

ASSIGNMENT INTERNAL VERIFICATION FORM (2017-2018)

ASSIGNMENT TITLE:	Investigation into DC Transients	LEVEL:	4
MODULE :	PSDE4001 Electrical and Electronic Principles	ASSIGNMENT NO (x of y):	1 of 2
PROGRAMME:	HNC Electrical and Electronic Engineering	ASSIGNMENT AUTHOR :	R. Jenkins

VERSION:	DATE SUBMITTED FOR VERIFICATION :	INTERNAL VERIFIER COMMENTS (Approval or detail of amendments required):	DATE
1.	11/01/2018	Aims and Objectives: Consider using bullet points to emphasise the separate aims and objectives. All tasks: Considering feedback from the TSD moderator you may want to reduce the amount of instruction for the tasks.	16/1/2018
2.	24/1/2018	Assignment ready to be sent to external moderator	24/1/2018

INTERNAL VERIFIER PLEASE TICK TO INDICATE THAT THE COURSEWORK:	
✓	Conforms to the assessment pattern described in the module syllabus
✓	Tests the module learning outcome(s) appropriately

SIGNATURES OF FINAL APPROVAL:	SIGNATURE	DATE
INTERNAL VERIFIER: I confirm that this version of the assignment specification is ready to be sent to the external examiner		24/1/2018
ASSIGNMENT AUTHOR: I confirm that internal verifier and external examiner approval have been received and that this version of the assignment specification will be distributed to students		

LEVEL/ LEFEL 4

SEMESTER 1

MODULE CODE/ COD Y MODIWL: PSDE4001
ELECTRICAL AND ELECTRONIC PRINCIPLES

ASSESSMENT TYPE/ MATH O ASESU: ASSIGNMENT

ASSESSMENT/COMPONENT/ ASESAD/CYDRAN: 1

COMPONENT WEIGHTING/ PWYSAU'R CYDRAN: 25%

WORD COUNT (or WORD COUNT EQUIVALENT)/ NIFER Y GEIRIAU:
1500 and 2000 WORDS/O EIRIAU

MODULE TUTOR / TIWTOR Y MODIWL: ROBERT JENKINS

SUBMISSION DETAILS/ MANYLION CYFLWYNO:

- **Make sure that Your Name , Your Student P Number, Your Module Title, Assignment Title and Your Module Lecturer's Name are clearly shown on the front page of your assignment**
- **All assignments must be submitted electronically to Turnitin unless indicated by the module lecturer here:**
- **If lecturer additionally requires you to upload coding separately to Moodle it will be indicated here: NO**
- **If a paper submission is required, then it will be indicated here: NO
you will then be required to submit the assignment parts in a suitable report folder–
not in poly-pockets - to the module tutor.
For paper submissions only this form (ALL PAGES) MUST be printed out, signed, attached to the front of your assignment and submitted to the module tutor separately from your electronic assignment submission. Paper submission assignments will not be accepted without this form as it is a requirement that you sign the disclosure regarding the referencing convention.**
- **DO NOT put this form into Turnitin or it will match many similarities with other students' submissions.**



ASSIGNMENT SPECIFICATION

Student name:		Student P number:	
Programme:	HNC Electrical and Electronic Engineering		
Lecturer:	Robert Jenkins	Internal Verifier:	R. Davies
Assignment Title:	Investigation into DC Transients		
Hand Out Date:		Submission deadline:	

Referencing:	In the main body of your submission you must give credit to authors on whose research your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have read or quoted in order to complete this assignment (e.g. for books: surname of author and initials, year of publication, <u>title of book</u> , edition, publisher: place of publication).		
Disclosure:	I declare that this assignment is all my own work and that I have acknowledged all materials used from the published or unpublished works of other people. All references have been duly cited.		
Student's Signature:	<i>Hardcopy assignments will not be accepted without a signature here</i>	Date:	

Late submission will result in a late penalty mark, as follows:

Up to one week late, maximum mark of 40% for first attempts. No late submission for resit work.

(Academic Quality Handbook 2016/17 7.5 (5))

Only the Extenuating Circumstances Committee may grant an extension.

Learning Outcomes tested (from module syllabus)
1. Use scientific principles to produce routine solutions to familiar engineering principles
2. Use collected data and relate it to a limited range of scientific principles related to the engineering discipline

TASK DESCRIPTION

Aims and Objectives

The aim of this assignment is to introduce RC and RL series circuit analysis using mathematical formulae. Carry out comparison of results using simulated and practical exercises and suggest logical reasons for any discrepancies.

The objectives of this assignment are:

Use and manipulate appropriate formulae in carrying out calculations relating to engineering problems.
Compare practically obtained results with calculated/simulated values and account for discrepancies.

Annotate and interpret information from simulations and use data appropriately with a range of scientific principles.
Correctly take instrument readings from practical circuits, collect and use data with a range of scientific principles related to the engineering discipline.

Introduction

This assignment contains an investigation into the behaviour of R-L and R-C circuits when connected to a direct current voltage source, through simulation, practical construction and testing and through theoretical prediction.

Results must be analysed and discussed and comparison will be required between all three methods and suitable and relevant conclusions must be drawn.

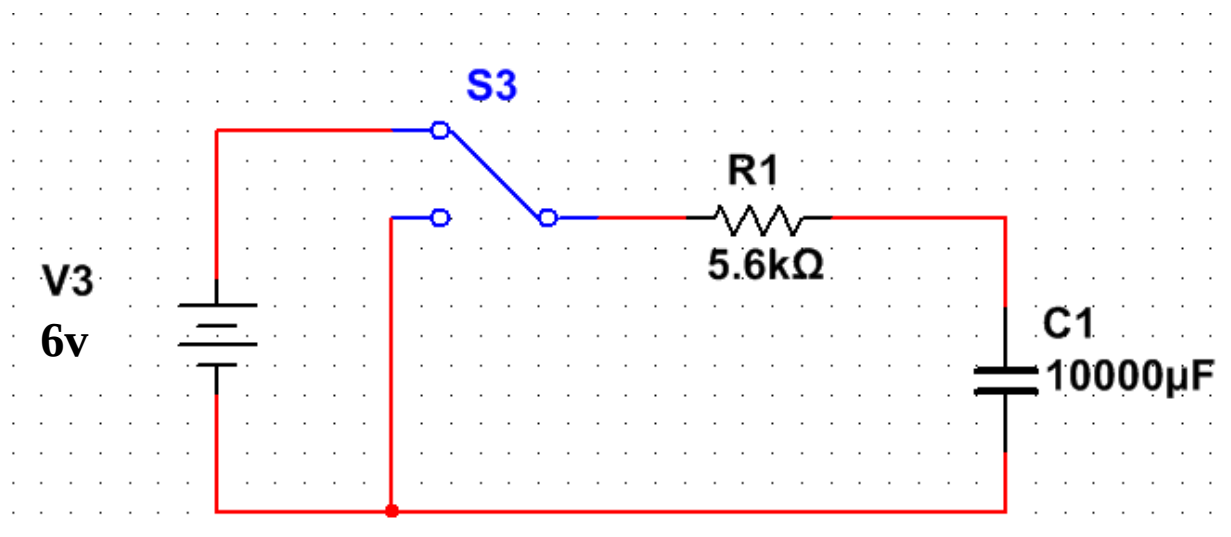
Task 1

Transient Behaviour for the Charging of a Capacitor

Examine the circuit shown in fig 1 below. Discuss the reasons for the selection of suitable practical values for R and C to provide an appropriate time constant. The supply voltage is 6v dc.

- Take voltage and current readings until steady state conditions are reached.
- Plot current and voltage to a base of time.
- Choose three random time values and using the exponential equations check calculated current and voltage values and compare with graphical values.
- Using NI Multisim to simulate the circuit and plot current and voltage and compare simulated values with manually plotted ones.

Figure 1



Task 2

Transient Behaviour for the Discharging of a Capacitor

- With the circuit in fig 1 now in discharge state take current and voltage readings until both parameters are zero (theoretically).
- Plot current and voltage against time for the discharge condition.
- Again, choose three random time values and using the exponential equations check calculated values of current and voltage and compare with graphical values.
- Using NI Multisim, simulate the circuit and plot current and voltage against time.
- Using the same random time values, measure simulated currents and voltages and compare with manually plotted ones.
- As a team, discuss and compare your findings.

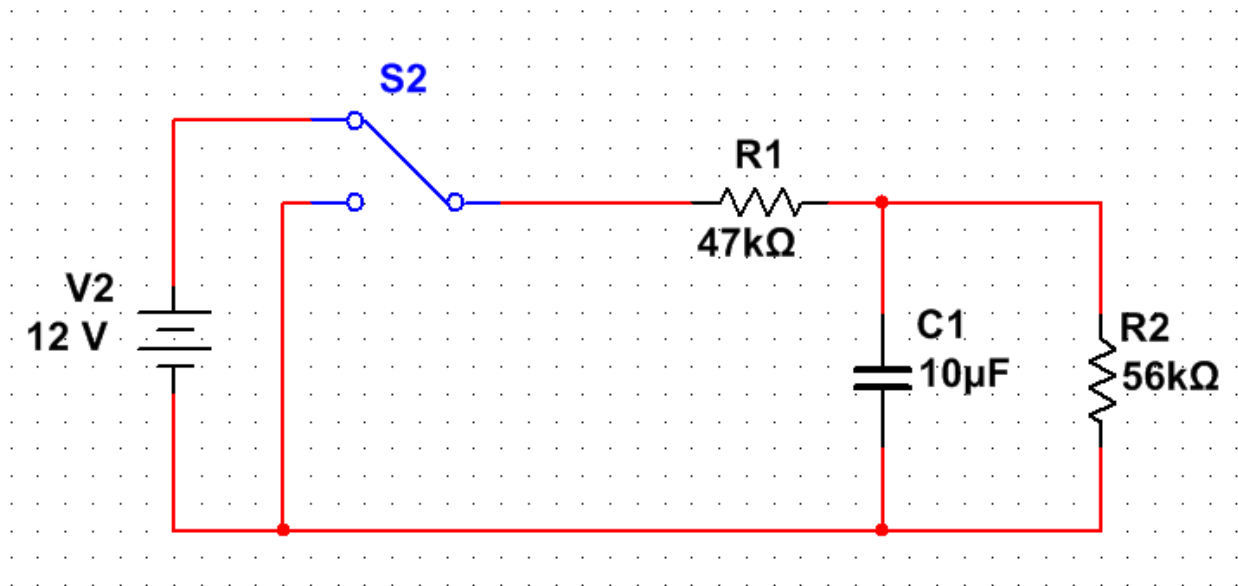
Task 3

Transient Behaviour for a more Complex Circuit

For a simple R-C circuit the time constant of the circuit is simply equal to the product of the resistance R and the capacitance C . For some other, somewhat more complex circuits, however, it may not be immediately obvious how the time constant can be determined.

Consider the circuit shown in figure 2.

Figure 2



The time constant should be calculated by determining the total resistance that is connected across the terminals of the capacitor.

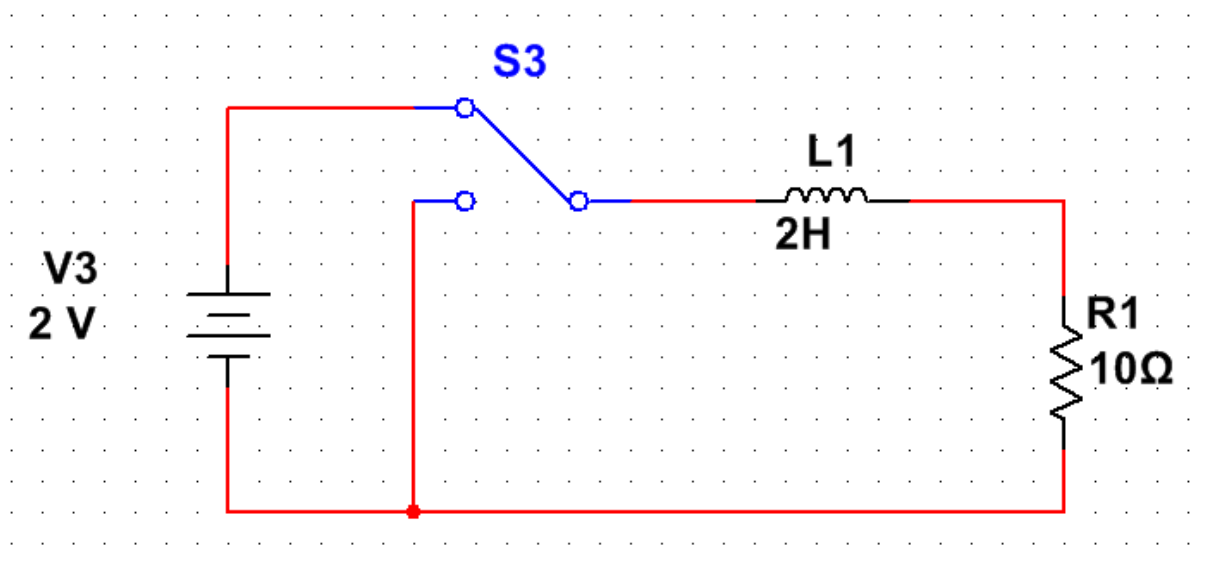
- Investigate to show that this resistance is the parallel combination of R_1 and R_2 .
- Simulate this circuit using NI Multisim, and plot currents to a base of time for the charge and discharge conditions.
- From your plots estimate the time constant for both the charge and discharge conditions.
- Calculate the time constants for the conditions in (iii) and compare with simulated values.
- Calculate the initial and final currents taken from the supply.

Task 4

Transient Behaviour for the Inductive Circuit

Examine the circuit shown in figure 3

Figure 3



- i. Using NI Multisim, capture and simulate the current growth for the first one second after the voltage source is applied to the circuit.
- ii. Carry out calculations (using the approximate method of calculation) and manually plot this current. Compare with simulation and comment.
- iii. Determine the current flowing in the circuit immediately before the switch is changed over.
- iv. Calculate the circuit time constant and compare with estimates from manual and simulated plots.
- v. Calculate the time that elapses before the current flowing in the circuit has fallen to (i) 100mA, (ii) 10mA. Compare and comment with plotted value.

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

The final grade awarded for this assignment will be based on the common criteria found on the next page which also provides an opportunity for your tutor to give feedback on each of these criteria. Actual marks awarded will be based upon the advice given below. Please ensure you read this section carefully as marks will not be awarded for individual tasks but rather according to the combination of the sections required in your report. The report must be written using between 1500 and 2000 words containing the following sections: -

1. **Introduction**
2. **Circuit testing**
3. **Testing and results discussion**
4. **Conclusions and recommendations**
5. **Appendix**

Ensure the report has a title page and that all pages are numbered. Include a table of contents and a list of figures to be placed before the introduction.

1. Research-informed Literature

Not applicable to this assignment, no marks awarded.

2. Knowledge and Understanding of Subject (20%)

Marks will be awarded for the extent of your knowledge and understanding of concepts and underlying principles associated with the discipline.

3. Analysis (30%)

Marks will be awarded for your analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence

4. Practical Application and Deployment (30%)

Marks will be awarded for your effective deployment of appropriate methods, tools and techniques; extent of skill demonstrated in the application of concepts to a variety of processes and/or contexts; formulation of innovative and creative solutions to solve problems.

5. Skills for Professional Practice (20%)

Marks will be awarded for your demonstration of attributes expected in professional practice including: individual initiative; deployment of appropriate media to communicate (including written); clarity and effectiveness in presentation and organisation. This will be based on the quality of the report.

COMMON ASSESSMENT AND GRADING CRITERIA

Assessment Criteria	OUTRIGHT FAIL	UNSATISFACTORY	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT	EXCEPTIONAL
	REFER (equivalent to 0-29%)	REFER (equivalent to 30-39%*	PASS (equivalent to 40-49%)	PASS (equivalent to 50-59%)	MERIT (equivalent to 60-69%)	DISTINCTION (equivalent to 70-79%)	DISTINCTION (equivalent to 80-100%)
1. Research-informed Literature Extent of research and/or own reading, selection of credible sources, application of appropriate referencing conventions	Little or no evidence of reading. Views and findings unsupported and non-authoritative. Referencing conventions largely ignored.	Poor evidence of reading and/or of reliance on inappropriate sources, and/or indiscriminate use of sources. Referencing conventions used inconsistently.	References to a limited range of mostly relevant sources. Some omissions and minor errors. Referencing conventions evident though not always applied consistently.	Inclusion of a range of research-informed literature, including sources retrieved independently. Referencing conventions mostly consistently applied.	Inclusion of a wide range of research-informed literature, including sources retrieved independently. Selection of relevant and credible sources. Very good use of referencing conventions, consistently applied.	A comprehensive range of research informed literature embedded in the work. Excellent selection of relevant and credible sources. High-level referencing skills, consistently applied.	Outstanding knowledge of research-informed literature embedded in the work. Outstanding selection of relevant and credible sources. High-level referencing skills consistently and professionally applied.
2. Knowledge and Understanding of Subject Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.	Major gaps in knowledge and understanding of material at this level. Substantial inaccuracies.	Gaps in knowledge, with only superficial understanding. Some significant inaccuracies.	Evidence of basic knowledge and understanding of the relevant concepts and underlying principles.	Knowledge is accurate with a good understanding of the field of study.	Knowledge is extensive. Exhibits understanding of the breadth and depth of established views.	Excellent knowledge and understanding of the main concepts and key theories. Clear awareness of challenges to established views and the limitations of the knowledge base.	Highly detailed knowledge and understanding of the main theories/concepts, and a critical awareness of the ambiguities and limitations of knowledge.
3. Analysis Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence	Unsubstantiated generalisations, made without use of any credible evidence. Lack of logic, leading to unsupportable/missing conclusions. Lack of any attempt to analyse, synthesise or evaluate.	Some evidence of analytical intellectual skills, but for the most part descriptive. Ideas/findings sometimes illogical and contradictory. Generalised statements made with scant evidence. Conclusions lack relevance.	Evidence of some logical, analytical thinking and some attempts to synthesise, albeit with some weaknesses. Some evidence to support findings/ views, but evidence not consistently interpreted. Some relevant conclusions and recommendations, where relevant	Evidence of some logical, analytical thinking and synthesis. Can analyse new and/or abstract data and situations without guidance. An emerging awareness of different stances and ability to use evidence to support the argument. Valid conclusions and recommendations, where relevant	Sound, logical, analytical thinking; synthesis and evaluation. Ability to devise and sustain persuasive arguments, and to review the reliability, validity & significance of evidence. Ability to communicate ideas and evidence accurately and convincingly. Sound, convincing conclusions / recommendations.	Thoroughly logical work, supported by evaluated evidence. High quality analysis, developed independently or through effective collaboration. Ability to investigate contradictory information and identify reasons for contradictions. Strong, persuasive, conclusions, justifiable recommendations.	Exceptional work; judiciously selected and evaluated evidence. Very high quality analysis, developed independently or through effective collaboration. Ability to investigate contradictory information and identify reasons for contradictions. Highly persuasive conclusions
4. Practical Application and Deployment Effective deployment of appropriate methods, materials, tools and techniques; extent of skill demonstrated in the application of concepts to a variety of processes and/or contexts; formulation of innovative and creative solutions to solve problems.	Limited or no use of methods, materials, tools and/or techniques. Little or no appreciation of the context of the application.	Rudimentary application of methods, materials, tools and/or techniques but without consideration and competence. Flawed appreciation of the context of the application.	An adequate awareness and mostly appropriate application of well established methods, materials, tools and/or techniques. Basic appreciation of the context of the application.	A good and appropriate application of standard methods, materials, tools and/or techniques. Good appreciation of the context of the application, with some use of examples, where relevant.	A very good application of a range of methods, materials, tools and/or techniques. Very good consideration of the context of the application, with perceptive use of examples, where relevant. Evidence of some innovation and creativity.	An advanced application of a range of methods, materials, tools and/or techniques. The context of the application is well considered, with extensive use of relevant examples. Application and deployment extend beyond established conventions. Innovation and creativity evident throughout.	Outstanding levels of application and deployment skills. Assimilation and development of cutting edge processes and techniques.
5. Skills for Professional Practice Demonstrates attributes expected in professional practice including: individual initiative and collaborative working; deployment of appropriate media to communicate (including written and oral); clarity and effectiveness in presentation and organisation.	Communication media is inappropriate or misapplied. Little or no evidence of autonomy in the completion of tasks. Work is poorly structured and/or largely incoherent.	Media is poorly designed and/or not suitable for the audience. Poor independent or collaborative initiative. Work lacks structure, organisation, and/or coherence	Can communicate in a suitable format but with some room for improvement. Can work as part of a team, but with limited involvement in group activities. Work lacks coherence in places and could be better structured.	Can communicate effectively in a suitable format, but may have minor errors. Can work effectively as part of a team, with clear contribution to group activities. Mostly coherent work and is in a suitable structure.	Can communicate well, confidently and consistently in a suitable format. Can work very well as part of a team, with very good contribution to group activities. Work is coherent and fluent and is well structured and organised.	Can communicate professionally and, confidently in a suitable format. Can work professionally within a team, showing leadership skills as appropriate, managing conflict and meeting obligations. Work is coherent, very fluent and is presented professionally.	Can communicate with an exceptionally high level of professionalism. Can work exceptionally well and professionally within a team, showing advanced leadership skills. Work is exceptionally coherent, very fluent and is presented professionally.

GRADING CRITERIA AND STUDENT FEEDBACK

This section details the assessment criteria. The *extent* to which these are demonstrated by you determines your grade. The weightings available for each criterion are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Common Assessment Criteria Applied	Percentage weighting	Grade awarded
1. Research-informed Literature Extent of research and/or own reading, selection of credible sources, application of appropriate referencing conventions.		
N/A	n/a	
2. Knowledge and Understanding of Subject Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.	25	
Section 1: Introduction –	10	
Section 3: Results and discussion –	15	
3. Analysis Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence	30	
Section 3: Testing and results discussion -	20	
Section 4: Conclusions and recommendations -	10	
4. Practical Application and Deployment Deployment of methods, materials, tools and techniques; application of concepts; formulation of innovative and creative solutions to solve problems.	25	
Section 2: Circuit testing -	15	
Section 5: Quality of test results -	10	
5. Skills for Professional Practice Attributes in professional practice: individual and collaborative working; deployment of appropriate media; presentation and organisation.	10	
All sections -	10	

*Assignment Result (Assessment grades are subject to ratification at the Exam Board. These comments and grades are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)	
	Up to 1 week late	
	1 st / 2 ^d / 3 rd attempt?	1 st

SPECIFIC LEARNING OUTCOMES FOR IENG

This section lists the IEng learning outcomes for full accreditation that are relevant to the assignment. The marks allocated are extracted from the Marking Criteria and Student Feedback form. The grade awarded for the particular LO is also shown. These grades are then transferred onto a 'global' sheet related to each student ensuring all IEng LO's are assessed at least twice across all modules

Code	Learning Outcome	Relevant Tasks in Assignment	Marks available	Marks awarded	Grade awarded
Science & Mathematics					
	N/A				
Engineering Analysis					
EA2i	Ability to apply quantitative methods in order to understand the performance of systems and components	Section 3: Section 4:	30		
Design					
	N/A				
Economic, Legal, Social, Ethical and Environmental context					
	N/A				
Engineering Practice					
EP2i	Understanding of and ability to use relevant materials, equipment, tools, processes, or products.	Section 2	15		