Data structure and Programming II

TP01:
Getting started with C++ programming

Deadline:
6 days

- Objective:
  - To review some lectures learnt in Semester 1 and apply with C++
    - Variable (number, string, character), decision making, loop, structure, function,
    - Main topics: Function, structure, while loop
  - To be ready for semester 2
- Submit to Moodle (individually)
  - *A pdf report (cover, team member, percentage of contribution for each member, exercise and solution with screenshot)*
  - *Source codes*

```
1   #include<iostream>
2   using namespace std;
3   main(){
4       string name;
5
6       cout<<"Hello world!\n";
7       cout<<"Welcome to C++ language!\n";
8
9       cout<<"What is your name?: ";
10      cin>>name;
11      cout<<"\tHi, "<<name<<endl;
12  }
```

```
Hello world!
Welcome to C++ language!
What is your name?: Bob
        Hi, Bob
```

Figure 1: An example of C++ program: Structure

Write programs using C++ to solve each problem below:

1. Write a C++ program to ask information from a student such as name, gender, major, age then display the greeting message on screen. Say he/she is eligible to vote the election if the age is at least 18.

   Hi, Mr. ***name!*** your age is ***age*** year old and you learn ***major***! : **for male (M)**

   Hi, Mrs. n***ame!***, you are ***age*** year old and you are majoring in ***major*** : **for female (F)**

   For either Male or Female:

   You can vote. If age is at least 18.

   You can not vote Otherwise.

2. Write a C++ program to check whether an input character is a vowel or a consonant. Hint: Use ASCII code to test condition.
    - Uppercase letters from: 65 to 90, lowercase letters from 97 to 122
    - Vowel and its ASCII code: a = 97, e = 101, i = 105, o = 111, u = 117

3. A program to compute tax salary of a person. The program asks for name, gender and salary of a person and tell him/her how much tax he/she is required to pay. The tax is computed based on the rules below:
    - **For males**
        - Salary more than 1000 USD, pay tax 9.5%
        - Salary 500 – 1000 USD, pay tax 7%
        - Salary 300 – 500 USD, pay tax 5%
        - Salary less than 300, no need to pay tax
    - **For females**
        - Salary more than 1000 USD, pay tax 8%
        - Salary 500 – 1000 USD, pay tax 6.5%
        - Salary 300 – 500 USD, pay tax 3.5%
        - Salary less than 300, no need to pay tax
4. Create a C++ program that can play a game Rock-Paper-Scissor. The game plays between the user against the computer.
5. Write a C++ program to convert a minute to a time format which consists of hour, minute, and second (h:m:s). A user is required to input a minute.
    - Hours = minutes / 60
    - Remainderminutes = minutes % 60
    - Seconds = remainderminutes * 60

6. Write a C++ program to find the summation of numbers from 1 to n except number 10 and 30, where n is a number input by a user and n should be greater than 50.

7. Write a C++ program to create a new data structure for storing info of book (book ID, book ISBN, book title, published year, author names and price ($)). Each book could have more than one author. To do:
    - Create an array that can store 5 books' info.

- Create a function to display a book info based on ISBN. This function takes a parameter which is an ISBN of a book.

  void displayBookByISBN(Book books[], int size, string isbn){…. }

- Create a function to display information of all books.

  void displayAllBooks(Book books[], int size) { … }

8. Create 5 functions to:
   - i) convert temperature Celsius to Fahrenheit: Fahrenheit = (Celsius * 9.0 / 5.0) + 32
   - ii) convert temperature Fahrenheit to Celsius: Celsius = (Fahrenheit – 32) * 50 / 9.0
   - iii) find root of quadratic equation $ax^2+bx+c=0$.
   - iv) compute BMI of a person's weight and height and tell whether he/she is overweight, underweight and other terms according to BMI list:
     - bmi = weight / (height * height)
     - bmi < 18.5, underweight
     - bmi < 25, normal weight
     - bmi < 30, overweight
     - else, obese
   - v) sum numbers from 1 to n except those numbers that are divisible by 3, n is a parameter of the function.

   Design a menu program to demonstrate these 5 functions with different test cases during the run time of the program.