(STRUCTURES PROBLEMS)

(MADE BY ALI AKBER)

(BSCS IST SS1)

PROBLEM 8.1

Write a program that declares a structure to store Roll No, Marks, Average and Grade of a student. The program should define a structure variable, inputs the values and then displays these values.

```
#include <iostream>

using namespace std;

struct student{

        int rno;

        int marks;

        float average;

        char grade;

};

int main(){

        student s;

        cout<<"Enter roll no: ";

        cin>>s.rno;

        cout<<"Enter marks: ";

        cin>>s.marks;

        cout<<"Enter average of marks: ";

        cin>>s.average;

        cout<<"Enter grade : ";

        cin>>s.grade;

        cout<<" You have entered the following details: "<<endl;;
```

```
        cout<<"Roll No: "<<s.rno<<endl;
        cout<<" Marks: "<<s.marks<<endl;
        cout<<" Average: "<<s.average<<endl;
        cout<<" Grade : "<<s.grade<<endl;
        return 0;
}
```

PROBLEM 8.2

Write a program that declares a structure to store day, month and year of birth date. It inputs three values and displays date of birth in dd/mm/yy format.

```
#include <iostream>
using namespace std;
struct birthday{
        int day;
        int month;
        int year;
};
int main(){
        birthday s;
        cout<<"Enter day of birthday: ";
        cin>>s.day;
        cout<<"Enter month of birthday: ";
        cin>>s.month;
        cout<<"Enter year of birthday: ";
        cin>>s.year;
        cout<<" Your date of birth is is : ";
        cout<<s.day<<"/"<<s.month<<"/"<<s.year;
```

```
	return 0;
}
```

PROBLEM 8.3

Write a program that declares a structure to store BookID, price and pages of a book. It defines two structure variables and inputs values. It displays the record of most costly book.

```
#include <iostream>
using namespace std;
struct book{
	int id;
	int pages;
	int price;
};
int main(){
	book b1, b2;
	cout<<"Enter id,pages and price of book 1"<<endl;
	cin>>b1.id>>b1.pages>>b1.price;
	cout<<"Enter id,pages and price of book 2"<<endl;
	cin>>b2.id>>b2.pages>>b2.price;
	cout<<" The most costly book is as follows: "<<endl;
	if (b1.price> b2.price){
		cout<<"Book id: "<<b1.id<<endl;
		cout<<"Book pages: "<<b1.pages<<endl;
		cout<<"Book price: "<<b1.price<<endl;
	}
	else {
			cout<<"Book id: "<<b2.id<<endl;
```

```
        cout<<"Book pages: "<<b2.pages<<endl;
        cout<<"Book price: "<<b2.price<<endl;
    }
    return 0;
}
```

PROBLEM 8.4

Write a program that declares a structure to store employee id and salary of an employee. It defines and initializes a structure variable and displays it.

```
#include <iostream>
using namespace std;
struct emp{
    int eid;
    int sal;
};
int main(){
    emp e ={ 20, 23000};
    cout<<" Empolyee Id: "<<e.eid<<endl;
    cout<<" Empolyee Salary: "<<e.sal<<endl;
    return 0;
}
```

PROBLEM 8.5

Write a program that uses a structure to store three parts of phone number i.e. National code, Area code, Number separately. Create two variables of structure phone. Initialize one variable and get inputs from the user in the second variable and then display both numbers.

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

```
struct phone{
        int ncode;
        int acode;
        long number;
};
int main(){
        phone p1, p2 ={ 92, 32,67245397};
        cout<<" Enter national code: "<<endl;
        cin>>p1.ncode;
        cout<<" Enter area code : "<<endl;
        cin>>p1.acode;
        cout<<" Enter phone number: "<<endl;
        cin>>p1.number;
        cout<<"Phone number 01 : +";
        cout<<p1.ncode<<"-"<<p1.acode<<"-"<<p1.number<<endl;
        cout<<"Phone number 02 : +";
        cout<<p2.ncode<<"-"<<p2.acode<<"-"<<p2.number<<endl;
        return 0;
}
```

PROBLEM 8.6

Write a program that uses a structure to store employee number, name, hours worked,hourly rate and gross pay. The program inputs employee number, name, hours worked and hourly rate the user, calculates gross pay and then displays all employee data on screen.

```
#include <iostream>
using namespace std;
struct einfo{
```

```
        int eno;
        char fname[40],sname[30];
        double hrs,hrsrate,gsal;
};
int main(){
        einfo e;
        cout<<" Enter employee number: "<<endl;
        cin>>e.eno;
        cout<<" Enter employee first name : "<<endl;
        cin>>e.fname;
        cout<<" Enter employee second name : "<<endl;
        cin>>e.sname;
        cout<<" Enter employee's hours worked: "<<endl;
        cin>>e.hrs;
        cout<<"Enter empolyee's hourly rate : "<<endl;
        cin>>e.hrsrate;
        e.gsal=e.hrs*e.hrsrate;
        cout<<" \t The Empolyee data is as follows :\t "<<endl;
        cout<<" Employee number: "<<e.eno<<endl;
        cout<<" Employee first name : "<<e.fname<<endl;
        cout<<" Employee second name : "<<e.sname<<endl;
        cout<<" Employee's hours worked: "<<e.hrs<<endl;
        cout<< " Empolyee's hourly rate : "<<e.hrsrate<<endl;
        cout<<"    Empolyee's gross salary: Rs    "<<e.gsal<<endl;
        return 0;
}
```

Problem 8.7

Write a program that declares a structure to store marks and grade of a student. It defines two structure variables. It inputs the values in one variable and assigns that variable to the second variable. It finally displays the values of both variables.

```
#include <iostream>

using namespace std;

struct marks{

int m;

char g;

};

int main()

{

marks a,b;

cout<<"enter marks"<<endl;

cin>>a.m;

cout<<"enter grade"<<endl;

cin>>a.g;

b=a;

cout<<"the first record is as belows"<<endl;

cout<<"Marks: "<<a.m<<endl;

cout<<"Grade: "<<a.g<<endl;

cout<<"the second record is as belows"<<endl;

cout<<"Marks: "<<b.m<<endl;

cout<<"Grade: "<<b.g<<endl;

        return 0;

}
```

(PASSING STRUCTURE BY REFERENCE)

Problem 9.26

Write a program that declares a structure to store price and author name of a book. It defines a structure variable and inputs values. It passes the variable to a function by s that doubles the value of price. The main() function finally displays the values.

```
#include <iostream>

using namespace std;

struct Book{

        char authorname[50];

        float price;

};

void dbl(Book &x);

int main(){

        Book b;

        cout<<"Enter author name and his book price: "<<endl;

        cin.get (b.authorname,50);

        cin>>b.price;

        dbl (b);

        cout<<"Author name is : "<<b.authorname<<endl;

        cout<<"Enter the price: "<<b.price<<endl;

        return 0;

}

void dbl(Book &x){

        x.price=x.price*2;

}
```

Problem 9.27

Write a program that uses a structure to stimulate the time in hours, minutes and seconds. Write a function to set the time, another function to increment, the time by a number of seconds and a function to display the time.

```
#include <iostream>

using namespace std;

struct Time{

	int hours;

	int minutes;

	int seconds;

};

void SetTime (int H, int M, int S, Time &time);

void IncrementTime (int S, Time&time);

void DisplayTime (Time & time);

void SetTime (int H, int M, int S, Time &time){

	time.hours=H;

	time.minutes=M;

	time.seconds=S;

}

void IncrementTime (int S, Time&time){

	time.seconds= time.seconds+S;

	if (time.seconds/60>0){

		time.minutes+= time.seconds/60;

		time.seconds=time.seconds%60;

	if (time.minutes/60>0){

		time.hours+= time.minutes/60;

		time.minutes=time.minutes%60;

		time.hours= time.hours%24;
```

```
}
}
}
void DisplayTime (Time & time){
        cout<<time.hours<<":"<<time.minutes<<":"<<time.seconds<<endl;
}
int main(){
Time t;
SetTime(23,58,30,t);
cout<<"initial time :";
DisplayTime (t);
IncrementTime(145,t);
cout<<"time after the increment of seconds; "<<endl;
DisplayTime (t);
        return 0;
}
```

Problem 9.28

Write a program that declares a structure to store author name, pages and price of a book. It declares two structure variables and inputs values. It passes these variables to a function. The function returns the variable with more price. The program finally displays the values of the returned structure variable.

```
#include <iostream>
using namespace std;
struct Book{
        int pages;
        float price;
};
```

```
Book check(Book x, Book y);
int main(){
	Book a,b,r;
	cout<<"Enter book pages and price: "<<endl;
	cin>>a.pages;
	cin>>a.price;
	cout<<"Enter book pages and price: "<<endl;
	cin>>b.pages;
		cin>>b.price;
	r=check(a,b);
	cout<<"the most costly book is: "<<endl;
	cout<<"Pages: "<<r.pages<<endl;
	cout<<"Price: "<<r.price<<endl;
	return 0;
}
Book check(Book x,Book y)
{
	if (x.price>y.price)
	return x;
	else return y;
}
```

(ARRAY OF STRUCTURES)

PROBLEM 8.9

Write a program that declares a structure to store id, pages a price of a book. It defines an array of structures to store the records of five books. It inputs the records of five books and displays the record of most costly book.

```
#include <iostream>
using namespace std;
struct Book{
	int id;
	int pages;
	float price;
};
int main(){
	Book b[5];
	int max,m;
	for(int i=0; i<5;i++){
		cout<<"Enter book id:"<<endl;
		cin>>b[i].id;
		cout<<"Enter book pages:"<<endl;
		cin>>b[i].pages;
		cout<<"Enter price of book:"<<endl;
		cin>>b[i].price;
	}
	max=b[0].price;
	m=0;
	for (int j=0; j<5; j++){
		if (b[j].price>max){
			max=b[j].price;
			m=j;
		}
	}
```

```
        cout<<"The Price of most costly book is:"<<endl;
        cout<<"Book id: "<<b[m].id<<endl;
        cout<<"Book pages: "<<b[m].pages<<endl;
        cout<<"Book price: "<<b[m].price<<endl;
        return 0;
}
```