**Question Number 1:**

**PROGRAM:**

#include<iostream>

#include<string>

using namespace std;

class Publications

{

public:

string title;

float price;

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

}

};

class Book :public Publications

{

public:

int page\_count;

void getter()

{

cout << endl << "Enter the Title of the Book : ";

cin >> title;

cout << "Enter the Price of the Book : ";

cin >> price;

cout << "Enter the Page Count of the Book : ";

cin >> page\_count;

}

void setter()

{

cout << endl << "The Title of Book is : " << title << endl;

cout << "The Price of the Book is : " << price << "/-RS" << endl;

cout << "The Page Count of the Book is : " << page\_count << endl;

}

};

class Tape :public Publications

{

public:

float time\_in\_mins;

void getter()

{

cout << endl << "Enter the Title of the Tape : ";

cin >> title;

cout << "Enter the Price of the Tape : ";

cin >> price;

cout << "Enter the Number of Minutes of the Tape : ";

cin >> time\_in\_mins;

}

void setter()

{

cout << endl << "The Title of Tape is : " << title << endl;

cout << "The Price of the Tape is : " << price <<"/-RS"<< endl;

cout << "The Number of Minutes of the Tape is : " << time\_in\_mins << endl;

}

};

int main()

{

int a=0, b=0;

cout << "Enter the Number of Instances you want to make for Books : ";

cin >> a;

cout << "Enter the Number of Instances you want to make for Tapes : ";

cin >> b;

Book \*ptrb = new Book[a];

Tape \*ptrt = new Tape[b];

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Book : " << endl;

ptrb[i].getter();

} // instances creation wirh getter funtion

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Tape : " << endl;

ptrt[i].getter();

}

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "The Values for " << i + 1 << " Instance of Book is : " << endl;

ptrb[i].setter();

} // Value showing by setter function

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "The Values for " << i + 1 << " Instance of Tape is : " << endl;

ptrt[i].setter();

}

delete[]ptrb;

delete[]ptrt;

ptrb = NULL;

ptrt = NULL;

cout << endl << endl;

system("pause");

}

**A screenshot of a computer monitor sitting on top of a computer

Description automatically generated**

**Question Number 2:**

**PROGRAM:**

#include<iostream>

#include<string>

using namespace std;

class Publications

{

public:

string title;

float price;

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

}

};

class Sales

{

public:

float \*sale = new float[3];

void getter()

{

for (int i = 0; i < 3; i++)

{

cout << "Enter the Earnings in Dollars for " << i + 1 << " last Month : ";

cin >> sale[i];

}

}

void setter()

{

for (int i = 0; i < 3; i++)

{

cout << "The Earnings in Dollars for " << i + 1 << " last Month is : " << sale[i] << endl;;

}

}

~Sales()

{

delete[]sale;

sale = NULL;

}

};

class Book :public Publications,public Sales

{

public:

int page\_count;

void getter()

{

cout << endl << "Enter the Title of the Book : ";

cin >> title;

cout << "Enter the Price of the Book : ";

cin >> price;

cout << "Enter the Page Count of the Book : ";

cin >> page\_count;

for (int i = 0; i < 3; i++)

{

cout << "Enter the Earnings in Dollars for " << i + 1 << " last Month : ";

cin >> sale[i];

}

}

void setter()

{

cout << endl << "The Title of Book is : " << title << endl;

cout << "The Price of the Book is : " << price << "/-RS" << endl;

cout << "The Page Count of the Book is : " << page\_count << endl;

for (int i = 0; i < 3; i++)

{

cout << "The Earnings in Dollars for " << i + 1 << " last Month is : " << sale[i] << endl;;

}

}

~Book()

{

delete[]sale;

sale = NULL;

}

};

class Tape :public Publications,public Sales

{

public:

float time\_in\_mins;

void getter()

{

cout << endl << "Enter the Title of the Tape : ";

cin >> title;

cout << "Enter the Price of the Tape : ";

cin >> price;

cout << "Enter the Number of Minutes of the Tape : ";

cin >> time\_in\_mins;

for (int i = 0; i < 3; i++)

{

cout << "Enter the Earnings in Dollars for " << i + 1 << " last Month : ";

cin >> sale[i];

}

}

void setter()

{

cout << endl << "The Title of Tape is : " << title << endl;

cout << "The Price of the Tape is : " << price <<"/-RS"<< endl;

cout << "The Number of Minutes of the Tape is : " << time\_in\_mins << endl;

for (int i = 0; i < 3; i++)

{

cout << "The Earnings in Dollars for " << i + 1 << " last Month is : " << sale[i] << endl;;

}

}

~Tape()

{

delete[]sale;

sale = NULL;

}

};

int main()

{

int a=0, b=0;

cout << "Enter the Number of Instances you want to make for Books : ";

cin >> a;

cout << "Enter the Number of Instances you want to make for Tapes : ";

cin >> b;

Book \*ptrb = new Book[a];

Tape \*ptrt = new Tape[b];

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Book : " << endl;

ptrb[i].getter();

} // instances creation wirh getter funtion

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Tape : " << endl;

ptrt[i].getter();

}

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "The Values for " << i + 1 << " Instance of Book is : " << endl;

ptrb[i].setter();

} // Value showing by setter function

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "The Values for " << i + 1 << " Instance of Tape is : " << endl;

ptrt[i].setter();

}

delete[]ptrb;

delete[]ptrt;

ptrb = NULL;

ptrt = NULL;

cout << endl << endl;

system("pause");

}

**A screenshot of a computer screen

Description automatically generated**

**Question Number 3:**

**PROGRAM: (DOING ALTERATION IN Q#2)**

**BY USING VIRUTAL KEYWORD**

#include<iostream>

#include<string>

using namespace std;

class Publications

{

public:

string title;

float price; // BASE CLASS

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

}

};

class Book :public virtual Publications

{

public:

int page\_count;

void getter()

{

cout << endl << "Enter the Title of the Book : ";

cin >> title;

cout << "Enter the Price of the Book : ";

cin >> price;

cout << "Enter the Page Count of the Book : ";

cin >> page\_count;

}

void setter()

{

cout << endl << "The Title of Book is : " << title << endl;

cout << "The Price of the Book is : " << price << "/-RS" << endl;

cout << "The Page Count of the Book is : " << page\_count << endl;

}

};

class Tape :public virtual Publications

{

public:

float time\_in\_mins;

void getter()

{

cout << endl << "Enter the Title of the Tape : ";

cin >> title;

cout << "Enter the Price of the Tape : ";

cin >> price;

cout << "Enter the Number of Minutes of the Tape : ";

cin >> time\_in\_mins;

}

void setter()

{

cout << endl << "The Title of Tape is : " << title << endl;

cout << "The Price of the Tape is : " << price <<"/-RS"<< endl;

cout << "The Number of Minutes of the Tape is : " << time\_in\_mins << endl;

}

};

class Sales:public Book,public Tape

{

public:

float \*sale = new float[3];

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

for (int i = 0; i < 3; i++)

{

cout << "Enter the Earnings in Dollars for " << i + 1 << " last Month : ";

cin >> sale[i];

}

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

for (int i = 0; i < 3; i++)

{

cout << "The Earnings in Dollars for " << i + 1 << " last Month is : " << sale[i] << endl;;

}

}

~Sales()

{

delete[]sale;

sale = NULL;

}

};

int main()

{

int a=0, b=0;

cout << "Enter the Number of Instances you want to make for Books : ";

cin >> a;

cout << "Enter the Number of Instances you want to make for Tapes : ";

cin >> b;

Sales s;

Book \*ptrb = new Book[a];

Tape \*ptrt = new Tape[b];

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Book : " << endl;

ptrb[i].getter();

} // instances creation wirh getter funtion

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Tape : " << endl;

ptrt[i].getter();

}

cout << endl;

s.getter();

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "The Values for " << i + 1 << " Instance of Book is : " << endl;

ptrb[i].setter();

} // Value showing by setter function

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "The Values for " << i + 1 << " Instance of Tape is : " << endl;

ptrt[i].setter();

}

s.setter();

delete[]ptrb;

delete[]ptrt;

ptrb = NULL;

ptrt = NULL;

cout << endl << endl;

system("pause");

}

**BY USING VIRUTAL KEYWORD CODE SUCCESSFULLY COMPILES AND WORKS!!!**

**A screenshot of a computer screen

Description automatically generated**

**WITHOUT USING VIRUTAL KEYWORD**

#include<iostream>

#include<string>

using namespace std;

class Publications

{

public:

string title;

float price; // BASE CLASS

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

}

};

class Book :public Publications

{

public:

int page\_count;

void getter()

{

cout << endl << "Enter the Title of the Book : ";

cin >> title;

cout << "Enter the Price of the Book : ";

cin >> price;

cout << "Enter the Page Count of the Book : ";

cin >> page\_count;

}

void setter()

{

cout << endl << "The Title of Book is : " << title << endl;

cout << "The Price of the Book is : " << price << "/-RS" << endl;

cout << "The Page Count of the Book is : " << page\_count << endl;

}

};

class Tape :public Publications

{

public:

float time\_in\_mins;

void getter()

{

cout << endl << "Enter the Title of the Tape : ";

cin >> title;

cout << "Enter the Price of the Tape : ";

cin >> price;

cout << "Enter the Number of Minutes of the Tape : ";

cin >> time\_in\_mins;

}

void setter()

{

cout << endl << "The Title of Tape is : " << title << endl;

cout << "The Price of the Tape is : " << price <<"/-RS"<< endl;

cout << "The Number of Minutes of the Tape is : " << time\_in\_mins << endl;

}

};

class Sales:public Book,public Tape

{

public:

float \*sale = new float[3];

void getter()

{

cout << endl << "Enter the Title of the Publication : ";

getline(cin, title);

cout << "Enter the Price of the Publication : ";

cin >> price;

for (int i = 0; i < 3; i++)

{

cout << "Enter the Earnings in Dollars for " << i + 1 << " last Month : ";

cin >> sale[i];

}

}

void setter()

{

cout << endl << "The Title of Publication is : " << title << endl;

cout << "The Price of the Publication is : " << price << "/-RS" << endl;

for (int i = 0; i < 3; i++)

{

cout << "The Earnings in Dollars for " << i + 1 << " last Month is : " << sale[i] << endl;;

}

}

~Sales()

{

delete[]sale;

sale = NULL;

}

};

int main()

{

int a=0, b=0;

cout << "Enter the Number of Instances you want to make for Books : ";

cin >> a;

cout << "Enter the Number of Instances you want to make for Tapes : ";

cin >> b;

Sales s;

Book \*ptrb = new Book[a];

Tape \*ptrt = new Tape[b];

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Book : " << endl;

ptrb[i].getter();

} // instances creation wirh getter funtion

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "Enter value for " << i + 1 << " Instance of Tape : " << endl;

ptrt[i].getter();

}

cout << endl;

s.getter();

cout << endl;

for (int i = 0; i < a; i++)

{

cout << "The Values for " << i + 1 << " Instance of Book is : " << endl;

ptrb[i].setter();

} // Value showing by setter function

cout << endl;

for (int i = 0; i < b; i++)

{

cout << "The Values for " << i + 1 << " Instance of Tape is : " << endl;

ptrt[i].setter();

}

s.setter();

delete[]ptrb;

delete[]ptrt;

ptrb = NULL;

ptrt = NULL;

cout << endl << endl;

system("pause");

}

**WITHOUT USING VIRUTAL KEYWORD CODE DOES NOT COMPILES AND DOES NOT WORKS!!!**

**A screenshot of a computer screen

Description automatically generated**

**Question Number 4:**

**PROGRAM: (WITH CONSTRUCTORS)**

#include <iostream>

#include <string>

using namespace std;

class Student

{

public:

Student(string num) :roll\_no("NULL") // CONSTRUCTORS

{

roll\_no = num;

}

string roll\_no;

void get\_roll\_no()

{

cout << "Enter you roll number : "; // base class

cin >> roll\_no;

}

void disp\_roll\_no()

{

cout << "Entered roll number is : " << roll\_no;

}

};

class Subject :public Student

{

public:

Subject(float s1,float s2) :sub1(0),sub2(0),Student("NULL") // CONSTRUCTORS

{

sub1 = s1;

sub2 = s2;

}

float sub1, sub2;

void get\_roll\_no()

{

cout << "Enter you roll number : "; // derived class of student

cin >> roll\_no;

cout << "Enter your marks in OOP : ";

cin >> sub1;

cout << "Enter your marks in Discreet Structures : ";

cin >> sub2;

}

};

class Sports

{

public:

Sports(float m):marks(0) // CONSTRUCTORS

{

marks = m;

}

float marks;

void sport()

{

cout << "Enter your marks in sports : ";

cin >> marks;

}

};

class Result :public Subject, public Sports

{

public:

Result():Subject(0,0),Sports(0) // CONSTRUCTORS

{}

void total()

{

cout << endl << "Total subject scores obtained by student is : " << sub1 + sub2 << endl;

cout << "Total sport scores obtained by student is : " << marks << endl;

cout << endl << "Overall collecively the score becomes : " << sub1 + sub2 + marks;

}

};

int main()

{

Result std;

std.get\_roll\_no();

std.sport();

std.total();

cout << endl << endl;

system("pause");

}

**A screenshot of a computer screen

Description automatically generated**

**Question Number 5:**

**PROGRAM: (WITH CONSTRUTORS)**

#include <iostream>

#include<string>

using namespace std;

class Person

{

protected:

string name;

int age;

public:

Person()

{

age = 0;

}

Person(string n, int a):name(NULL),age(0)

{

name = n;

age = a;

}

void getdata()

{

cout << "Enter the Name of Person : ";

cin >> name;

cout << "Enter Age of the Person : "; // Base Person class

cin >> age;

}

void showdata()

{

cout << endl << "Name of the Person is : " << name;

cout << endl << "Age of the Person is : " << age;

}

};

class Student :public Person

{

private:

string id\_no;

public:

Student(){}

Student(string n):id\_no(NULL),Person(NULL,0)

{

id\_no = n;

}

void getdata()

{

cout << "Enter the Name of Student : ";

cin >> name;

cout << "Enter Age of the Student : ";

cin >> age;

cout << "Enter the ID number of the student : ";

cin >> id\_no;

}

void showdata() // Derived Student Class

{

cout << endl << "Name of the Student is : " << name;

cout << endl << "Age of the Student is : " << age;

cout << endl << "ID number of the Student is : " << id\_no;

}

};

class Employee :public Person

{

private:

int salary;

public:

Employee(){}

Employee(int s) :salary(0), Person(NULL, 0)

{

salary = s;

}

void getdata()

{

cout << "Enter the Name of Employee : ";

cin >> name;

cout << "Enter Age of the Employee : ";

cin >> age;

cout << "Enter the Salary of the Employee in rupees : ";

cin >> salary;

}

void showdata() // Derieved Employee class

{

cout << endl << "Name of the Employee is : " << name;

cout << endl << "Age of the Employee is : " << age;

cout << endl << "Salary of the Employee is : " << salary;

}

};

int main()

{

Student S;

Employee E;

cout << "Getting values of Student" << endl;

S.getdata();

cout << endl << "Getting values of Employee" << endl;

E.getdata();

cout << endl;

cout << endl << "Displaying values of Student" << endl;

S.showdata();

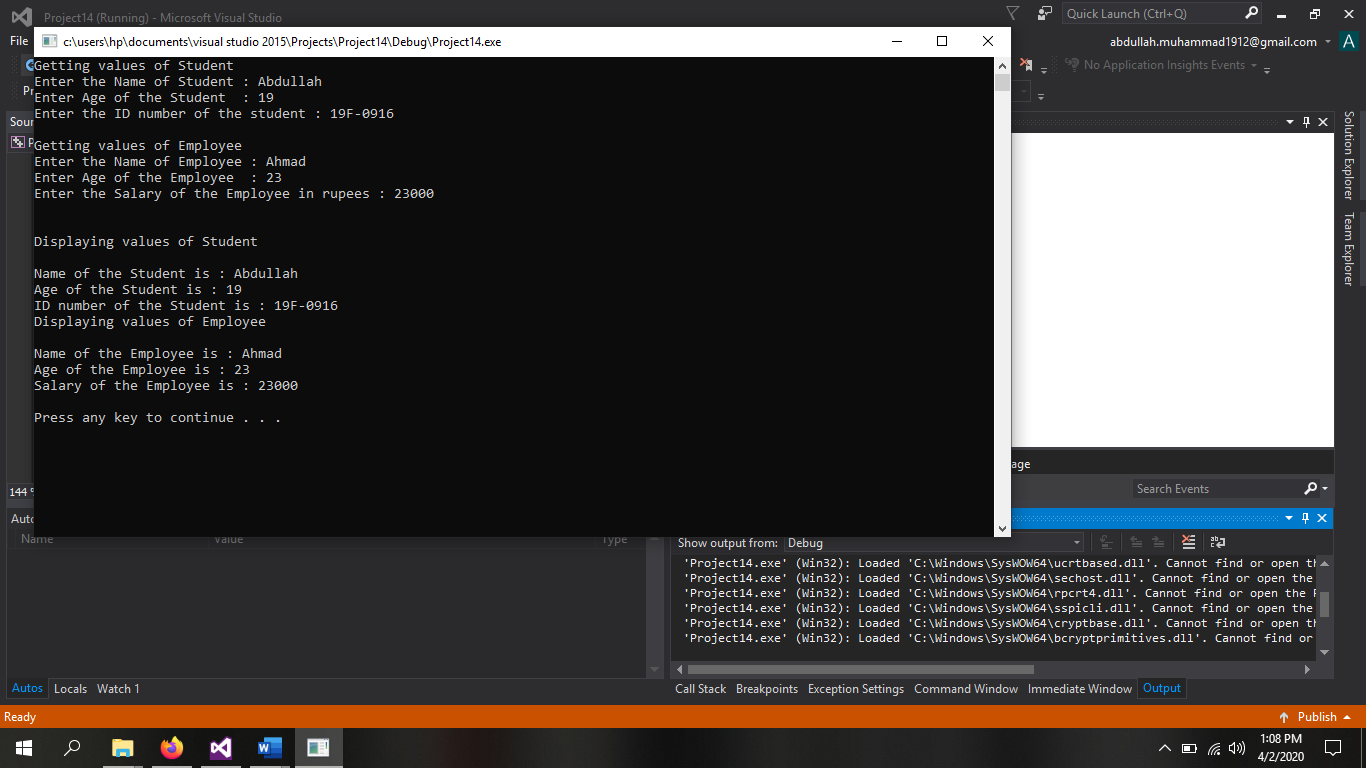
cout << endl << "Displaying values of Employee" << endl;

E.showdata();

cout << endl << endl;

system("pause");

}

****