CONFIDENTIAL

UNIVERSITI TEKNOLOGI MALAYSIA
FACULTY OF COMPUTING

TEST 3 (PRACTICAL)

SEMESTER I 2018/2019

SUBJECT CODE : SCSJ1023
SUBJECT NAME : PROGRAMMING TECHNIQUE I
YEAR/COURSE : 1 (SCSJ/ SCSV/ SCSB/ SCSR/ SCSP)
TIME : 2.30 – 4.30 pm (2 hours)
DATE : 13 November 2018 (Tuesday)
VENUE : N28 MPK1-MPK10

INSTRUCTIONS TO THE STUDENTS:

- Read the instructions carefully.
- References to any resources by any means are strictly prohibited.
- You are given **TWO HOURS** to complete the test, including the submission of your program.
- Your program must follow the input and output as required in the text and shown in the examples. You must test the programs with (but not limited to) all the input given in the examples.

MATERIAL FOR THE TEST:

- You are provided with a template source code file, **`tempTest3.cpp`**. The provided program file should be used as the basis to answer this test.
- Download the file (compressed in a RAR file named **`final_practical.rar`**) from e-learning.
- **IMPORTANT:** You MUST extract the RAR file into the local hard drive of your computer. Do not edit the code directly from the WinRAR.

SUBMISSION PROCEDURE:

- Only the source code file is required for the submission (i.e. the edited **`tempTest3.cpp`**).
- Submission must be done via the **UTM's e-learning system**.

Question [50 Marks]

Complete a C++ program (**`tempTest3.cpp`**) that could do 2 main operations;

a) calculate electric charge,
b) count the number of words in a string.

(**Note:** values in ***bold*** are input by the user)

Task 1: Complete a function named **`displayMenu`** to provide a menu driven screen for user to select the operation to be performed. (10 marks)

a) The function should ask the user to enter his/ her choices.
b) If the user enters **1**, the function should call **`countWords`** function.
c) If the user enters **2**, the function should call **`calcElecRest`** function.
d) If the user enters **3**, the function should display thanks messages and quit.
e) If the user enters other inputs, the program will display invalid input message and quit.

The sample screen display is shown in **Figure 1**.

```
::MID TERM TEST SYSTEM MENU::
   (1) Words count calculator
   (2) Electric charges calculator
   (3) Quit

Your choice >> 1

::WORDS COUNT CALCULATOR::

Enter a string: Hello world
```

```
::MID TERM TEST SYSTEM MENU::
   (1) Words count calculator
   (2) Electric charges calculator
   (3) Quit

Your choice >> 3

Thank you for using our system...
```

```
::MID TERM TEST SYSTEM MENU::
   (1) Words count calculator
   (2) Electric charges calculator
   (3) Quit

Your choice >> 2

::ELECTRIC CHARGES CALCULATOR::

Please enter the power in Watts
and the voltage in kilovolts

   Power(W)    = 1

   Voltage(kV) = 2
```

Figure 1: Sample screen display for the program

Task 2: Complete a function named **`countWords`** that counts the number of words in a string. (14 marks)

a) The function should ask the user to enter a string.
b) The function should list all the words found in the string entered in (a) in **lowercase**. **Note:** Please strip **punctuation marks/symbols** from the words. (e.g. ? ! . ,)
c) The function should display the words identified, and the total number of words identified.

The sample screen display is shown in **Figure 2**.

```
::WORDS COUNT CALCULATOR::

Enter a string: How are you feeling today? I am HAPPY!..

List of words:
   Word 1 >> how
   Word 2 >> are
   Word 3 >> you
   Word 4 >> feeling
   Word 5 >> today
   Word 6 >> i
   Word 7 >> am
   Word 8 >> happy

The number of words = 8
```

Figure 2: Sample screen display for Task 2

Task 3: Complete a function named **`calcElecRest`** that calculates electric charges.

(16 marks)

a) The function should ask the user to enter the power, P, in watts and the voltage, V, in **kilovolts**.
Input validation: The program should **not accept negative** numbers for the two inputs.

b) The function should call **`calc_Q`** function to calculate the electric charge, Q in coulombs.
Note: Pass the current, I, in amperes to **`calc_Q`** function. The formula to calculate the current, I in amperes is equal to the power, P in watts divided by the voltage, V in **volts** (I = P / V).

c) The function should display:
- the power, P, in watts.
- the voltage, V, in **volts**.
- the current, I, in amperes.
- the electric charge, Q in coulombs.

The sample screen display is shown in **Figure 3**.

```
::ELECTRIC CHARGES CALCULATOR::

Please enter the power (P) in Watts
and the voltage (V) in kilovolts

   Power(W)    = -3000
   Voltage(kV) = 2
   Invalid input. Please try again !

   Power(W)    = 2500
   Voltage(kV) = -1
   Invalid input. Please try again !

   Power(W)    = 3000
   Voltage(kV) = 1.5

Enter the time of current flow, t in minutes = 0.5

Power, P = 3000 watts
Voltage, V  = 1500 volts
Electric current, I = 2 amperes
Electric charge, Q = 60 coulombs
```

Figure 3: Sample screen display for Task 3 and Task 4

Task 4: Write a function named `calc_Q` to calculate the electric charge, Q in coulombs. (6 marks)

a) This function takes the current, I, in amperes as input parameter.
b) The function should ask the user to enter time in **minutes**.
c) The function should calculate the electric charge, Q in coulombs.
   Note: The formula is the electric charge, Q equal to the current, I, in amperes, multiply the time of current flow, t in **seconds** ($Q = I * t$).
d) The function should return the value of electric charge, Q.

Task 5: Define function prototypes for all functions at the top of the program.

(4 marks)

SAMPLE PROGRAM EXECUTION 1

```
::MID TERM TEST SYSTEM MENU::
   (1) Words count calculator
   (2) Electric charges calculator
   (3) Quit

Your choice >> 1

::WORDS COUNT CALCULATOR::

Enter a string: Hi! Hello.. Nothing to say???

List of words:
   Word 1 >> hi
   Word 2 >> hello
   Word 3 >> nothing
   Word 4 >> to
   Word 5 >> say

The number of words = 5
```

SAMPLE PROGRAM EXECUTION 2

```
::MID TERM TEST SYSTEM MENU::
   (1) Words count calculator
   (2) Electric charges calculator
   (3) Quit

Your choice >> 2

::ELECTRIC CHARGES CALCULATOR::

Please enter the power (P) in Watts
and the voltage (V) in kilovolts

   Power(P)   = 2500
   Voltage(kV) = -3
   Invalid input. Please try again !

   Power(P)   = 3500
   Voltage(kV) = 2.5

Enter the time of current flow, t in minutes = 0.2

Power, P = 3500 watts
Voltage, V  = 2500 volts
Electric current, I = 1.4 amperes
Electric charge, Q = 16.8 coulombs
```