

12 Pages

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.**

(see note 2 below)

SURNAME: Thomas

FORENAME(S): Oliver

1	Student Number	603339
2	Title of Examination Paper	Electrical Principles Theory
3	Module Code	M2x0003
4	Date and Time of Examination	4th May 2018
5	Examination Venue	68860
6	Seat Number	7
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	14
Q2	20
Q3	0
Office Use	34 %

1.

$$V_{TH} = \frac{150}{30+150} \times 360 = 300V \checkmark$$

$$V_{TH} = \frac{R_2}{R_1+R_2} \times V_s$$

2 ✓

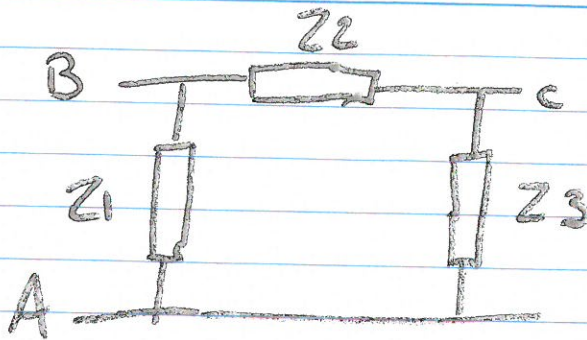
$$R_{TH} = \frac{150 \times 30}{150+30} = 25\Omega \checkmark$$

$$R_{TH} = \frac{R_1 \times R_2}{R_1+R_2}$$

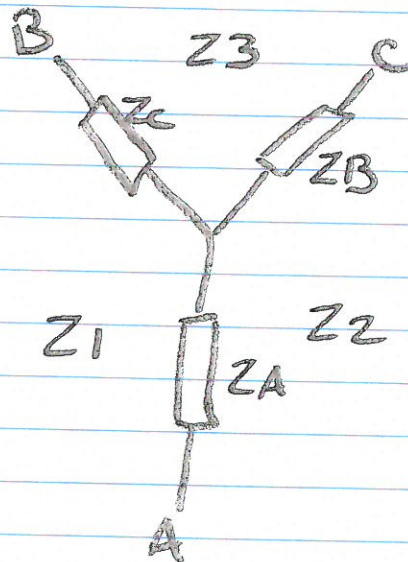
2 ✓

~~150~~ x
~~R = 30 + 150~~

1.5.



$$\begin{aligned} Z_1 &= 5 + j15 \\ Z_2 &= 15 - j5 \\ Z_3 &= 10 + j30 \end{aligned}$$



$$Z_A = \frac{Z_1 \times Z_2}{Z_1 + Z_2 + Z_3}$$

$$Z_A = \frac{5 + j15 \times 15 - j5}{5 + j15 + 15 - j5 + 10 + j30}$$

$$Z_A = \frac{75 - 25j + 225j - 75j^2}{30 + j40}$$

$$Z_A = \frac{150 + 200j}{30 + j40} \times \frac{30 - j40}{30 - j40}$$

$$Z_B = \frac{Z_2 \times Z_3}{Z_1 + Z_2 + Z_3} = \frac{15 - j5 \times 10 + j30}{5 + j15 + 15 - j5 + 10 + j30}$$

$$Z_B = \frac{150 + j450 - j50 - j^2 150}{30 + j40}$$

$$Z_B = \frac{300 + j400}{30 + j40}$$

$$Z_A = \frac{Z_1 \times Z_3}{Z_1 + Z_2 + Z_3} = \frac{5 + j15 \times 10 + j30}{5 + j15 + 15 - j5 + 10 + j30}$$

$$Z_A = \frac{50 + j150 + j150 + j^2 450}{30 + j40} \checkmark$$

$$Z_A = \frac{-400 + j300}{30 + j40} \checkmark$$

③

✓

2

$$a_0 = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x) dx$$

$$a_0 = \frac{1}{2\pi} \int_{-\pi}^0 f(x) dx + \frac{1}{2\pi} \int_0^{\pi} f(x) dx$$

$$a_0 = \frac{1}{2\pi} \int_{-\pi}^0 0 dx + \frac{1}{2\pi} \int_0^{\pi} 1 dx$$

$$a_0 = \frac{1}{2\pi} [x]_0^{\pi}$$

$$a_0 = \frac{1}{2\pi} \pi$$

$$a_0 = \frac{1}{2}$$

$$a_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos nx dx$$

$$a_n = \frac{1}{\pi} \int_{-\pi}^0 f(x) \cos nx dx + \frac{1}{\pi} \int_0^{\pi} f(x) \cos nx dx$$

$$a_n = \frac{1}{\pi} \int_{-\pi}^0 0 \cos nx dx + \frac{1}{\pi} \int_0^{\pi} 1 \cos nx dx$$

$$a_n = \frac{1}{\pi} \left[\frac{\sin nx}{n} \right]_0^{\pi}$$

BUT SHOULD
EXPAND

$$a_n = 0$$

$$2 \quad b_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin nx \, dx$$

$$b_n = \frac{1}{\pi} \int_{-\pi}^0 f(x) \sin nx \, dx + \frac{1}{\pi} \int_0^{\pi} f(x) \sin nx \, dx$$

$$b_n = \frac{1}{\pi} \int_{-\pi}^0 0 \sin nx \, dx + \frac{1}{\pi} \int_0^{\pi} 1 \sin nx \, dx$$

$$b_n = \frac{1}{\pi} \int_0^{\pi} \sin nx \, dx$$

$$b_n = \frac{1}{\pi} \left[-\frac{\cos nx}{n} \right]_0^{\pi}$$

(14)
✓

$$3a e^t + 5$$

~~$$(s+5)$$~~

~~$$(s+5)$$~~

~~$$(s+5)$$~~

3(ii) $\cos(2t) + 7\sin(2t)$

$$= \frac{s(s^2 + 3a^2)}{(s^2 + a^2)^2}$$

$$= \frac{s(s^2 + 3(2^2))}{(s^2 + 14^2)^2}$$

$$3(i) e^{4t} + 5$$

$$\frac{1}{s-a} = \frac{6}{s-4}$$

Q.1.

~~3(iii) $t^2 + 4t + 12$~~ ~~3(iii)~~

$$3(iv) \quad 6e^{5t} \cos(2t) - e^{7t}$$

$$= \frac{s-a}{(s-a)^2 + b^2}$$

X

O