

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 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	
2	Title of Examination Paper	TCA1
3	Module Code	PCEE 4000
4	Date and Time of Examination	11:15 15/11/25
5	Examination Venue	PENYCRYSHIRE GYMNASEM
6	Seat Number	
7	Number of Answer Books handed in	1

1	List the numbers of the questions you have attempted	1
2		7
3		6
4		3
5		7
6		7
7		0
8		0
9		7
Total		38

Second Marked 57/112 12/02/25

QUESTION 1.) $f_0 = \frac{1}{2\pi\sqrt{LC}}$ REARRANGE FOR

$$\sqrt{LCf_0} = \frac{1}{2\pi} \times \sqrt{LC}$$

$$L = \left(\frac{1}{2\pi C f_0} \right)^2 \div \sqrt{LCf_0}$$

QUESTION 2.) SOLVE THE FOLLOWING EQUATIONS:

$$(i) 5(2-x) - 4(5-2x) - 2 = 0$$

$$7 - 5x - 20 + 8x - 2 = 0$$

$$25 + 3x = 0$$

$$3x = -25$$

$$x = -\frac{25}{3} \quad x = -8.3$$

$$(ii) 5x^2 + 14x - 3 = 0$$

$$a = 5 \quad b = 14 \quad c = -3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-14 \pm \sqrt{14^2 - 4 \times 5 \times (-3)}}{2 \times 5}$$

$$= -1 \frac{3}{5} \text{ AND } 5$$

$$(iii) 3.25 \times 10^{5x-2} = 52$$

$$52 \div 3.25 = 16$$

$$3x - 2 = \log_{10}(16)$$

$$3x = \log_{10}(16) + 2$$

$$x = \frac{\log_{10}(16) + 2}{3}$$

$$x = 1.06$$

With rounding

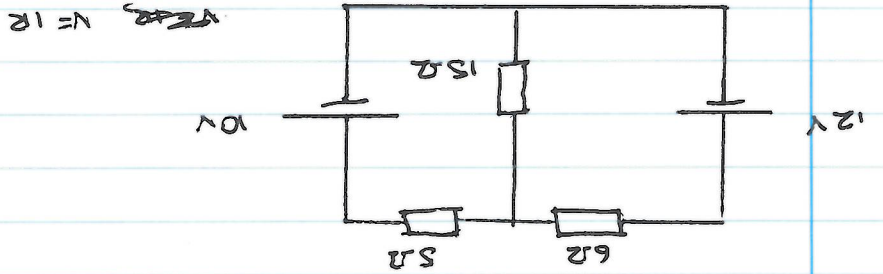
QUESTION 3.)

TURN TO NEXT PAGE.

5DP

→ NEXT PAGE

$$\begin{aligned} 12 &= 6I_1 + (I_1 + I_2)15 \\ 12 &= 6I_1 + 15I_1 + 15I_2 \\ 12 &= 21I_1 + 15I_2 \\ 10 &= 5I_2 + 15I_2 + 15I_1 \\ 10 &= 20I_2 + 15I_1 \\ 21I_1 + 15I_2 &= 12 \\ 20I_2 + 15I_1 &= 10 \end{aligned}$$



$$V_{15\Omega} = 12$$

6.) KIRCHHOFF'S LAW

$$AB = \begin{pmatrix} 6 & 6 \\ -10 & 11 \end{pmatrix} \quad BA = \begin{pmatrix} 3 & -8 \\ 12 & -10 \end{pmatrix}$$

THEY ARE NOT EQUAL

$$(iii) \quad BA \neq AB$$

$$\begin{pmatrix} 4 & 1 \\ 2 & 0 \end{pmatrix} \begin{pmatrix} -2 & 4 \\ -1 & 3 \end{pmatrix} \neq \begin{pmatrix} 1 \times 1 & 1 \times 3 \\ 4 \times 2 & 4 \times 0 \end{pmatrix} \begin{pmatrix} -2 & 4 \\ -1 & 3 \end{pmatrix}$$

$$(ii) \quad AB$$

$$\begin{pmatrix} 2 & 0 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} -1 & 3 \\ -2 & 4 \end{pmatrix} = \begin{pmatrix} 2 \times -1 & 2 \times 3 \\ 4 \times -1 & 4 \times 3 \end{pmatrix} = \begin{pmatrix} -2 & 6 \\ -4 & 12 \end{pmatrix}$$

$$\begin{pmatrix} 8 & 0 \\ 0 & -1 \end{pmatrix} = \begin{pmatrix} -4 & 12 \\ -4 & 8 \end{pmatrix}$$

$$4A = \begin{pmatrix} 8 & 0 \\ 0 & -4 \end{pmatrix} \quad 2B = \begin{pmatrix} -2 & 6 \\ -4 & 12 \end{pmatrix}$$

(i) $4A - 2B$

$$A = \begin{pmatrix} 2 & 0 \\ -1 & 3 \end{pmatrix} \quad B = \begin{pmatrix} 4 & 1 \\ -2 & 4 \end{pmatrix}$$