

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:	Chelsi Mason	Student ID number:	
Programme:	HNC Electrical/Electronic Engineering, Power Systems Engineering & Instrumentation Engineering		
Module:	Electrical Principles		
Module code:	PCEE4001	Contribution to Overall Module Assessment (%):	100%
Lecturer:	Jason Pointer	Internal Verifier:	Steve Roberts
Assignment Title:	Electrical Principles	Word count (or equivalent):	2000
Submission deadline:	16/01/19	Return date of provisional marks & written feedback:	
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): Late submission of the assessment will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)
1. Produce routine solutions to typical electrical problems. 2. Relate and apply basic electrical theory to collected data.

STUDENT FEEDBACK FORM

This section details the *extent* to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill 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.

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills	15	4.5
Poor engagement with essential reading. No evidence of wider reading. Have made no direct reference in the assignment.		
2. Knowledge and Understanding Skills	25	10.4
Task 1 achieved 52%. Task 2 achieved 25% - missing elements of the task. Task 3 achieved 45%. Task 4 achieved 45%. Limited knowledge and understanding of the basic underlying concepts and principles within the subject area. Have made a number errors in the calculation work and elements of Task 2 are missing.		
3. Cognitive and Intellectual Skills	15	7
Task 1 achieved 47%. Task 4 achieved 45%. Limited attempt at evaluation of the underlying concepts and principles, tending towards description.		
4. Practical Application Skills	35	20.3
Task 1 achieved 66%. Task 4 achieved 50%. A good application of practical work for Task 1 and 4, very good use of the test equipment to obtain all of the required results.		
5. Transferable Skills for Life and Professional Practice	10	4.5
Mostly ordered presentation and structure in which relevant concepts are reasonably expressed. Work may lack coherence in places. Try to produce all of the work on computer.		

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks 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 (40% Max)

Over 1 week late (0%)

47%

GENERIC ASSESSMENT CRITERIA

Level 5

In accordance with the Framework for Higher Education Qualifications, at the end of Level 4 students will be expected to have demonstrated knowledge of the basic underlying concepts and principles of a subject, and an ability to evaluate and interpret these within the context of that area of study. They should be able to present, evaluate and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study. They will have learned how to evaluate different approaches to solving problems, and will be able to communicate the results of their study/work accurately and reliably, and with structured and coherent arguments. They will be able to undertake further training and develop new skills within a structured and managed environment and will have the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility.

Level 5	Category	FAIL 0-29%	MARGINAL FAIL 30-39%	SATISFACTORY (3 rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1 st / Distinction)	EXCEPTIONAL (1 st / Distinction)
Engagement with literature (including reading, referencing, academic conventions and academic honesty)		Little or no evidence of reading and/or reliance on inappropriate sources. Views and findings mostly unsupported and non-authoritative. Referencing conventions used incoherently or largely absent.	Poor engagement with essential reading. No evidence of wider reading. Reliance on inappropriate sources, and/or indiscriminate use of sources. Heavily reliant on information gained through class contact. Inconsistent and weak use of referencing.	Engagement with a limited range of mostly relevant and credible sources but with some reliance on information gained through class contact. Some omissions and minor errors. Referencing conventions evident though not always applied accurately or consistently.	Engagement with an appropriate range of literature, including sources retrieved independently. Some over-reliance on texts rather than other sources. Referencing may show minor inaccuracies or inconsistencies.	Engagement with a wide range of literature, including sources retrieved independently. Selection of relevant and credible sources. Generally sound referencing, with no/very few inaccuracies or inconsistencies.	Engagement with an extensive range of relevant and credible literature. Consistently accurate application of referencing.	Engagement with literature (including reading, referencing, academic conventions and academic honesty)
	Knowledge and understanding (Knowledge of the basic underlying concepts and principles of a subject.)	Major gaps in knowledge and understanding of the basic underlying concepts and principles of the subject matter. Inclusion of irrelevant material. Substantial inaccuracies.	Gaps in knowledge of the basic underlying concepts and principles, with flawed or superficial understanding. Some significant inaccuracies and/or irrelevant material.	Limited knowledge and understanding of the basic underlying concepts and principles within the subject area. Some elements may be missing.	Knowledge of the basic underlying concepts and principles is accurate with a good understanding of the field of study but lacks depth and/or breadth.	Competent knowledge of the basic underlying concepts and principles. Exhibits very good understanding.	Excellent knowledge and understanding of the basic underlying concepts and principles of the subject.	Exceptional, detailed knowledge and understanding of the basic underlying concepts and principles

Level 5	FAIL	MARGINAL FAIL	SATISFACTORY (3 rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)
Category	0-29%	30-39%	40-49%	50-59%	60-69%
Cognitive and intellectual skills (Evaluate underlying concepts and principles of a subject and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements.)	Wholly or almost wholly descriptive work. Little or no evaluation of the underlying concepts and principles. Failure to develop arguments, leading to illogical or invalid judgements. Minimal or no use of evidence to back up views.	Largely descriptive work, with superficial evaluation of the underlying concepts and principles. Weak interpretation of data, flawed development of arguments and judgements. Information accepted uncritically, uses generalised statements made with scant evidence and unsubstantiated opinions. Ideas sometimes illogical and contradictory.	Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation.	Good evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data, with minor errors. An emerging ability to use evidence to support the argument. Mostly valid arguments and logical judgements.	Sound evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately. Ability to devise arguments using evidence to make mostly appropriate and valid judgements.
Practical skills (Different approaches to solving problems in particular contexts.)	Limited or no use of taught, basic methods, materials, tools and/or techniques. Little or no appreciation of the context of the application. Very weak evidence of different approaches to problem-solving in particular contexts.	Rudimentary application of taught, basic methods, materials, tools and/or techniques but without consideration and competence. Flawed appreciation of the context of the application. Weak evidence of different approaches to problem-solving in particular contexts.	An adequate awareness and mostly appropriate application of basic methods, materials, tools and/or techniques. Basic appreciation of the context of the application. Can identify problems in particular contexts and propose basic alternative approaches or solutions though there may be errors.	A good and appropriate application of basic methods, materials, tools and/or techniques. Clear appreciation of the context of the application. Good evidence of different approaches to problem-solving in particular contexts and proposes mostly appropriate solutions.	A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of the application. Very good evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.
Transferable skills for life and professional practice (Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments; the qualities needed for employment requiring the exercise of some personal responsibility within a structured and managed environment.)	Work is poorly structured, disorganised, inaccurate and/or confusingly expressed. Very weak use of language and/or very inappropriate style. Failure to work effectively individual or as part of a group. Little or no evidence of the skills for employment requiring the exercise of some personal responsibility.	Work is poorly presented in a disjointed manner. It is loosely, and at times incoherently, structured, with information and ideas often poorly expressed. Weak use of language and/or inappropriate style. Flawed approach to individual or group work, meeting only partial obligations to others. Limited evidence of the skills for employment requiring the exercise of some personal responsibility.	Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas of minor weakness.	Mostly coherent, organised and accurate work, in a suitable structure and is for the most part clearly expressed. Can work effectively independently and/or as part of a team, with clear contribution to group activities. Demonstrates the skills for employment requiring the exercise of some personal responsibility, with some areas of strength and some of minor weakness.	Work is accurate, coherent, fluent, well structured and organised. Can work effectively independently and as part of a team, with very good contribution to group activities. Demonstrates very good skills for employment requiring the exercise of some personal responsibility, with just occasional minor weakness.

Task 1.

Group 4

Series

1. Measured total resistance was 1318Ω ✓

2. Measured supply current = 7.5 A ✓

Measured voltages across each resistor

$$R1 = 1.33 \text{ V} \quad ✓$$

$$R2 = 3.48 \text{ V} \quad ✓$$

$$R3 = 5.11 \text{ V} \quad ✓$$

3. Supply current = Current = Voltage/Total resistance = $10 / 1318 = 7.58 \text{ mA}$ Units ✓

Voltage across each resistor = Current x Resistance

$$V1 = 7.5 \times 180 \times 10^{-3} = 1.35 \text{ V} \quad ✓$$

$$V2 = 7.5 \times 470 \times 10^{-3} = 3.525 \text{ V} \quad ✓$$

$$V3 = 7.5 \times 680 \times 10^{-3} = 5.1 \text{ V} \quad ✓$$

$$\text{Total Resistance} = R1 + R2 + R3 = 180 + 470 + 680 = 1330 \quad ✓$$

Measured voltages across each resistor

$$R1 = 1.33 \text{ V}$$

$$R2 = 3.48 \text{ V}$$

$$R3 = 5.11 \text{ V}$$

4. There is a variation in calculated and measured results due to each resistor having a tolerance of $\pm 5\%$. This can create a difference between the calculated value and the measured value. Kirchoff's second law states that 'in any closed loop, the total voltage around the loop is equal to the sum of all the voltage drops within the same loop'. This is related to the voltage across each resistor equals the supply voltage of 10 V . The accuracy of the equipment can also cause a difference between the measured and calculated values. Overtime equipment can lose accuracy or even when bought can be less accurate than other types of equipment. ✓

You should state the requirements of the task.

Should have used calculated value for total resistance

Parallel

1. Measured $R_t = 1.527\text{K}\Omega$
2. Supply Current = 6.47mA
Current through each resistor
 $R_1 = 0.988\text{mA}$
 $R_2 = 3.71\text{mA}$
 $R_3 = 1.77\text{mA}$

3. $1/R_t = 1/R_1 + 1/R_2 + 1/R_3$
 $1/R_t = 1/10000 + 1/2700 + 1/5600 = 6.489 \times 10^{-4}$
 $R_t = 1/6.489 \times 10^{-4} = 1541.1 \Omega$

$$\text{Supply current} = \text{Voltage} / \text{Total resistance} = 10/1541.1 = 6.5\text{mA}$$

Current across each resistor

$$I_1 = V/R_1 = 10/10000 = 1\text{mA}$$

$$I_2 = V/R_2 = 10/2700 = 3.7\text{mA}$$

$$I_3 = V/R_3 = 10/5600 = 1.78\text{mA}$$

4. Again the calculated results can differ from the measured results due to tolerances and equipment accuracy. Human error could also have affected the results. If the measurements were taken in the incorrect way then the results will also be incorrect. ?
Kirschoffs law states that current flowing into a node will be equal to the current leaving the node. This means that no current can be lost in a circuit and that the sum of all resistors is found within the circuit. In a parallel circuit the total current is spread across the circuit with each resistor. Therefore the supply current is spread across each resistor. }

Task 2 – Capacitors

The basic function of a capacitor is to store electric charge. in some applications capacitance isn't desirable however in other applications it is desirable. The capacitance is the change in between two electric fields. For example between two plates with electric fields will have an equal amount of positive and negative charges measured in (Q) coulombs. While charge is measured in coulombs capacitance is measured in (F) farads. ✓

As stated before two plates with a charge will have a capacitance. This charge is stored in the capacitors magnetic field. This is how a capacitor is made. The most basic capacitor will be composed of two plates separated by a dielectric. This dielectric is an insulating material. When put into a circuit the capacitor will hold the charge created in the circuit and only release when needed. ✓

The material used to create the dielectric can differ the different types of capacitors. Ceramic capacitors ill have a dielectric made out of ceramic. These types of capacitors don't hold as much charge as others due to the material. Silver micas are another type of capacitors. The dielectric is composed of layers of silver. These have a low loss and are used in circuits where the charge output needs to be as stable as possible. These types of capacitors also have a wider range compared to a ceramic capacitor. A silver mica has a range from 2 picofarads to 2000 farads. ✓

↑ too large.

One application of a capacitor could be a light emitting diode. When the capacitors charge and discharge it is done at regular intervals. Due to the diode requiring the light to be switched on at certain regular intervals a capacitor is fitted to the circuit to charge the light when needed and to then discharge when it needs to be switched off. } ?

Capacitors can be used in circuits where alternating current needs to be converted to direct current. The capacitor does this by smoothing out the current and charging it so that there isn't such a difference between the positive and negative voltage. An example of where this can be used is within house hold appliances which predominately use AC. By smoothing out the current the appliance will stay at a constant value and have the same power throughout.

Your applications make no sense.

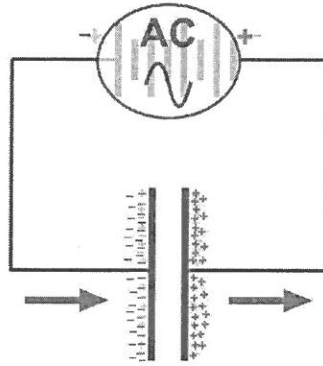


Figure 1.0 illustrates the basic construction of a capacitor.

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The figure above shows the basic construction of a capacitor in an AC circuit. The two plates will have a dielectric insulating material. As the charge runs through the circuit the plates will store this between the electronic fields. At certain intervals the capacitor will discharge this stored charge into the circuit. This charge is higher than the output of the circuit as it is a build-up of charge over time. This is desirable in circuits where a device may need to be switched on.

Task 3 – Magnetism

Permanent Magnets

A permanent magnet is made from a ferrous material a common one being iron. Magnets are able to attract other magnetic materials when they are within their magnetic field. A magnetic has two poles; North and South. When left the magnet will place itself with the poles facing in the correct direction. A scientist named Michael Faraday was able to use images to represent the magnetic field produced by ferrous materials. Due to magnetic fields not being visible imagery is a way of representing it. Faraday theorised that the magnetic field had lines to represent the flux of the magnetic field. Faraday found that stronger magnets had a higher flux and therefore the lines of the magnetic field were closer together. The closer the lines the stronger the magnet. These lines of flux go from the North Pole to the South Pole and this field is 3D.

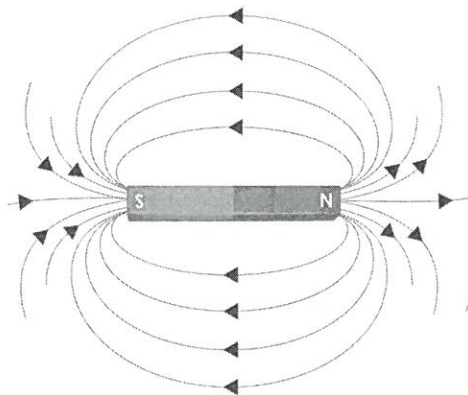


Figure 1.2 illustrates the flux lines found within a magnetic field.

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*This is google
image web address,
not the web page.*

Figure 1.1 illustrates how the flux lines of a magnetic field move from North to South and how they spread around the magnet. Any magnetic material within this field would therefore be attracted to the magnet.

Electromagnets

Another way of creating a magnetic field is through the use of electromagnets. When wire is coiled around a magnet and a current is passed through this creates an electromagnet. The amount of current and the number of coils determines the strength of the magnetic field. The more coils and the more current the stronger the magnetic field. Certain applications require stronger electromagnets than others. Switches in circuits require the use of an electromagnet. When the circuit is on and the electromagnet is energised this can either turn a switch on or off. This is dependent on whether the circuit is wired as normally open or normally closed. Unlike normal magnets where the poles determine the direction of the field, within electromagnets the direction of the current will determine the way in which the field is directed. If the current is moving away from the person observing then the field is clockwise. Vice versa if the current is moving towards the person observing then the field is moving in an anticlockwise direction.

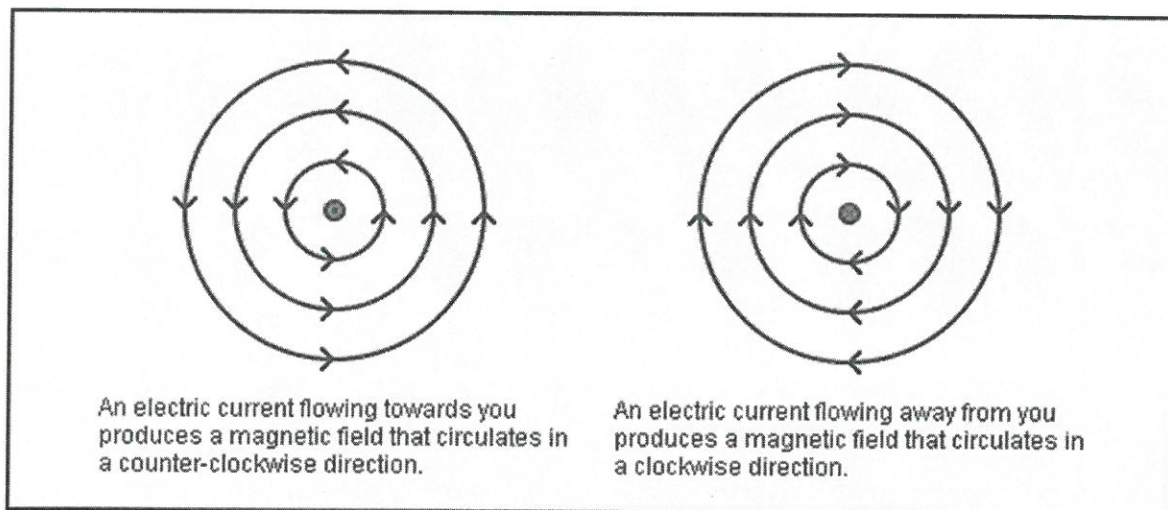


Figure 1.3 again explains the direction of the magnetic field when the current is moving in a certain way.

https://www.google.com/search?q=electromagnets+direction+of+magnetic+field&safe=strict&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjzz4a0xvLfAhVWwXhUIHYeSB3IQ_AUIDigB&biw=1200&bih=855#imgsrc=2GANPecTvw-MQM:

A second application of an electromagnet is a telephone receiver. The Electromagnet is coiled and attached to a thin diaphragm within the receiver. As the current varies it varies the magnetic field. This varying field affects the diaphragm by making it vibrate. These vibrations are seen as different sounds which the listener on the phone can hear. This is the basics of how people communicate through phones via electromagnets.

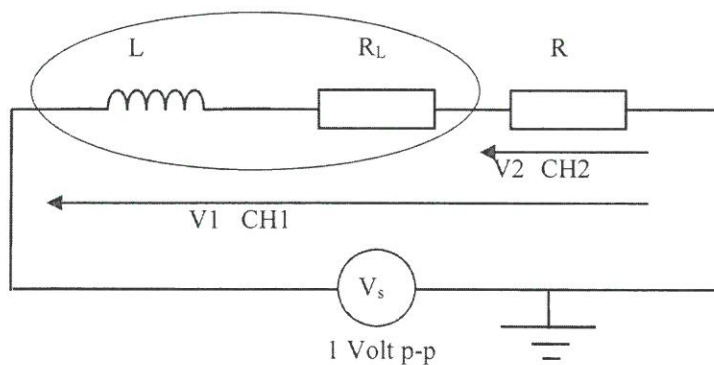
Task 4 – AC Circuits

- e) Peak voltage
 $\frac{1}{2} V_{p-p}$
- f) Frequency
 $1/T$
- g) Average voltage
 $0.637 \times V_P$
- h) Root mean square (rms) voltage.
 $V_P/\sqrt{2}$

Table 3 – values for Task 4

Student Number	Oscilloscope Settings		Grid Spacing	
	Volts/Div	Timebase (ms/Div)	Vertical (peak to peak)	Horizontal (1 cycle)
1	5	20	6	4
2	2	20	7	4.4
3	2	10	7.6	4.4
4	5	10	5	4.6
5	5	5	4.4	4.8
6	2	5	6.8	4
7	2	20	5.4	5.2
8	0.5	20	6.4	5.2
9	0.5	10	5.2	5.4
10	0.5	10	7.4	5.6
11	0.5	5	6.6	5.8
12	5	5	5.6	6

7. Below is a RL circuit:



$L = 1\text{mH}$, $R = 10\Omega$, $R_L = ?\Omega$ (measure this value)

8. Measure and record the value of each of the component.

$L = \dots\dots\dots 0.001 \dots\dots\dots$ $R = \dots\dots\dots 10 \dots\dots$ $R_L = \dots\dots\dots 2.2 \dots\dots\dots$

Frequency (f)	CH1 (mV)	CH2 (mV)	Time			
(kHz)	<i>pk to pk</i> Voltage	<i>pk to pk</i> Voltage	Difference (μ s) (between peaks)	Periodic Time (T)	Fraction of cycle (T2- T1)/T	Phase Angle (Fraction x 360)
			(T2-T1)			
1	221.76	152.46	88	0.001	0.088	31.68
2	277.2	148.5	60	0.0005	0.12	43.2
3	336.6	144.54	46	0.000333	0.138	49.68
4	403.92	142.56	44	0.00025	0.176	63.36
5	467.28	134.64	38	0.0002	0.19	68.4
6	514.8	130	32	0.000167	0.192	69.12
7	570.24	124.74	28	0.000143	0.196	70.56
8	609.84	118.8	26.4	0.000125	0.2112	76.032
9	657.36	112.86	23.2	0.000111	0.2088	75.168

Frequency (f - kHz)	$X_L (\Omega)$ ($2\pi fL$)	R_T ($R + R_L$)	$Z (\Omega)$	Current (A)	Phase Angle ($^\circ$)
1	6.28	12.2	13.72	0.073	27.25
2	12.57	12.2	17.51	0.057	45.85
3	18.85	12.2	22.45	0.045	57.09
4	25.13	12.2	27.94	0.036	64.11
5	31.42	12.2	33.70	0.030	68.78
6	37.70	12.2	39.62	0.025	72.07
7	43.98	12.2	45.64	0.022	74.50
8	50.27	12.2	51.72	0.019	76.36
9	56.55	12.2	57.85	0.017	77.83

Parallax error could be the cause of the difference between the measured and calculated phase angles. When measuring on the oscilloscope the cursor lines are an approximation, they are not accurate. This parallax error also allows room for human error. Equipment accuracy also affects the measured values. The equipment used was not the best equipment out there so meant the measured values weren't accurate. If the equipment was also not within its calibration date then the results will not be accurate and will have a higher percentage of error compared to if the equipment was within calibration.

References

J. Bird, Electrical and electronic principles and technology, third edition, 2000, electrical principles and technology.

J, Bird, Engineering maths, Fourth Edition, 2003, Burlington ✓

*Your reference list is limited
and there were no direct references
within your assignment.*

Task 3 Magnetism

6 c.

$$\text{flux } \Phi = 120 \mu\text{Wb} = 120 \times 10^{-6} \text{ Wb}$$

$$\text{Cross sectional side area } A = 250 \times 120 = 30000 \text{ mm}^2$$

$$= 30000 \times 10^{-6} \text{ m}^2$$

$$\text{flux density, } B = \frac{120 \times 10^{-6}}{30000 \times 10^{-6}} = 4 \times 10^{-3} \text{ T}$$

Must state the formula.

d. Flux density, $B = 1.5 \text{ T}$

$$\text{flux } \Phi = 340 \text{ mWb} = 340 \times 10^{-3} \text{ Wb}$$

$$B = \Phi / A \text{ then } A = \Phi / B$$

$$= 340 \times 10^{-3} / 1.5 = 0.226 \text{ m}^2$$

$$\text{Area} = \pi r^2$$

$$r = \sqrt{0.226 / \pi} = 0.84 \text{ mm}$$

$$= 0.262 \text{ m}$$

8 c.

$$L = 320 \text{ mm} = 0.32 \text{ m}$$

$$I = 8 \text{ A}$$

$$r = 60 \text{ mm} = 0.06 \text{ m}$$

$$\Phi = 0.4 \text{ mWb}$$

$$F = B \times I \times L$$

$$A = \pi r^2 = \pi \times 0.06^2 = 0.0113 \text{ m}^2$$

$$B = \Phi / A = 0.4 \times 10^{-3} / 0.0113 = 0.035 \text{ T}$$

$$F = 0.035 \times 8 \times 0.32$$

$$= 0.09036 \text{ N}$$



d.

$$L = 400 \text{ mm} = 0.4 \text{ m}$$

$$I = 25 \text{ A}$$

$$\Phi = 1.27 \text{ mWb}$$

$$F = 80 \text{ N}$$

$$B = \frac{F}{IL} = \frac{80}{25 \times 0.4} = 8 \text{ T}$$

$$B = \frac{1}{a} \text{ therefor } a = \frac{1}{B} = \frac{1.27 \times 10^{-3}}{8} = 1.5875 \times 10^{-4} \text{ m}^2$$

$$A = \pi r^2 = r^2 \frac{a}{A} = \sqrt{\frac{a}{A}}$$

$$A = \sqrt{1.5875 \times 10^{-4}} = 0.0125 \times 10^{-3} \text{ N}$$

$$B = \frac{1}{A} = 1.271 / 0.0125 \times 10^{-3} = 101600 \text{ N. } \times$$

Why do you 2 different values of "a"?

Task 4. Student 7.

7.1

$$e. \text{ Peak Voltage} = \frac{1}{2} \times V_{P-P} = \frac{1}{2} \times 5.4 = 2.7 \text{ V } \times$$

$$f. \text{ Frequency} = 1/T = 1/20 = 0.05 \times$$

$$g. \text{ Average Voltage} = 0.637 \times V_P = 0.637 \times 5.4 = 3.43 \text{ V } \times$$

$$h. \text{ Root mean square (rms) voltage} = V_P / \sqrt{2} = 3.81 \text{ V } \times$$

2. frequency 1.

$$\text{Time difference} = T_2 - T_1 = 182146 - 122146$$



3.

$$X_L = 2 \times \pi \times f \times L = 2 \times \pi \times 1 \times 0.001 = 6.31 \times 10^{-3} \Omega$$

$$R_T = R + R_L = 10 + 2.2 = 12.2 \Omega \quad \text{Units}$$

$$Z = \sqrt{R_T^2} = \sqrt{12.2^2} = 12.$$

$$Z = \sqrt{R_T^2 + X_L^2} = \sqrt{12.2^2 + 6.31 \times 10^{-3}^2}$$

$$Z = \sqrt{R_T^2 + X_L^2} = \sqrt{12.2^2 + 6.31 \times 10^{-3}^2} = 76.9 \Omega$$

$$I = \frac{V}{Z} = \frac{10}{76.9} = 0.13 \text{ A}$$

$$\text{Phase angle} = \frac{t}{T} \times 360 = 0.001 / 1 \times 360 = 0.36$$

~~~~~  
↑  
 $N_0$

