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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 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	2015846
2	Title of Examination Paper	Engineering PCEE 4000 mathematics
3	Module Code	PCEE 4000
4	Date and Time of Examination	27-05-21 12:30
5	Examination Venue	Pembrokeshire College
6	Seat Number	1
7	Number of Answer Books handed in	

Complete, fold and seal
(see note 2 below)

SURNAME: BENDALL

FORENAME(S): CHRISTOPHER

PAUL.

List the numbers of the questions you have attempted	Office Use
1	5 ✓
2	10 ✓
3	1 ✓
4	1 ✓
6	3 ✓
7	2 ✓
8	4 ✓
9	1 ✓
5	1 ✓
Total	28 ✓

second marker
SD/ST

1. $x = \frac{1}{2\pi FC}$ make F Subject.
($\times 2\pi FC$)

$$x 2\pi FC = 1 \quad (\div x 2\pi C)$$

$$F = \frac{1}{x 2\pi C} \quad \checkmark$$

$2x\pi C$

5 ✓

2. a. $3(2x+7) - 4(2x-5) - 11 = 0$

$$6x + 21 - 8x + 20 - 11 = 0$$

$$-2x + 30 = 0 \quad (-30)$$

$$-2x = -30 \quad (\div -2)$$

$$x = 15 \quad \checkmark$$

4 ✓

b. $6x^2 + 7x - 5 = 0$ $3 \times 2 \quad 3$

$$(6x - 3)(x - 2) = 0$$

$$6x^2 - 12x - 3x + 6 = 0$$

$$6x^2 - 15x + 6 = 0.$$

X

c. $3 \times 10^{2x-7} = 225.$ ($\div 3$)

$$10^{2x-7} = 75 \quad \checkmark$$

$$2x-7 = \log_{10} 75$$

$$x = \frac{(\log_{10} 75) + 7}{2}$$

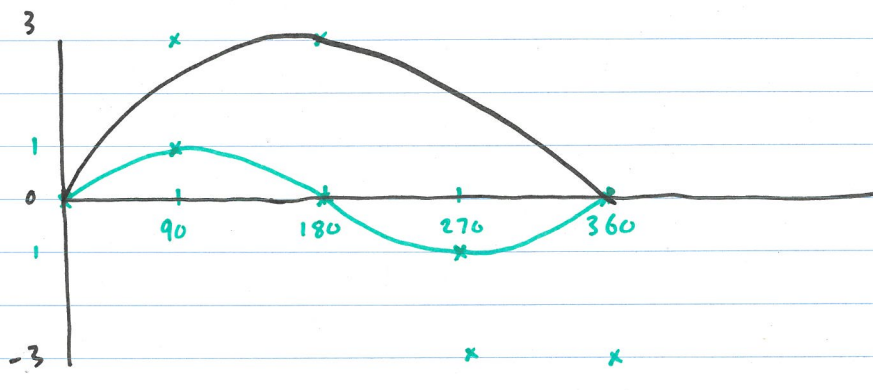
$$x = 4.4375$$

$$(+7) (\div 2) \quad \checkmark$$

6 ✓

3. $y \sin x.$ $y = 3 \sin(2x)$

amplitude (1) ✓



$$90 = 180$$

$$18 = 360$$

4. a. $(4 + j3) - (-1 - j4.)$

$$= 3 + j-1.$$

X

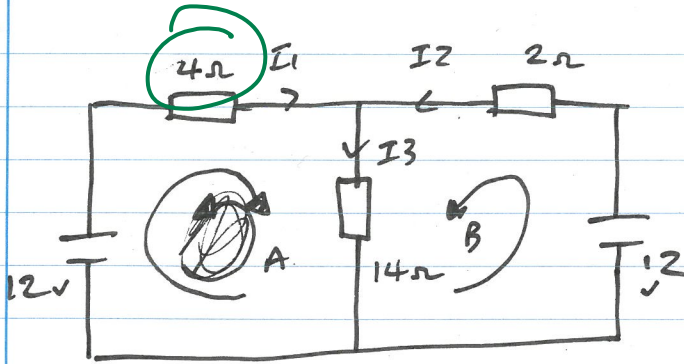
b. $(4 + j3)(-1 - j4)$

$$-4 - 4j4 - 1j3 - j12.$$

(1) ✓

c. z_1/z_2

6.



$$I_3 = I_1 + I_2.$$

$$\begin{aligned} \text{A: } 12 &= 4I_1 + 14I_1 + 14I_2 \\ 12 &= 18I_1 + 14I_2 \end{aligned}$$

$$\begin{aligned} \text{B: } 12 &= 2I_2 + 14I_1 + 14I_2 \\ &= 16I_2 + 14I_1. \end{aligned}$$

$$\begin{bmatrix} 18 & 14 \\ 16 & 14 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 12 \\ 12 \end{bmatrix}$$

X

$$\text{inverse det} = 18 \times 14 - 16 \times 14 = 28$$

$$\begin{bmatrix} 14 & -14 \\ -16 & 18 \end{bmatrix} \begin{bmatrix} 12 \\ 12 \end{bmatrix}$$

$$\begin{bmatrix} 14 \times 12 & -14 \times 12 \\ -16 \times 12 & 18 \times 12 \end{bmatrix} = \begin{bmatrix} 168 & -168 \\ -192 & 216 \end{bmatrix} \begin{matrix} I_1 \\ I_2 \end{matrix}$$

$$I_1 = 168 + -168 = 0 = 0/28$$

$$I_2 = -192 + 216 = 24/28.$$

X

7. a) $y = mx + c$. $(-1, 4)$ $(1, 2)$.

$$m = \frac{y - y_1}{x - x_1} = \frac{-1 - 1}{4 - 2} = \frac{-2}{2} = -1 \quad \checkmark$$

$$-1 = -1 \times 4 + c$$

$$-1 = -4 + c. \quad \checkmark$$

(2) $\checkmark$

8. £1.75 £0.40 100 components.

$$99 \times 0.40 + 1.75 = \underline{\underline{41.35}} \quad \checkmark$$

4

9. 4 speeds (n) 5 - 300. ar^{n-1}
 $a = 5 \quad \checkmark$

Find r.

$$\begin{aligned} ar^{n-1} \\ 300 &= 5r^{4-1} \\ &= 5r^3 \quad | :5 \\ r &= 300^{\frac{1}{3}} \quad (3\sqrt{}) \\ r &= 100 \end{aligned}$$

X

1

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

a) $2A - B$.

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

$$\begin{pmatrix} 6 & 0 \\ -4 & 2 \end{pmatrix} - \begin{pmatrix} 2 & -1 \\ 2 & -4 \end{pmatrix}$$

$$\begin{pmatrix} 4 & 7 \\ -6 & 6 \end{pmatrix}$$

1