



Usman Institute of Technology
Mid-Term Examinations
Spring 2020 Semester

Course: Programming Fundamentals

Course Code: EL125

Date: August 6, 2020

Batch: 19B Electrical Engineering

Time Allowed: 120 minutes (for downloading, solving, and uploading the paper)

This is an open book examination

Student's Name	Muhammad junaid khan
UIT Roll Number	19b-022-ce
Course Title	Programming fundamentals
Course Code	EL-125
Date of the Examination	8/6/2020
Section	b
Faculty Member's Name	Sir ghazanfarullah khan

Ethical Compliance / Integrity Undertaking

I guarantee that all this is my independent work and is done without any unauthorized help. All activities are completed with full adherence to the "Ethics Policy" of the Institute. I understand that any breach would result in disciplinary action against me as per the Institute rules.

Please make sure to check the following before you proceed.

☒ I have read and understood the ethical compliance / integrity undertaking and will comply.

Instructions

Please read the following instruction carefully before you proceed:

1. Please solve all questions on this word document only. Please do not submit any other document as it will not be graded.
2. Wherever needed, you may insert scanned images, tables, equations, and diagrams.
 - a. These can be scanned and pasted (screenshots will also work)
 - b. You may make the tables, equations etc. on another Word file and then paste here.
3. Please download the paper immediately after it is made available to protect yourself from any power failure Internet issues.
4. Solve the paper on your computer and, once done, upload on Microsoft Teams assignment created to receive your paper. You would require the Internet only to download and upload the paper.
5. The time provided (2 hours) is for downloading, solving, and uploading your solution.
6. Once you are done with your paper, save it as a pdf file and upload.
7. This is an open book examination. You are allowed only to consult your textbook, reference books, and class notes. You are not allowed to use any other source.
8. All work submitted will tested with Turnitin. Any work considered suspicious may be tested through a viva.

☒ I have read and understood the instructions and will comply.

Additional Instructions for EL125- Programming Fundamentals Mid-term Examination:

- ✓ Include your name and roll number as comments at the top of every C++ source code.
- ✓ Use appropriate comments on important C++ statements.
- ✓ Copy/Type all C++ source code. Pasting of screen shots of C++ source code is NOT ALLOWED.
- ✓ Screen shots of sample output must be included.

Note: There will be marks penalty if the instructions are not properly followed.

Question#01**Marks: 04****CLO: 1****Scenario:**

Mr. Ahmed, a Pakistani business man regularly imports sugar from China. Every week a cargo brings containers of sugar (take user input). In each container there are 10 wooden boxes, in each wooden box there are 20 bags filled with sugar. If each bag measures 50kg of sugar, write a simple program in C++ to calculate the total amount of sugar (in kgs) present inside the cargo and the total price of sugar. Take price (per kg) of sugar to be your rollnumber+10 Rupees (For example if your roll number is 19B-001-CE, then the price of imported sugar per kg will be 11 Rupees). Calculate total profit using a C++ program, if selling price of sugar is 30% more than the import price.

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    int cargo_container;
```

```
    cout<<"\nenter number of cargo container in a week = ";
```

```
    cin>>cargo_container;
```

```
    int total_bags;
```

```
    int wooden_box=10;
```

```
    int bags=20;
```

```
    int bag_kg=50;
```

```
    total_bags=cargo_container*wooden_box*bags;
```

```
    cout<<"\ntotal bags of suger in week of container = "<<total_bags;
```

```
    int price=32;//preice per kg
```

```
    int total_price=total_bags*bag_kg*price;
```

```
    int total_kg=total_bags*bag_kg;
```

```
    cout<<"\ntotal kg present in cargo = "<<total_kg;
```

```
    cout<<"\ntotal price of suger present inside the cargo = "<<total_price;
```

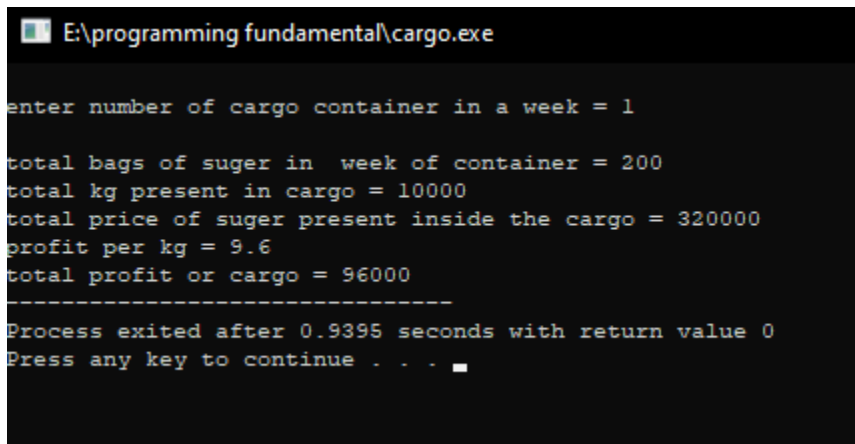
```

float profit;
profit=32*0.3;
cout<<"\nprofit per kg = "<<profit;
float total_profit;
total_profit=profit*total_kg;
cout<<"\ntotal profit or cargo = "<<total_profit;

return 0;

}

```



```

E:\programming fundamental\cargo.exe

enter number of cargo container in a week = 1

total bags of suger in week of container = 200
total kg present in cargo = 10000
total price of suger present inside the cargo = 320000
profit per kg = 9.6
total profit or cargo = 96000
-----
Process exited after 0.9395 seconds with return value 0
Press any key to continue . . .

```

Scenario:

Mr. Ali discovered gold mine inside his privately-owned land, he wants to secure the area from public intervention as this news has spread all over the vicinity. It is assumed that each hour locals will try to approach and take some amount of gold with them.

There are three ways to react in such situation:

- a) If he asks the police to seal the land, they will charge PKR 200,000 and it will take around 2 days to completely block public access to that area and for two days the locals will be free to take gold.
- b) If he deploys a well-known ABC security, it will take about 1 day for the security to take over the area. However, the company is going to charge PKR 500,000.
- c) If he asks the local government to intervene, government will not charge anything but it will take 3 days to secure the location, hence three days for the locals to loot the area.

Assume the price of gold to be 100,000 per 10 grams. Take user input the amount of gold (in grams) stolen by locals each hour. Use switch case to select (selection is based on user input) and implement one of the above three scenarios and calculate the loss in terms of gold value and security payment.

```
#include<iostream>
```

```
using namespace std;
```

```
int main()
```

```
{
```

```
    int b,c,d,e,f,g,h,i;
```

```
    char a;
```

```
    cout<<"Mr. Ali has to secure his gold mine "<<endl;
```

```
    cout<<"He has following 3 ways to secure his mine"<<endl;
```

```
    cout<<"a. With the help of police he has to pay 200,000 RS, it will take 3 days to secure and locals will have 2 days to loot"<<endl;
```

```
    cout<<"b. With the help of ABC company he will have to pay 500,000 and 2 days will be left for locals to loot"<<endl;
```

```
    cout<<"c. With the help of government he will not pay anything but it will take 1 day to secure and locals will have 3 days to loot"<<endl;
```

```
    cout<<"Select your security plan ";
```

```
    cin>>a;
```

```
    cout<<"Price of gold per 10 grams is 110,000"<<endl;
```

```
    b=110000/10;
```

```
    cout<<"Enter amount of gold (in grams) stolen per hour : ";
```

```
    cin>>c;
```

```

        if(a=='a' || a=='A')
        {
            d=24*2;
            e=b*d;
            cout<<"You have to pay 200,000 to the police and locals will loot "<<e<<" amount of
gold";
        }
        if(a=='b' || a=='B')
        {
            f=24*2;
            g=b*g;
            cout<<"You have to pay 500,000 to the ABC company and locals will loot "<<g<<" amount
of gold";
        }
        if(a=='c' || a=='C')
        {
            h=24*3;
            i=b*h;
            cout<<"You will not have to pay anything to government and locals will loot "<<i<<"
amount of gold";
        }
        return 0;
    }
}

```

Question#03**Marks: 04****CLO: 1****Scenario:**

(Note: This scenario is based on fiction)

Thousands of years ago there was a civilization named Civilization-Z which had a wise man named Cataclysmico. He predicted that there was a planet called Planet-X which is revolving around earth and is going to fall on earth after its (Roll no. x 1000)th revolution. He discovered that during the first year Planet-X will revolve 4 times, but after each year the revolution will speed up and will be 2 times the previous year.

Can you implement this scenario and find the number of years after which Planet-X would hit planet earth according to prediction made by Cataclysmico?

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    float total_rev=22*1000;
```

```
    float rev_per_year=total_rev/365;
```

```
    cout<<"\nrevolution per year = "<<rev_per_year;
```

```
    cout<<"\n after one year...";
```

```
    float one_year;
```

```
    one_year=4*365;
```

```
    cout<<"\nfirst year revolution 4 x times = "<<one_year;
```

```
    cout<<"\nfirst year = "<<one_year/365;
```

```
    float rem_rev=total_rev-one_year;
```

```
    cout<<"\nremaing year = "<<rem_rev;
```

```

float rem_year;

do{

    float rem_year;

    rem_year=2*365;

    cout<<"\nremaining year revolution 2 x times = "<<rem_year;

    float rem_rev=rem_rev-rem_year;

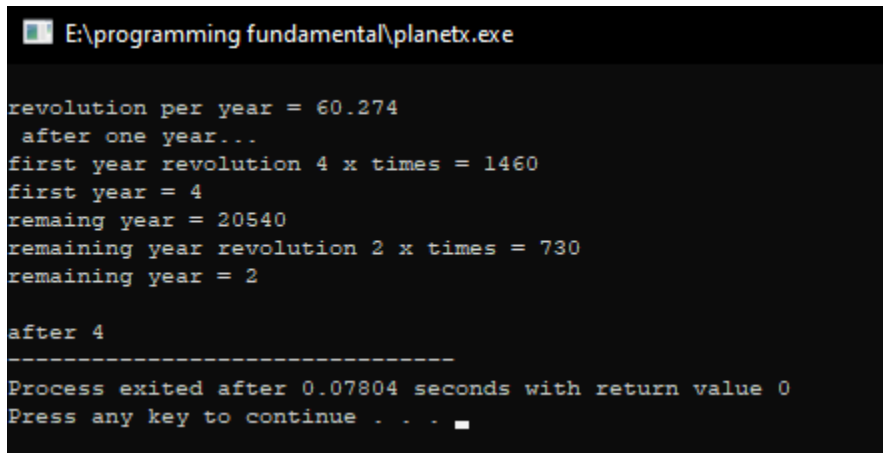
    cout<<"\nremaining year = "<<rem_year/365;

}while(rem_rev==0);

cout<<"\n\nafter "<<one_year/365+rem_year/365;

}

```



```

E:\programming fundamental\planetx.exe

revolution per year = 60.274
after one year...
first year revolution 4 x times = 1460
first year = 4
remaining year = 20540
remaining year revolution 2 x times = 730
remaining year = 2

after 4
-----
Process exited after 0.07804 seconds with return value 0
Press any key to continue . . .

```


You are putting together some speeches for a conference. You arrange a list of speeches in the order in which you want to play them. However, you would like to minimize the empty space left, at the end of each CD (a CD plays for 60 minutes of audio). So, you want to figure out the total time for a group of speeches and see how they will fit. Write a top down design and a program to help you do this. The program should input a speech number and a time for each speech, until it encounters a speech number of 0. The times should each be entered as minutes and seconds (two integer values). For example, if speech number 4 takes 7 minutes and 42 seconds to play, the data entered for that speech would be:

4 7 42

If you are using interactive input, your output should have prompting messages interspersed with the results. For example:

```
Enter speech number: 1
Enter number of minutes: 5
Enter number of seconds: 10

Speech 1, 5 minutes and 10 seconds.

Total speech time 5 minutes and 10 seconds.
Time remaining on CD: 54 minutes 50 seconds.

Enter speech number: 2
Enter number of minutes: 7
Enter number of seconds: 30

Speech 2, 7 minutes and 30 seconds.

Total speech time 12 minutes and 40 seconds.
Time remaining on CD: 47 minutes 20 seconds.
...
...
```

The program should display the data for each speech and the current running time total and remaining time on CD. The last data (speech number 0) should not be added to the total time. After all the data has been read, the program should print a message indicating the time remaining on the CD.

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    int cd_min=60;
```

```
    int cd_sec=60;
```

```
    while(cd_min!=0){
```

```

int number;

cout<<"\nenter speech number = ";

cin>>number;

cout<<"\nenter number of minutes = ";

cin>>cd_min;

cout<<"\nenter number of second = ";

cin>>cd_sec;

cout<<"speech "<<number<<",minutes "<<cd_min<<",seconds "<<cd_sec;

int rem_min=60-cd_min;

cd_min=rem_min;

int rem_sec=60-cd_sec;

cd_sec=rem_sec;

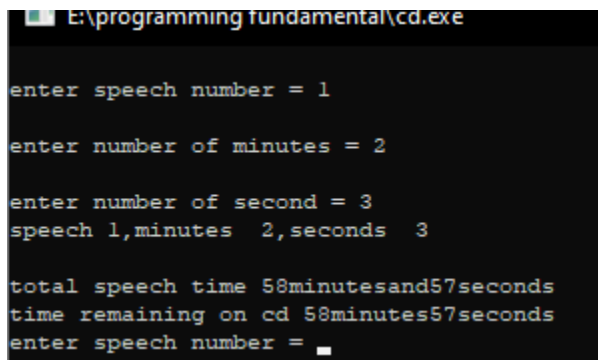
cout<<"\n\ntotal speech time "<<cd_min<<"minutes"<<"and"<<cd_sec<<"seconds";

cout<<"\ntime remaining on cd "<<rem_min<<"minutes"<<rem_sec<<"seconds";

}

}

```



```

E:\programming fundamental\cd.exe

enter speech number = 1

enter number of minutes = 2

enter number of second = 3
speech 1,minutes 2,seconds 3

total speech time 58minutesand57seconds
time remaining on cd 58minutes57seconds
enter speech number = 

```

Calculation of Water Bill

Your water bill includes these charges:

Total Water Bill = Minimum Bill + Volume Charge

All customers pay the minimum bill, which includes up to 2 Ccf (1,496 gallons) of water. If you use more than 2 Ccf, you pay an additional volume charge. To determine your minimum bill and volume charge, you need to know two things:

i Water used

This is on the bill in a unit called Ccf, which stands for centum (hundred) cubic feet. One Ccf equals 748 gallons. To convert Ccf to gallons, multiply by 748. Ex. 6 Ccf x 748 = 4,488 gallons.

The units of water used has to be taken as input from the user.

ii Water connection size

Taken as input from the user as per table 1.

Steps to calculate the water bill:

Step 1: Determine your minimum bill

If you select connection size 1 and used between 0 and 2 Ccf of water, you only pay the minimum bill amount i.e. PKR. 1300.00. If you used more than 2 Ccf, continue to step 2 below.

Table 1: Connection size and minimum bill

Connection size (inch)	Minimum bill (PKR)
1	1300.00
2	1600.00
3	2000.00
4	3000.00
5	5500.00

Step 2: Determine how much water you used above the 2 Ccf minimum bill amount

If you used 6 Ccf, the first 2 Ccf are included in the minimum bill. That means you'll pay a volume charge for the other 4 Ccf.

$$6 \text{ Ccf (total usage)} - 2 \text{ Ccf (included in minimum bill)} = 4 \text{ Ccf}$$

Step 3: Calculate the volume charge

Find the appropriate unit rate as in table 2 and multiply by the amount of water you calculated in step 2.

Table 2: Water rate in PKR upon usage over 2 Ccf

Water use	Amount (PKR) per Ccf
Over 2 Ccf	Your roll number x 10

Continuing from step 2; assume that if your roll number is 16B-025-EL. Calculate volume charge like this:

$$4 \text{ Ccf} \times 250 = \text{PKR. 1000.00 (volume charge)}$$

Step 4: Add the volume charge to the minimum bill

This will give you your total water bill. Here's what it would look like for a customer who used 6 Ccf (4,488 gallons) of water:

1300.00 (minimum bill) + 1000.00 (volume charge) = PKR. 2300.00 (total water bill)

Write a C++ program that takes input the following:

- ✓ **Connection size in inches (as per table 1)**
- ✓ **Water usage in Ccf**

The program then displays the water bill (in PKR) using above procedure, to be paid by the customer.

```
#include<iostream>

using namespace std;

int main(){

    int min_bill;

    int conn_size;

    cout<<"\nenter connection size = ";

    cin>>conn_size;

    if(conn_size==1){

        min_bill=1300;

    }

    if(conn_size==2){

        min_bill=1600;

    }

    if(conn_size==3){

        min_bill=2000;

    }

    if(conn_size==4){

        min_bill=3000;

    }

    if(conn_size==5){

        min_bill=5500;

    }

    int ccf;

    cout<<"\nenter ccf = ";
```

```

cin>>ccf;

int rem_ccf;

if(ccf>2){

    rem_ccf=ccf-2;

    cout<<"remaining ccf = "<<rem_ccf;

}

float vol_ch;

vol_ch=rem_ccf*22*10;

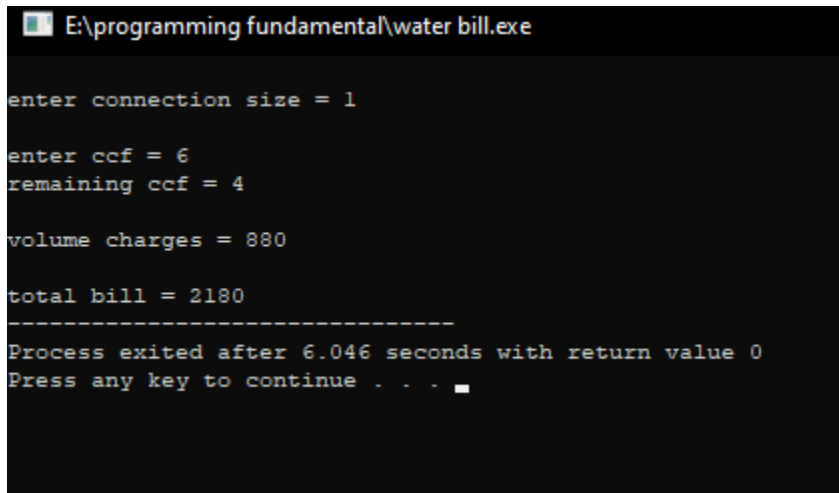
cout<<"\n\nvolume charges = "<<vol_ch;

float total_bill=vol_ch+min_bill;

cout<<"\n\ntotal bill = "<<total_bill;

}

```



```

E:\programming fundamental\water bill.exe

enter connection size = 1

enter ccf = 6
remaining ccf = 4

volume charges = 880

total bill = 2180
-----
Process exited after 6.046 seconds with return value 0
Press any key to continue . . .

```