**Computing (International Year 1)**

**Coursework Brief**

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| Module Title: | Computing | IY1 |
| Title of Coursework: | A Simple Electric Circuit Programme | |
| Hand-out date: | 15th April 2015 | |
| Hand-in date: | 5th June 2015 | |
| Weighting within the module | 60% of total module mark | |
| Word limit / presentation criteria | Project deliverables include texts, diagrams and codes | |
| Learning Outcomes to be assessed(from module spec.) | K1. Understand procedural and object-oriented programming approaches and be able to apply them in real-world problem-solving  K2. Apply and implement required operations of related procedural and object oriented languages such as C and C++  K3. Outline and define how to plan software using modelling techniques, test software using debug techniques and document software using comments  A1. Create a well-written and well documented computer programme from a detailed design specification  A2. Employ a recognised software development method to design and implement software which meets a specified requirement  A3. Communicate the results of their study accurately and reliably and with structured and coherent arguments | |

# Coursework Details

**Purchase and Sales Management System**

You are asked to develop a simple program to calculate the voltage and current of a resistor using C++ programming language. In order to complete this coursework, you will need to use almost all knowledge we learned in this module, including flow chat diagram, pre-processor, I/O statements, operators, control statements (decision-making & loop), class, function, sequential files, in-code comments etc.

Resistor is the most basic component in an electric circuit. When a current is flowing through a resistor, the “resistance” it encounters is represented by the resistance value of the resistor. And as current flows through a resistor, voltage will build up across the resistor. In electric circuit, current is represented by symbol ***I*** and it has a unit of ampere or A in brief. Voltage is represented by symbol ***V*** and it has a unit of volt or V in brief. Resistance is represented by symbol ***R*** and it has a unit of ohm.

The relation between current, voltage and resistance is:

*V = I \* R*

i.e. voltage is equal to the production of current and resistor.

Your first task is to model the resistor using class. The class must have at least three private member variables representing the voltage, current and resistance values. The class should also have public member functions to access and change these variables. The class should also have functions to calculate, according to above equation, voltage and current of a resistor.

The second task is to allow the user to perform the following operations:

1. **Set resistance value**

When a user selects this option (i.e. input 1), it will ask the user to input a new resistance value and the program should use proper function to change the resistance value.

1. **Change voltage value**

When a user selects this option (i.e. input 2), it will ask the user to input a new voltage across the resistor and the program should use proper function to calculate and output new current flowing through.

1. **Change current value**

When a user selects this option (i.e. input 3), it will ask the user to input a new current through the resistor and the program should use proper function to calculate and output new voltage across the resistor.

1. **Exit**

When a user selects this option (i.e. input 4), it indicates that s/he would like to exit the system.

NOTE:

* The system should continue to display the four options (i.e. main menu) after completing an operation, until the user selects ‘Exit’ option.
* Creativity is encouraged and it would give you extra mark! For example, the resistor class could inherit from a base “electric component” class, which represents a generic electric component. This base class has only the most basic electric properties as its member variable, such as voltage and current and related functions.
* Sample output of the program is attached at the end of this document.

**Submission**

You need to submit both **printed copy** (to Rosy in Admin Office) and **electronic copy** of your project (via the assignment submission area in Unilearn).

For electronic copy, you should submit your work in *.doc* or*.pdf* format. Please name this using the convention ***YourInitial\_YourSurname\_Cpp\_Coursework.doc*** *(or .pdf)* (so that if your name is Steve Jobs you would name it as *S\_Jobs\_Cpp\_Coursework*). If your work cannot be submitted as a single document then you should submit a single zip file containing all your documents, as Unilearn will only allow a single submission for each student. Please make sure that you check your work carefully following submission.

Your solution must be original. Please make sure that you are familiar with the regulations regarding plagiarism and late submissions procedure.

**Marking Criteria**

There are 3 criteria for this assignment. Weight of each session is indicated on the right-hand side.

* **Planning:** This includes any diagrams or documents that you have produces to plan and understand your system. You may have employed flow chart diagrams for each activity/function of your system, produced a storyboard of the sequence of activities or something less formal. In order to produce a solution to this problem you are strongly encouraged to apply techniques of analysis in order to break the problem down into manageable and solvable elements**. [30%]**
* **Functionality:** This criterion focuses on the extent to which your project achieves what it is required to do, and the way by which it goes about doing it. Class must be used to model the resistor and all the four basic functions which are described in the brief must be included as functions. You are likely to receive extra marks if you illustrate your creativity and extend the system capabilities defined by the project brief. **[40%]**

* **Documentation:** This criterion considers the degree to which your assignment gives the impression of a coherent, thoughtful, thorough and sustainable project. Consistency throughout the project in terms of your visual approach, your use of terms and the linkage between the statement of goals in your planning and their final realisation. This also includes in-code commenting and use of a consistent and readable coding style. **[30%]**

**Sample Program Output**

**Please choose from following options:**

**1 - Set Resistance**

**2 - Change Voltage**

**3 - Change Current**

**4 - Exit**

**1**

**Please input new resistance value: 5**

**Resistance is now 5(Ohm).**

**Please choose from following options:**

**1 - Set Resistance**

**2 - Change Voltage**

**3 - Change Current**

**4 - Exit**

**2**

**Please input new voltage value: 20**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Resistance is now 5(Ohm).**

**Voltage is now 20(V).**

**Current is now 4(A).**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Please choose from following options:**

**1 - Set Resistance**

**2 - Change Voltage**

**3 - Change Current**

**4 - Exit**

**3**

**Please input new current value: 17**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Resistance is now 5(Ohm).**

**Voltage is now 85(V).**

**Current is now 17(A).**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Please choose from following options:**

**1 - Set Resistance**

**2 - Change Voltage**

**3 - Change Current**

**4 - Exit**

**4**

**Press any key to continue.**