

12 Pages

1. Please give the information requested in the boxes below
2. Enter your name in the space provided to the right, for the invigilator to see, and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners will ignore illegible 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	2406034
2	Title of Examination Paper	
3	Module Code	ACDA 4006
4	Date and Time of Examination	18/09/26 9:30 Am
5	Examination Venue	310
6	Seat Number	4
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
2	12 ✓
4	09 ✓
1	14 ✓
3	08 ✓
Total	43

(Gweler yr ochr arall am y fersiwn Cymraeg)

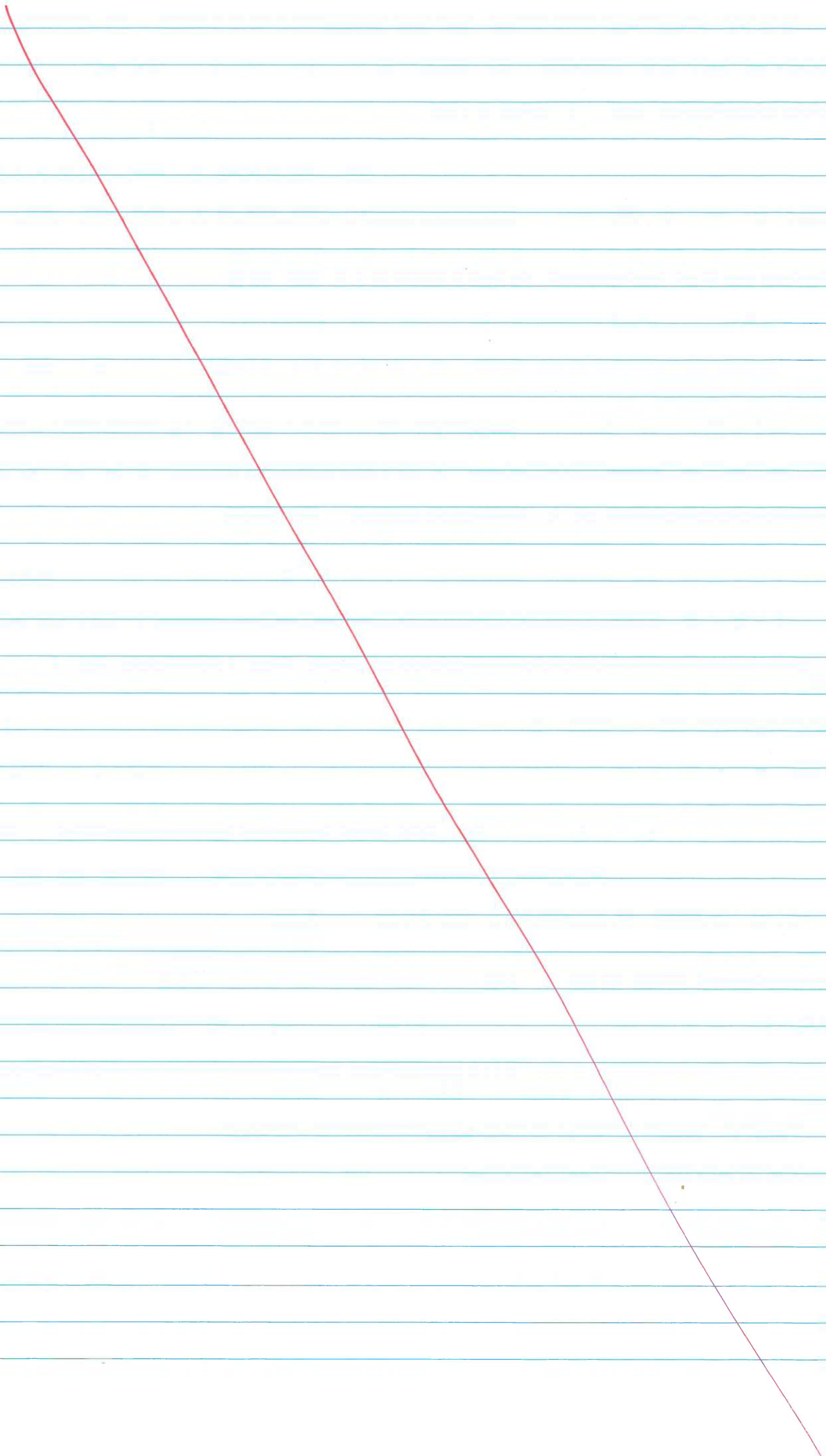
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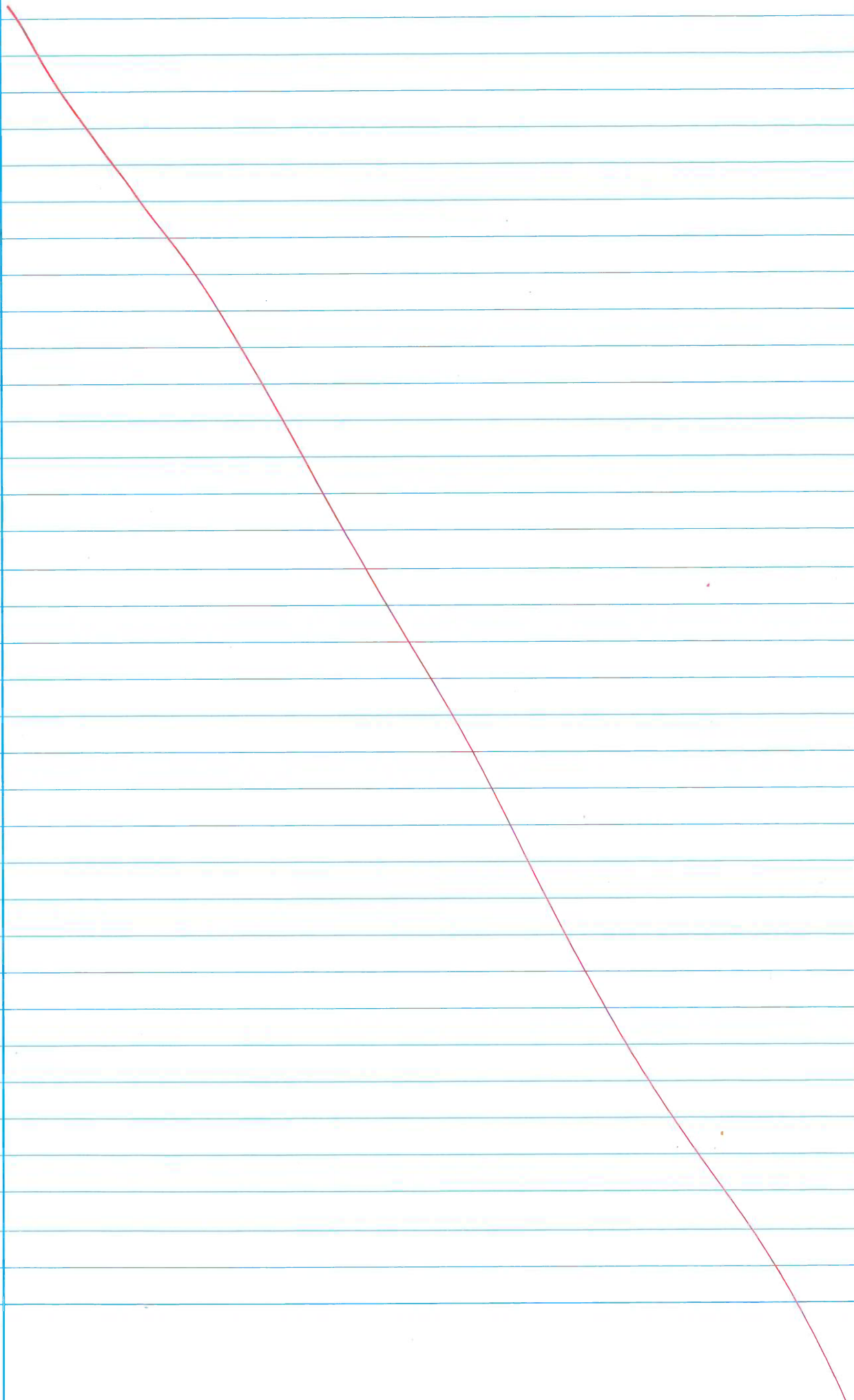
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Arholwr yn unig

Q2

a)

(i) R_3 and R_4 are in Parallel

$$R_{eq} = \frac{1}{\frac{1}{R_3} + \frac{1}{R_4}} \Rightarrow \frac{1}{\frac{1}{20} + \frac{1}{5}} = 4 \Omega$$

 R_{eq} and R_2 are series

$$R_{eq1} = R_2 + R_{eq} \Rightarrow R_{eq1} = 20 + 4 = 24 \Omega$$

 R_{eq1} and R_5 are Parallel

$$R_{eq2} = \frac{1}{\frac{1}{R_5} + \frac{1}{R_{eq1}}} \Rightarrow \frac{1}{\frac{1}{10} + \frac{1}{24}} = 7.1 \Omega$$

$$R_T = R_1 + R_{eq2} \Rightarrow 15 + 7.1 = 22.1 \Omega$$

(ii) Total current in the circuit

$$I = \frac{V}{R_T} \Rightarrow \frac{50}{22.1} = 2.26 A$$

~~Find~~ Current across R_3

$$I = \frac{I R_4}{R_3 + R_4} \Rightarrow \frac{2.26 \times 5}{20 + 5} = 0.452 A$$

current across R_4

$$I = \frac{I R_3}{R_3 + R_4} \Rightarrow \frac{2.26 \times 20}{20 + 5} = 1.8 \text{ A}$$

current across R_1

$$I = \frac{I(R_1 + R_5)}{R_1 + R_2 + R_{eq1}} = 3.75 \text{ A}$$

current across R_2

$$I = \frac{I R_{eq2}}{R_2 + R_{eq2}} = \frac{2.26 \times 7.1}{20 + 7.1} = 0.59 \text{ A}$$

current across R_5

$$I = \frac{I R_{eq1}}{R_5 + R_{eq1}} = 1.59 \text{ A}$$

$$(iv) \underline{I_N} = I R_1 = 2.26 \times 15 =$$

$$Q_2 = 12$$

Q 4

a)

$$(i) R = 200 \Omega \quad L = 47 \times 10^{-3} \quad C = 55 \times 10^{-6}$$

$$F = 50 \text{ Hz} \quad V = 240$$

$$X_L = 2\pi FL \Rightarrow 2\pi \times 50 \times 47 \times 10^{-3} =$$

$$X_C = \frac{1}{2\pi FC}$$

$$\frac{1}{2\pi \times 50 \times 55 \times 10^{-6}}$$

$$14.77 \Omega$$

$$= 610043 \Omega$$

$$|Z| = \sqrt{R^2 + (X_L - X_C)^2}$$

$$= 101 \Omega$$

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

$$I = \frac{V}{Z} = \frac{240}{101} = 2.37 \text{ A}$$

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

$$V_{PP} = V_S - V_D = 5 - 0.7 = 4.3 \text{ V} \quad \checkmark$$

$$I = \frac{V}{R} = \frac{4.3}{1000} = 0.0043 \text{ A} \quad \checkmark$$

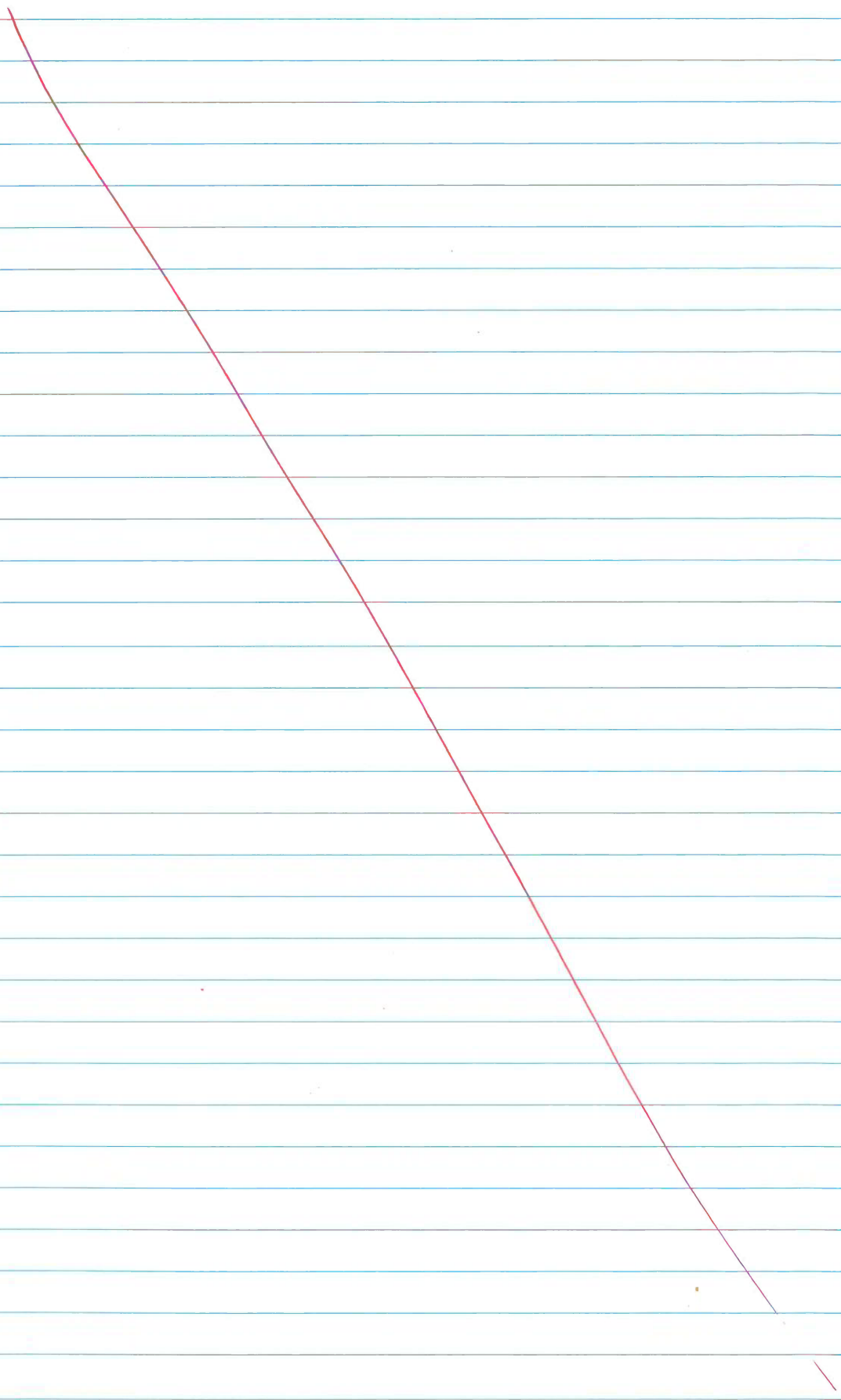
C-

$$Q_4 = 874 \quad \checkmark$$



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Q1

A-

BBB-

Input P = 80 W output P = 75 W

$$\eta = \frac{P_{out}}{P_{in}} \times 100 = \frac{75}{80} \times 100 = 93\%$$

$$\eta = \frac{P_{out}}{P_{in}} \times 100 = 93\%$$

Power losses

$$P_{in} - P_{out} \Rightarrow 80 - 75 = 5 \text{ W}$$

C- APPLY AB E F A

$$-5I_1 - 3(I_1 - I_2) + 5 - 2I_1 + 20$$

$$-5I_1 - 3I_1 + 3I_2 + 5 - 2I_1 - 20$$

$$3I_1 - 10I_2 = -15 \quad (1)$$

APPLY B E D E B

$$-6I_2 - 7I_2 - 2I_2 + 5 + 3(I_1 - I_2) = 0$$

$$-6I_2 - 7I_2 - 2I_2 + 3I_1 - 3I_2 = -5$$

$$3I_1 - 18I_2 = -5 \quad (2)$$

$$\text{eq}_1 \quad 3I_1 - 10I_2 = -15 \quad \times (-)$$

$$\text{eq}_2 \quad 3I_1 - 18I_2 = -5$$

$$\begin{array}{r} 28I_2 = -10 - 20 \\ \hline 28 \quad 28 \\ \hline -3I_1 + 10I_2 = +15 \\ 3I_1 - 18I_2 = -5 \\ \hline -8I_2 = 10 \end{array}$$

$$I_2 = -0.125 \text{ A}$$

Sub I_2 into eq₁

$$3(\cancel{-0.125}) = 1$$

$$3I_1 - 10(-0.125) \quad 3I_1 = \frac{7.1}{3} = 2.36 \text{ A}$$

$$I_1 = 2.36 \text{ A}$$

$$Q_1 = 5 + 9 = 14$$

Q3

C-1

(i) opposition to change of flow current. ✓

2 ✓

(ii) opposition to change of flow current ✓

1 ✓

d-

(i)

}

(ii)

}

(iii)

(iv) ~~IRMS~~ V_{RMS} ✓

$$v) T = \frac{1}{F} \quad \checkmark$$

1 ✓

a =

$$I = \frac{V}{R} = \frac{100}{2} = 50 \text{ A}$$

~~I =~~

$$(i) V = IR = 2 \times 15 = 30 \text{ V}$$

2

/

(ii)

?

(iii)

 R_B

$$R = \frac{V}{I} = \frac{50}{2} = 25 \Omega$$

2

/

$$Q_3 = 4 + 4 = 8$$



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