

Hand out date: 18-06-2021

Due date: 01-08-2021

BEng (Hons) Electrical and Electronic Engineering

Module Title: Engineering Software 2

Module Code: TC40072E

Resit Assignment 1: LabVIEW programming

This assignment carries 50% of the marks available for this module.

Set by: Dr NADIA DJAID

Learning Outcomes covered by this assignment:

1. Analyse and evaluate a range of engineering needs and specify them in terms of computational methods.
2. Design Flow Charts and State Diagrams to meet given specifications of proposed software programme
3. Design and Implement a software application to meet specific requirements.
4. Critically test and evaluate a range of software to meet given specifications

Instructions to Students:

For this assignment you are required to design and implement LabVIEW programmes. The assignment should be written in the form of a technical report.

Your program should present a user-friendly interface with clear instructions.

Write up the assignment as a technical report making sure all figures are numbered and labelled and the report is written in the third person. For the report:

- Specify inputs and outputs.

- Draw either a flow chart or state diagram of the proposed design.
- Implement the design using VI control and function blocks.
- Provide a description of the complete system and the function blocks used in the design.

Your report and your LabVIEW program should be submitted as separate files using the Turnitin links available on Blackboard in the resit folder.

This assignment is marked according to the relevant grid included with this assignment brief.

Assessment Brief

Design and implement LabVIEW programmes for the following three tasks.

Task 1

Design a VI to calculate the reactance R_c of a given capacitor and save it as a sub-VI.

Design a VI to calculate the total resistance, R_s , of any 2 resistors connected in series and save it as a sub-VI.

Design a VI to calculate the total resistance, R_p , of any 2 resistors in parallel and save it as a sub-VI.

The formula for calculating the Capacitive Reactance, or impedance of a capacitor is:

$$X_c = \frac{1}{2\pi fC}$$

Where:

X_c = Capacitive reactance measured in ohms.

f = is the AC frequency in Hertz.

C = is the capacitance in microfarads.

$V = 100 \text{ V}$

Specify the chosen values in your VI.

Task 2

Design a LabVIEW programme to calculate the output voltage of a voltage divider circuit. Use case structures to switch between a voltage divider circuit composed of a voltage source and two resistors in series shown on Figure 1, and a voltage divider circuit composed of a voltage source and three resistors, shown on Figure 2. Use the sub-VIs designed in **Task 1** to calculate V_{out} .

Specify the chosen values in your VI.

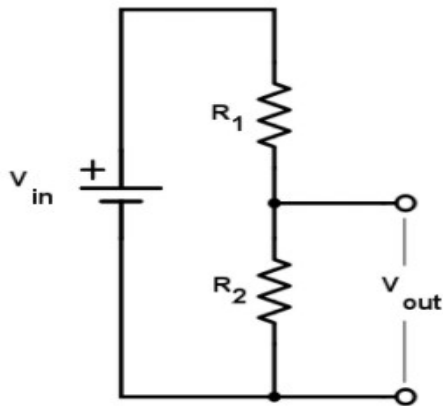


Figure 1

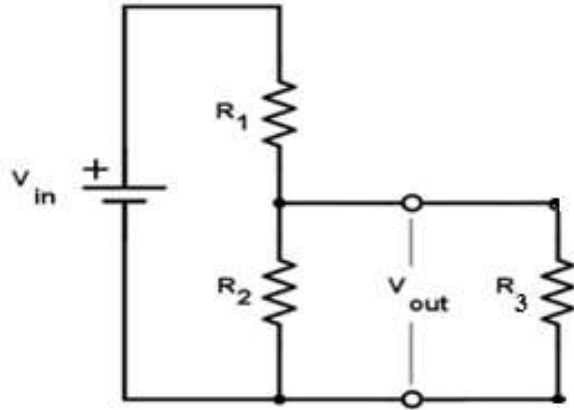


Figure 2

Task 3

Thermistors are active measurement devices that operate by changing resistance with changes to ambient temperature. Design a LabVIEW programme that calculates the output voltage of the circuit shown in Figure 3 for 10 iterations. Assume that the Thermistor's resistance will decrease by $-10\ \Omega$ for each iteration.

Where: $R_1 = 350\ \Omega$, $V = 10V$

Plot the result of the voltage divider (V_{out}) for all iterations using a waveform graph.

Analyse and comment on your result.

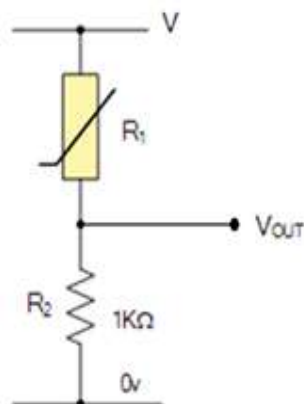


Figure 3

Assessment Criteria & Grading for Engineering Software 2 LabVIEW Assessment:

	Available marks	80%+	70%+	60% +	50% +	40%+	0 - 30%
Presentation: The degree to which the report is easily read and presented. The use of appropriate language and expression within the work to convey ideas and arguments. The degree of logical coherence within individual paragraphs and across the work as a whole.	20	Excellent presentation and use of appropriate language; well expressed, consistent and coherent arguments sustained.	High level of presentation, use of appropriate language; well expressed, consistent and coherent arguments sustained.	Very good standard of presentation, expression and use of language, well attempted argument of some sophistication.	Good presentation, a good grasp of basic language, well attempted and sound argument.	Basic presentation and grasp of basic appropriate language with some attempts at overall coherence.	Poor presentation, minimal use of appropriate language and minimal coherence.
Academic content: The degree to which students have engaged in the appropriate level of reading for the work and the preparedness of students to offer evaluation and analysis of the software programme implemented.	20	Excellent level of independent reading used in work; advanced evaluation analysis.	High level of independent reading used in work; advanced evaluation analysis.	Very good level of independent reading well deployed, some evidence of advanced analysis.	Good basic level of reading attempted and some analysis.	Some basic level of reading demonstrated with some basic analysis.	Little evidence of any reading or analysis offered. Mainly anecdotal and/or descriptive.
Software implementation. The degree to which students have engaged in the appropriate level of software programme implementation and problem solving.	60	Excellent level of software implementation achieved.	High level of software implementation achieved.	Very good level of software implementation attempted.	Good basic level of software implementation offered.	Some basic level of software implementation demonstrated.	Minimal evidence of any software implementation offered.

