OBJECT ORIENTED PROGRAMMING (CT-260)

ASSIGNMENT:02

TAQI HAIDER_CSIT_SECTION:B_ROLL#92

Exercise:-
Q1:-

```
#include <iostream>
#include <vector>
#include <algorithm>

using namespace std;

class Card {
public:
    int number;
    int digit_sum;

    Card(int n) {
        number = n;
        digit_sum = sum_digits(n);
    }

    int sum_digits(int n) {
        int sum = 0;
        while (n > 0) {
            sum += n % 10;
            n /= 10;
        }
        return sum;
    }
};

class CardGame {
public:
    vector<Card> cards;

    void get_data() {
        int num_cards;
        cout << "Enter number of cards: ";
        cin >> num_cards;

        for (int i = 0; i < num_cards; i++) {
            int card_number;
```

```
            cout << "Enter card number " << i+1 << ": ";
            cin >> card_number;
            cards.push_back(Card(card_number));
        }
    }

    void sort_cards() {
        sort(cards.begin(), cards.end(), [](Card a, Card b) {
            return a.digit_sum < b.digit_sum;
        });
    }

    void display() {
        cout << "Sorted cards:\n";
        for (Card c : cards) {
            cout << c.number << " (sum of digits = " << c.digit_sum << ")\n";
        }
    }
};

int main() {
    CardGame game;
    game.get_data();
    game.sort_cards();
    game.display();
    return 0;
}
```

Q2:-

```
#include<iostream>
#include<string>
using namespace std;
class Student{
    int size;
    int *Roll;
    string *Name;
    double *Marks;
    public:
        Student(int s){
            size = s;
            Roll = new int[s];
            Name = new string[s];
            Marks = new double{s};
        }
        void getdata(){
```

```
        for(int i=0;i<size;i++){
            cout<<"Enter Roll for student "<<i+1<<" : "<<endl;
            cin>>Roll[i];
            cout<<"Enter Name for student "<<i+1<<" : "<<endl;
            cin>>Name[i];
            cout<<"Enter Marks for student "<<i+1<<" : "<<endl;
            cin>>Marks[i];
            cout<<endl;
        }
    }
    void Marksort(){
        int temproll,l=size-1;
        string tempname;
        double tempmarks;
        for(int i=0;i<size;i++){
            for(int j=0;j<l;j++){
                if(Marks[j]<Marks[j+1]){
                    tempmarks=Marks[j];
                    Marks[j]=Marks[j+1];
                    Marks[j+1]=tempmarks;
                    tempname=Name[j];
                    Name[j]=Name[j+1];
                    Name[j+1]=tempname;
                    temproll=Roll[j];
                    Roll[j]=Roll[j+1];
                    Roll[j+1]=temproll;
                }
            }
            l--;
        }
    }
    void RollSearch(int roll){
        for(int i=0;i<size;i++){
            if(roll == Roll[i]){
                cout<<"Roll Number : "<<Roll[i]<<endl;
                cout<<"Name  : "<<Name[i]<<endl;
                cout<<"Marks : "<<Marks[i]<<endl;
            }
            cout<<endl;
        }
    }
    void NameSearch(string name){
        for(int i=0;i<size;i++){
            if(name == Name[i]){
                cout<<"Roll Number : "<<Roll[i]<<endl;
                cout<<"Name  : "<<Name[i]<<endl;
                cout<<"Marks : "<<Marks[i]<<endl;
            }
            cout<<endl;
```

```
            }
        }
        void ShowData(){
            for(int i=0;i<size;i++){
                    cout<<"Roll Number : "<<Roll[i]<<endl;
                    cout<<"Name  : "<<Name[i]<<endl;
                    cout<<"Marks : "<<Marks[i]<<endl;
            }
            cout<<endl;
        }
};
int main(){
    int roll,students;
    string name;
    cout<<"Enter Number of Students: "<<endl;
    cin>>students;
    Student Object(students);
    Object.getdata();
    cout<<endl<<"Data before Sorting: "<<endl;
    Object.ShowData();
    cout<<endl<<"Data After Sorting by Marks: "<<endl;
    Object.ShowData();
    cout<<"Enter Roll No. to search: "<<endl;
    cin>>roll;
    Object.RollSearch(roll);
    cout<<endl<<endl;
    cout<<"Enter Name to search: "<<endl;
    cin>>name;
    Object.NameSearch(name);

}
```

Q3:-

```
#include<iostream>
#include<string>
using namespace std;
int main(){
    int Qnum,Students,invalid=0;
    char temp1,temp2;
    cout<<"Enter number of Students :"<<endl;
    cin>>Students;
    cout<<"Enter number of Questions :"<<endl;
    cin>>Qnum;
    string Answers,temp,ID[Students];
    char StdAnswers[Students][Qnum]; //ASSUMING STUDENT ID IS 8 Characters
    do{
```

```
        invalid=0;
        cout<<"Enter Answers to the test:"<<endl;
        getline(cin, Answers);
        if(Answers.size()>Qnum || Answers.size()<Qnum){
            cout<<"Please enter same number of answers as questions! Try
again"<<endl;
        }
        for(int i=0;i<Answers.size();i++){
            temp1=Answers[i];
            if(!((temp1=='F')||(temp1=='f')||(temp1=='T')||(temp1=='t')||(temp1==
' '))){
                invalid=1;
            }
        }
        if(invalid==1){
            cout<<"Answers can only be given in T/t for TRUE or F/f for FALSE,
please try again"<<endl;
        }
    }while((Answers.size()>Qnum || Answers.size()<Qnum)||invalid==1);
    for(int j=0;j<Students;j++){
        do{
            invalid=0;
            fflush(stdin);
            cout<<"Please enter ID and Answers of Student #"<<j+1<<" : "<<endl;
            cout<<"Format (8 character ID) (Answers)"<<endl<<"ABC12345
TTF...(same amount as questions)"<<endl;
            cin>>ID[j];
            cin>>StdAnswers[j];
            for(int i=0;i<Qnum;i++){
                temp1 = StdAnswers[j][i];
                if(!((temp1=='F')||(temp1=='f')||(temp1=='T')||(temp1=='t')||(tem
p1==' '))){
                    invalid=1;
                }
            }
            if(invalid==1){
                cout<<"Invalid Input! please enter again according to the format,
in T/t or F/f only."<<endl;
            }
        }while(invalid==1);
        fflush(stdin);
    }
    int score=0;
    char grade;
    float percent;
    cout<<endl<<endl;

    for(int i=0;i<Students;i++){
        score=0;
```

```
        for(int j=0;j<Qnum;j++){
            temp1=Answers[j];
            temp2=StdAnswers[i][j];
            if(temp1==temp2){
                score+=2;
            }
            else if(temp1!=temp2 && temp2!=' '){
                score--;
            }
        }
        percent = 100*score/(Qnum*2);
        if(percent<60){
            grade='F';
        }
        else if(percent<60){
            grade='E';
        }
        else if(percent<70){
            grade='D';
        }
        else if(percent<80){
            grade='C';
        }
        else if(percent<90){
            grade='B';
        }
        else{
            grade='A';
        }
        cout<<ID[i]<<" ";
        for(int l=0;l<Qnum;l++){
            cout<<StdAnswers[i][l];
        }
        cout<<" "<<score<<" "<<grade<<endl;
    }
}
```

Q4:-

```
#include<iostream>
using namespace std;
int main(){
    int rows;
    cout << "Enter the number of rows : ";
    cin >> rows;
    cout << endl;
    for (int i = 0; i < rows; i++){
        int val = 1;
        for (int j = 1; j < (rows - i); j++){
```

```
            cout << "    ";
        }
        for (int k = 0; k <= i; k++) {
            cout << "      " << val;
            val = val * (i - k) / (k + 1);
        }
        cout << endl << endl;
    }
    cout << endl;
    return 0;
}
```

Q5:-

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

class data{
        int size;
        double *operands;
        char *sign;
    public:
        data(int s){
            size = s;
            operands = new double[s];
            sign= new char[s-1];
        }
        void getequation(){
            cout<<endl<<endl<<"Enter Operand 1: "<<endl;
            cin>>operands[0];
            for(int i = 1 ; i<size;i++){
                cout<<"Enter Operator "<<i<<" : "<<endl;
                cin>>sign[i-1];
                cout<<"Enter Operand "<<i+1<<" : "<<endl;
                cin>>operands[i];
            }
        }
        void display(){
            cout<<operands[0];
            for(int i=0;i<size-1;i++){
                cout<<" "<<sign[i]<<" "<<operands[i+1];
            }
        }
        void solveequation(){
            cout<<operands[0];
            for(int i=0;i<size-1;i++){
```

```
                cout<<" "<<sign[i]<<" "<<operands[i+1];
                if(sign[i]=='+'){
                    operands[i+1]=operands[i]+operands[i+1];
                }
                else if(sign[i]=='-'){
                    operands[i+1]=operands[i]-operands[i+1];
                }
                else if(sign[i]=='*'){
                    operands[i+1]=operands[i]*operands[i+1];
                }
                else if(sign[i]=='/'){
                    operands[i+1]=operands[i]/operands[i+1];
                }
            }
            cout<<" = "<<operands[size-1];
        }

};

class vector{
    int size;
    double *members;
    public:
        vector(int s){
            size=s;
            members = new double[s];
        }
        void getvector(){
            for(int i=0;i<size;i++){
                cout<<"Input member "<<i+1<<" : "<<endl;
                cin>>members[i];
            }
        }
        void showvector(){
            cout<<"[ ";
            for(int i=0;i<size-1;i++){
                cout<<members[i]<<" , ";
            }
            cout<<members[size-1]<<" ]"<<endl;
        }
        double dot(vector obj){
            double value=0;
            for(int i=0;i<size;i++){
                value += (members[i]*obj.members[i]);
            }
            cout<<"Dot Product is : "<<value;
            return value;
        }
};
```

```
int main(){
    char opt;
    int n;
    cout<<"What do you want to do?"<<endl<<"(A) Solve an Equation of N operands
\t (B) Dot Product of 2 vectors "<<endl;
    cin>>opt;
    fflush(stdin);
    if(opt=='A'||opt=='a'){
        cout<<"How many operands does your equation have : "<<endl;
        cin>>n;
        data obj(n);
        obj.getequation();
        cout<<endl<<"Equation input into program : "<<endl;
        obj.display();
        cout<<endl<<"Solution : "<<endl;
        obj.solveequation();
    }
    else if(opt=='b'||opt=='B'){
        cout<<"How many members do your vectors have : "<<endl;
        cin>>n;
        vector A(n);
        vector B(n);
        cout<<endl<<"Enter Members for Vector A :"<<endl;
        A.getvector();
        cout<<endl<<"A = ";
        A.showvector();
        cout<<"Enter Members for Vector B :"<<endl;
        B.getvector();
        cout<<endl<<"B = ";
        B.showvector();
        A.dot(B);
    }
    else{
        return 0;
    }
}
```