

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):	2 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 2

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

ASSESSMENT TYPE/ MATH O ASESU: ASSIGNMENT

ASSESSMENT/COMPONENT/ ASESAD/CYDRAN: 2

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:	M. Hall
Assignment Title:	Three-Phase Circuits		
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 problems.
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 carry out an analysis of three phase systems using mathematical, simulation and practical processes.

Carry out comparison of results and suggest logical reasons for differences.

The objective of this assignment is use and manipulate appropriate formula in carrying out calculations relating to engineering problems.

Obtain, annotate and interpret information from circuit simulations and use this data appropriately to a limited range of scientific principles

Correctly take instrument readings from practical circuits, collect and use such data to a limited range of scientific principles related to the engineering discipline.

Introduction and Background

A three-phase supply consists of three voltages at the same frequency, usually 50Hz, having the same amplitude, but with a mutual phase difference of 120° . The three phases were identified by being labelled as the red, yellow and blue phases. More recently, the new accepted European colours are grey, black and brown (neutral is now blue in a four wire system). We have three and four wire systems employed extensively for the distribution of electrical power around the country, and three and four wire systems are widely used for distribution and utilisation in domestic, commercial and industrial situations. This assignment will introduce you to both 3 and 4 wire star and delta systems with practical tasks and discussion to demonstrate team working skills.

Equipment required

'Feedback' panels:-

- ELT 171A: Three Phase Supply Unit
- ELT 171C: Load Unit
- NANOVIP electronic meter

A star connected supply will be applied to STAR and DELTA connected loads. Measurements are to be taken of voltage, current, power and power factor.

Task 1

1. As a team, set up a STAR connected balanced load on the ELT171C unit and connect to the STAR supply on the ELT171A unit. Provide a diagram of the system. Configure the ELT171C unit as follows:
 - Set each of the variable resistors R_A R_B R_C to $70\ \Omega$
 - Switch the L/C switches to L
 - Set each of the variable inductors to 200mH

All the measurements i.e. voltages, currents, power factor and power will be measured with an electronic wattmeter (NANOVIP). Sketch the NANOVIP connections illustrating how power measurements are to be taken. Switch on the AC supply (under supervision) and record readings for the STAR balanced load, in a table identical to that shown below.

Supply	Load	Line Voltages			Phase Voltages			I_A	I_B	I_C	PF	Real Power (W)	Apparent Power (VA)
		V_{AB}	V_{BC}	V_{CA}	V_{RN}	V_{YN}	V_{BN}						
Star	Star												
Star	Delta												

2. Switch off and isolate the circuit. What conclusion can be drawn from the values of I_A , I_B and I_C for the STAR balanced load?
3. Re-configure the load in DELTA, provide a diagram of the system and repeat the readings placing the results in the table.
4. Switch off and isolate the circuit. What conclusion can be drawn from the values of I_A , I_B and I_C for the DELTA balanced load?

Task 2

For both STAR and DELTA systems, perform calculations verifying phase & line voltages, and phase & line currents, power factor, checking for any discrepancies between measured and calculated values. Your calculations will show evidence of the use of the power triangle showing, active power, reactive power and apparent power. Provide another table for your calculated values.

Task 3

As a team, reconfigure the load back into STAR as in Task 1 but this time it must be unbalanced by setting $R_A = 40\Omega$, $R_B = 50\Omega$ and $R_C = 70\Omega$. The three-phase load must be purely resistive with the inductors left unconnected (see tutor for connections). Again the loads must be connected in STAR. Perform measurements and place results in a suitable table.

Calculate the 3 line currents and the neutral current and also compare with the measured value of the neutral current.

A full analysis of results is expected.

Draw a scaled PHASOR DIAGRAM for the circuit arrangement.

Task 4

Explain why electricity in the UK and throughout the developed world is transmitted on a Three-Phase basis. (Research and a comprehensive analysis is required). Discuss as part of a team to compare your findings.

Task 5

Discuss as part of a team, and explain what you understand by the term POWER FACTOR and its significance in Electrical Engineering Systems.

Task 6

List and draw diagrams of the four possible connection arrangements of STAR and DELTA when applied to Transformer applications. Give an example of where each arrangement may be used.

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

Requirements

- You are required to present a printed formal laboratory report and submit an electronic copy through 'Turnitin' containing detailed observational notes of your work. This report must be between 1500 and 2000 words and should be laid out in the following sections preceded by a title page and a table of contents:-

1. **Introduction and Background Theory**
2. **Research**
3. **Description of Experimental Procedures**
4. **Testing and Results**
5. **Discussion of Procedures and Results**
6. **Conclusions**
7. **Description of Team Working**
8. **Reference List and Bibliography**
9. **Appendices** (Hand written derivations and calculations)

- You are expected to present a detailed analysis of all your observations.

You will be assessed against the five common assessment criteria as follows:

1 Research Informed Literature (10%)

This will be assessed by sections 2 and 8 of the report related to tasks 4, 5 and 6. Provide a list of sources used and reference correctly using the Harvard method. A bibliography may also be included for material read but not used directly in the report.

2 Knowledge and Understanding of Subject (20%)

This will be assessed by all sections of the report.

3 Analysis (40%)

This will be assessed by sections 4 and 5 of the report related to tasks 1 to 3. Provide a detailed analysis of the results and discuss your observations. Your conclusion must compare results with theory accounting for discrepancies and must also relate the outcomes of the experiments with the original requirement of the assignment.

4 Practical Application and Deployment (20%)

This will be assessed in section 3 and 4 of the report by the method adopted, the use of measuring instruments, the quality and accuracy of the result obtained and the use of the data.

5 Skills for Professional Practice (10%)

This will be assessed in all sections of the report, via the written and presentational quality of your report. Ensure your pages are numbered, contents page is included after the title page and figures are all numbered. A good mark will be obtained for well written descriptions including appropriate punctuation, grammar and spelling. The report must be written in an impersonal and objective way. Ensure your conclusions compare your results with the requirements. It is essential that you try to keep within the word count and avoid unnecessary descriptions of what went wrong. Assessment will also be made by team work description.

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.	10	
Section 2: Research - Section 8: Referencing -	5 5	
2. Knowledge and Understanding of Subject Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.	20	
Section 1: Introduction - Section 3: Description of procedures - Section 5: Discussion of results -	5 5 10	
3. Analysis Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence	40	
Section 4: Testing and results - Section 6: Conclusions -	30 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.	20	
Section 3: Description of procedures - Section 5: Discussion of results - Section 9: Quality of work –	5 5 10	
5. Skills for Professional Practice Attributes in professional practice: individual and collaborative working; deployment of appropriate media; presentation and organisation.	10	
All sections - Section 7: Team working -	5 5	

***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 nd , 3 rd attempt?	1 st

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.

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					
SM1i	Knowledge and understanding of the scientific principles underpinning relevant current technologies, and their evolution	Section 2 Section 3	10		
Engineering Analysis					
EA2i	Ability to apply quantitative methods in order to understand the performance of systems and components.	Section 4: Section 6:	40		
Design					
	N/A				
Economic, Legal, Social, Ethical and Environmental context					
	N/A				
Engineering Practice					
EP3i	Knowledge and understanding of workshop and laboratory practice.	Section 3 Section 5	15		
EP4i	Ability to use and apply information from technical literature.	Section 5	10		