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Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either accept legible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2410529 ~~28~~
2	Title of Examination Paper	Electrical and Electronic Principles
3	Module Code	ACDA4006
4	Date and Time of Examination	13th May 9AM
5	Examination Venue	1Q304
6	Seat Number	
7	Number of Answer Books handed in	1 + Graph Paper x 1

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

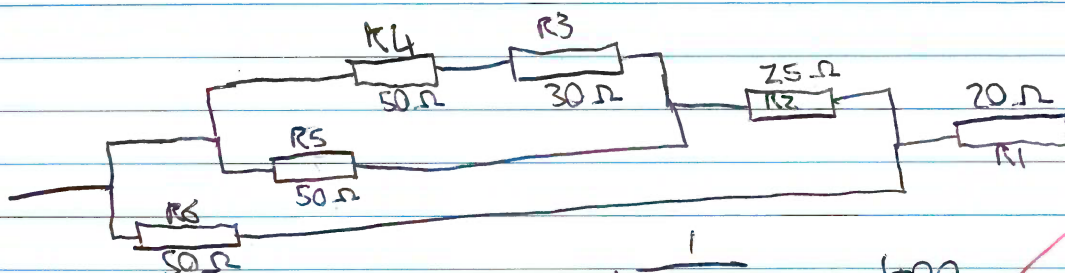
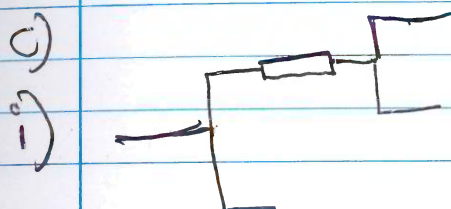
$$\frac{P}{V} \quad \frac{V}{R}$$

Q1

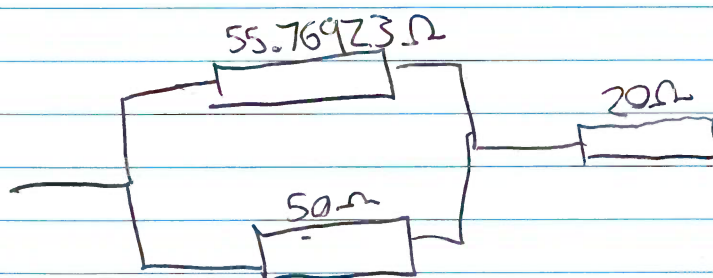
a) $P_{\text{put}} = 25W$ $\frac{25}{20} \times 100 = 80\%$
 $P_{\text{out}} = 20W$

Net power loss = 5W

b) $\frac{1}{3} = 0.33A$ or 330mA



$$\frac{1}{50} + \frac{1}{80} = \frac{400}{13}$$



$$\frac{1}{55.76923} + \frac{1}{50} = 26.363636$$

$$26.363636 + 20 =$$

$$46.363636 \Omega$$

ii) Current = $\frac{V}{R} = \frac{15}{46.363636} = 0.324A$ or 324mA

d) $R_1 = 0V$ ✗
 $R_2 = 10V$ ✓
 $R_3 = 10V$ ✓
 $R_4 = 10V$ ✓
 $R_5 = 10V$

3

e) KCL states that the sum of all the current will equal 0.

2

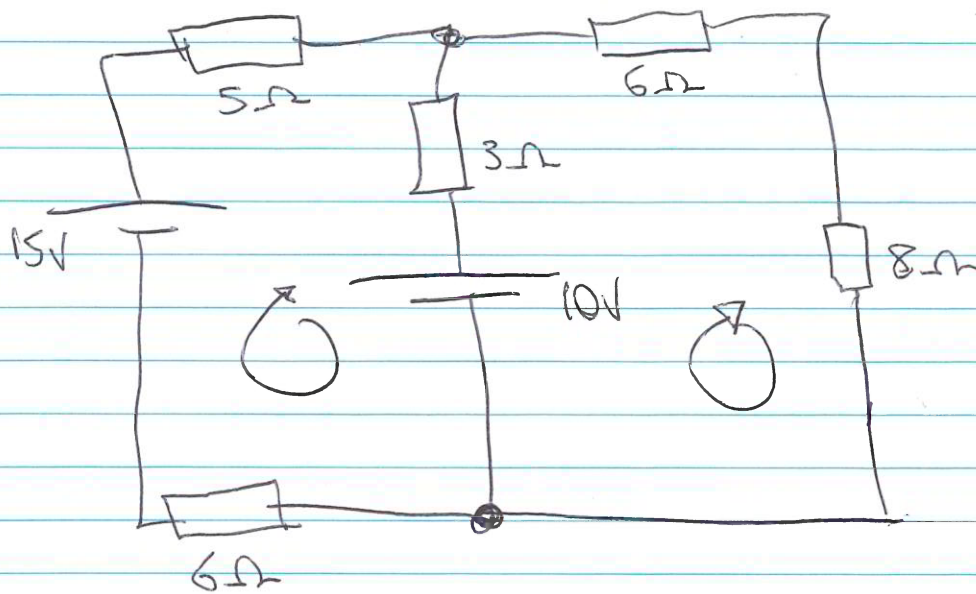
(Poorly explained)

An application of this is RCD switches in electrics. Since in a closed loop circuit all the current will return to its start point

23
23

Q2)

a)



$$-5I_1 + 6I_2 + 8I_2 - 6I_1 = -15$$

$$\textcircled{1} 14I_2 - 11I_1 = -15$$

$$3I_1 - 6I_2 - 8I_2 = -10$$

$$\textcircled{2} 3I_1 - 14I_2 = -10$$

$$\textcircled{1} + \textcircled{2} = -8I_1 = -25$$

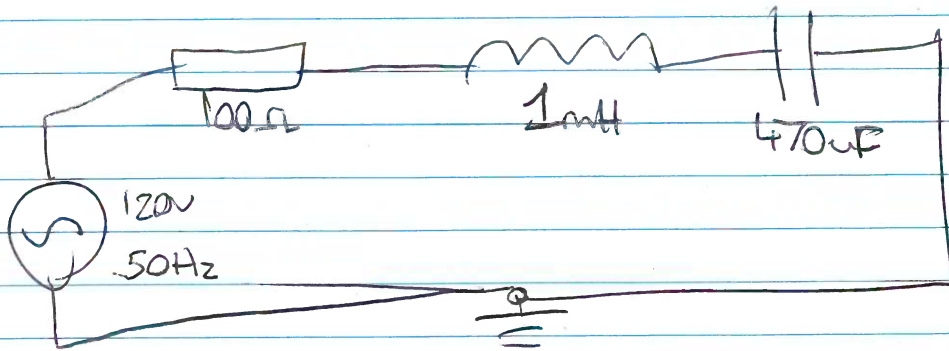
$$I_1 = \frac{-25}{-8} = 3.125 \text{ A}$$

Obviously
wrong



④

b)



i) Tot. Impedance

$$Z = X_L = \omega L = 2\pi fL$$

$$2\pi \times (50) \times (1 \times 10^{-3})$$

$$= \frac{1}{10}\pi = 0.314159265$$

 $X_C = ?$

$$Z = \sqrt{100^2 + \left(\frac{\pi}{10}\right)^2} = 100.0004935$$

$$\text{ii)} \quad \frac{120}{100} = 1.2A \quad \alpha$$

$$\text{iii)} \quad \phi = \tan^{-1}\left(\frac{\left(\frac{\pi}{10}\right)}{100}\right) = 0.179^\circ \quad \alpha$$

3

Q2 Total

7/25

Q3)

i) Resistance is the opposition to the flow of current

impedance

ii)

iii) Reactance is the opposition the change of the flow of current

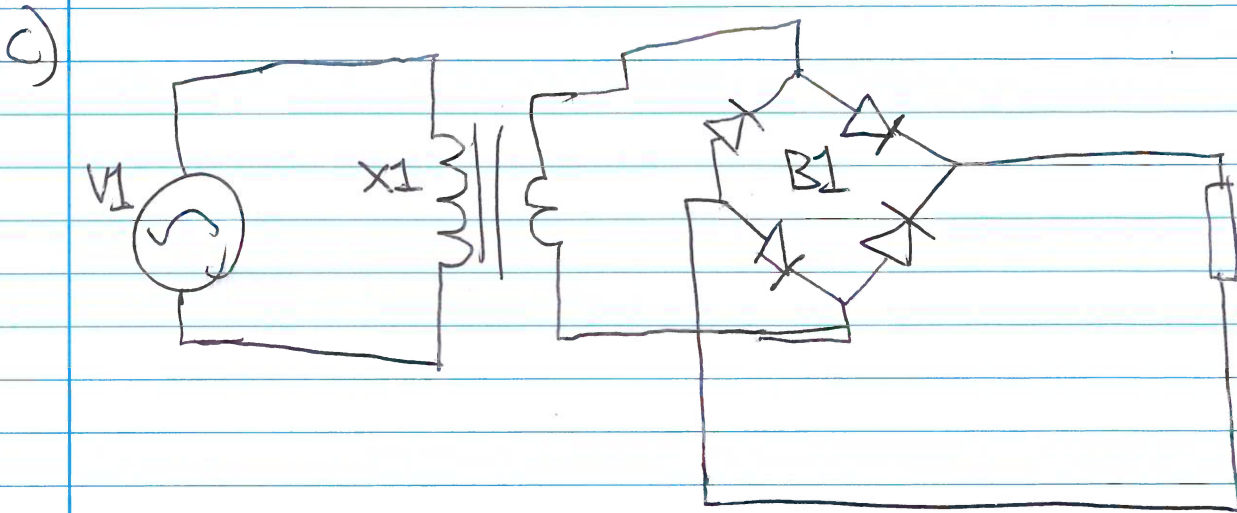
iv) Voltage rating is the maximum or minimum safe voltage for an electronic device to operate as intended.

b)

i) 40

$$ii) 40 \times \frac{1}{\sqrt{2}} = 20\sqrt{2} = \cancel{28.28} \quad 28.284 \text{ A (D)}$$

$$iii) \omega = 2\pi f = 251 \text{ Hz}$$



V_1 is an AC power supply ✓

X_1 is a step down transformer, which reduces the voltage passed because there are less coils on the right hand side ✓

B_1 is a Full bridge Rectifier, this allows for AC to be converted into DC ✓ as different parts of the circuit pass positive and negative voltage. This results in DC (Although not perfect DC in this example as there will be a stepped waveform (I think)). ✓

6

Q3 total.

$$\frac{15}{25}$$

Q14

$$I = \frac{V}{R}$$

$$P = \frac{V}{R} \times V = \frac{V^2}{R}$$

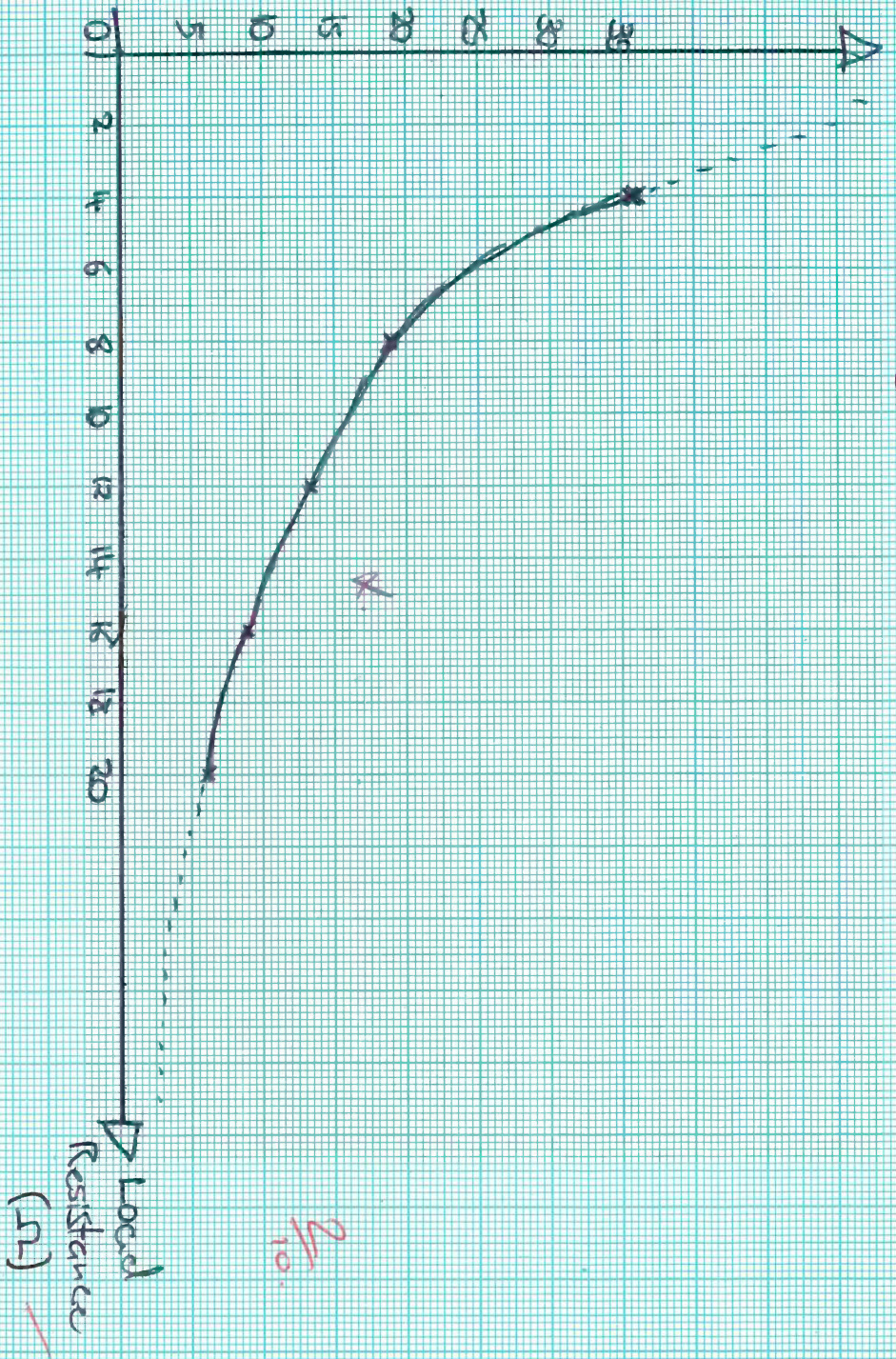
a)

Load Resistance (Ω)	Load power (W)
4	~~3.6~~
8	18
12	12
16	9
20	7.2

b) On Graph paper

2.

Load Power (W) ✓



2/10