Short Questions

1. **Consider a class Square derived from a class Quad. Declare a pointer to Quad and assign the address of an object of class Square to this pointer.**

   Square sq;
   Quad *pquad = & sq;

2. **Repeat the above using dynamic memory allocation, i.e. allocate memory for an object of class Square and assign the address to a pointer of class Quad.**

   Quad * pquad = new Square;

3. **Both Quad and Square have a method int area(); Which of the methods is called by the following statement.**
   Quad quad, *ptrQuad;
   Square sq;
   ptrQuad = &sq;
   quad.area();
   ptrQuad -> area();

   quad.area(); // it will print the area of quad

   ptrQuad -> area(); // // it will print the area of quad because of early bonding

4. **Repeat exercise 3 assuming that area() is declared as virtual function.**

   quad.area(); // it will print the area of quad

   ptrQuad -> area(); // // it will print the area of square because of dynamic bonding

5. **What is an abstract class? What makes a class abstract?**

   The class which has atleast one pure virtual funtion is called abstract class.

Exercise – 01

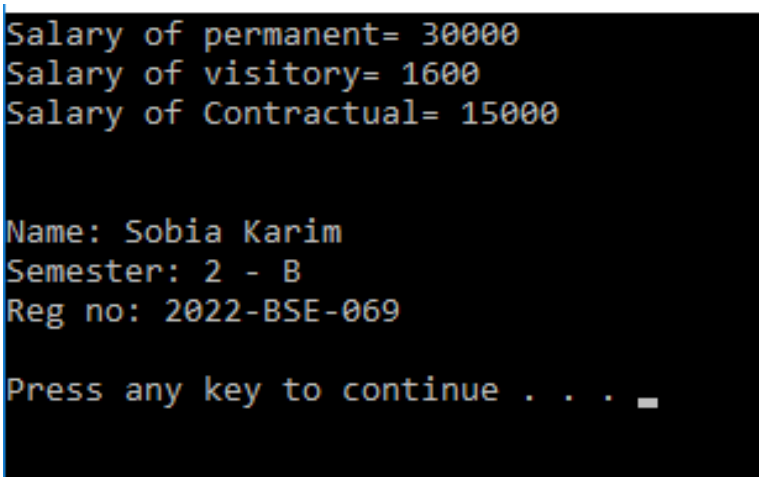
Create an abstract class Faculty with fields name and ID. Provide a pure virtual function salary(). Derive a class Permanent Faculty from Faculty. The class has additional attributes years of service and basic pay. The salary of permanent faculty is computed as the sum of basic pay, medical allowance and house rent. Medical allowance is 10% of basic pay and house rent is 25% of the basic pay. Derive another class Visiting Faculty from Faculty. The class has attributes per hour rate and number of hours taught. The salary of visiting faculty is computed by multiplying the per hour rate with the number of hours taught. Derive another class Contractual Faculty from Faculty. The class has additional attributes no of days worked and per day salary. The salary of contractual faculty can be calculated by multiplying no of days worked with per day salary.
Write a program to declare three pointers of class Faculty. Create an object each of visiting, permanent, contractual faculty, assign their addresses to pointers of base class, set the values of data members and call the salary function for each. Print your name, reg,no, section, semeste r in main using cout statements.

Code:

```
#include "stdafx.h"
#include<iostream>
#include<string>
using namespace std;

class Faculty{
protected:
	string name;
	string ID;
public:
	virtual void salary()=0;
	virtual void set_value(float a, float b){
	}

};

class Permanent:public Faculty{
private:
	float year_of_service;
	float basic_pay;
public:
	void salary(){
		cout<<"Salary of permanent=
"<<basic_pay+((10/100)*basic_pay)+((25/100)*basic_pay)<<endl;
	}
	void set_value(float yos, float bp){
		year_of_service=yos;
		basic_pay=bp;
	}
};

class Visitory:public Faculty{
```

```
private:
	float per_hour_rate;
	float number_of_hours;
public:
	void salary(){
		cout<<"Salary of visitory= "<<per_hour_rate*number_of_hours<<endl;
	}
	void set_value(float phr,float noh){
		per_hour_rate=phr;
		number_of_hours=noh;
	}
};

class Contractual:public Faculty{
private:
	float number_of_days;
	float per_day_salary;
public:
	void salary(){
		cout<<"Salary of Contractual= "<<number_of_days*per_day_salary<<endl;
	}
	void set_value(float nod, float pds){
		number_of_days=nod;
		per_day_salary=pds;
	}
};

int _tmain(int argc, _TCHAR* argv[])
{
	Faculty *f1,*f2,*f3;
	Permanent p1; Visitory v1; Contractual c1;

	f1=&p1; f2=&v1; f3=&c1;


	f1->set_value(7,30000);
	f2->set_value(200,8);
	f3->set_value(30,500);

	f1->salary();
    f2->salary();
	f3->salary();

	cout<<"\n\nName: Sobia Karim\n";
	cout<<"Semester: 2 - B\n";
	cout<<"Reg no: 2022-BSE-069\n\n";



	system ("pause");
	return 0;
}
```

Output:



Exercise – 02

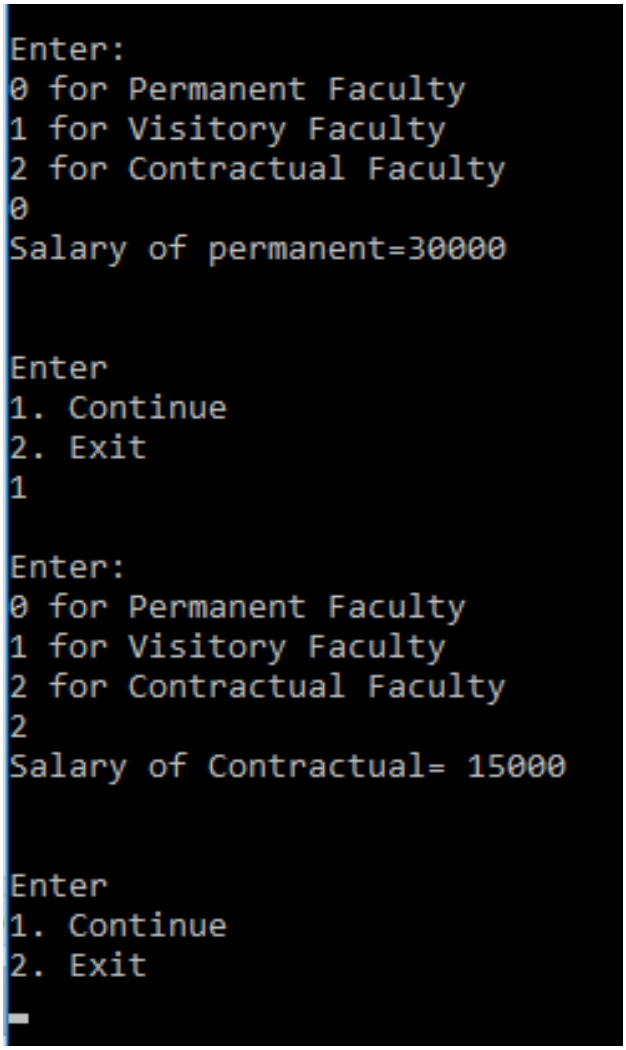
Modify the above program to declare an array of pointers to Faculty. Using dynamic memory allocation, create an object of permanent or visiting or contractual faculty as indicated by the user (Get user choice). Once the user has entered data for faculty, call the salary method for that object and display the salary. Print your name, reg,no, section, semester in main using cout statements.

Code:

```
#include<iostream>
#include<string>
using namespace std;

class Faculty{ protected:
string name; string ID;
public:
virtual void salary()=0;
virtual void set_value(float a, float b){
}
};

class Permanent:public Faculty{ private:
float year_of_service; float basic_pay;
public:
void salary(){
cout<<"Salary of
permanent="<<basic_pay+((10/100)*basic_pay)+((25/100)*basic_pay)<<endl;
}
void set_value(float yos, float bp){ year_of_service=yos;
basic_pay=bp;

}
};

class Visitory:public Faculty{ private:
float per_hour_rate;
float number_of_hours; public:
void salary(){
cout<<"Salary of visitory= "<<per_hour_rate*number_of_hours<<endl;
```

```
        }
        void set_value(float phr,float noh){ per_hour_rate=phr;
        number_of_hours=noh;
        }
        };

        class Contractual:public Faculty{ private:
        float number_of_days; float per_day_salary;
        public:
        void salary(){
        cout<<"Salary of Contractual= "<<number_of_days*per_day_salary<<endl;
        }
        void set_value(float nod, float pds){ number_of_days=nod;
        per_day_salary=pds;
        }
        };

        int main()
        {
        Faculty *f[3];
        int en;


        do{

        int i;
        cout<<"\nEnter:\n0 for Permanent Faculty\n"; cout<<"1 for Visitory Faculty\n";
        cout<<"2 for Contractual Faculty\n"; cin>>i;

        if(i==0){
              f[i]=new Permanent;
        f[i]->set_value(7,30000);
        f[i]->salary();}

        else if(i==1){
              f[i]=new Visitory;
        f[i]->set_value(200,8);
        f[i]->salary();
        }
        else if(i==2){
              f[i]=new Contractual;
        f[i]->set_value(30,500);
         f[i]->salary();
        }

        cout<<"\n\nEnter\n1. Continue\n2. Exit\n";
        cin>>en;
        }while(en=1);

        cout<<"\n\nName: Sobia Karim\n"; cout<<"Semester: 2 - B\n";
        cout<<"Reg no: 2022-BSE-069\n\n";


         return 0;
}
```

Output:


Enter:
0 for Permanent Faculty
1 for Visitory Faculty
2 for Contractual Faculty
0
Salary of permanent=30000
Enter
1. Continue
2. Exit
1
Enter:
0 for Permanent Faculty
1 for Visitory Faculty
2 for Contractual Faculty
2
Salary of Contractual= 15000
Enter
1. Continue
2. Exit