucky	9.1
6	naira	6.1
2	ram	5.5
12	rita	8.5
8	riya	7.1
15	shivang	9.9
4	sima	6.1
13	sita	8
1	tim	5.7
5	tina	6
10	tiya	7.1

---
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit

Choice : 3

ROLL NO	NAME	SGPA
15	shivang	9.9
14	lucky	9.1
12	rita	8.5
13	sita	8
8	riya	7.1
11	king	7.7
10	tiya	7.1
6	naira	6.1
5	tina	6
4	sima	6.1

---
1. Sort data by Roll Call
2. Sort data by Alphabetical order
3. Sort data by SGPA
4. Access data by name
5. Access data by SGPA
0. To exit

Choice : 0
Exit...