



SURNAME: Williams

FORENAME(S): Cecy Lynn

## 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                   | 110538                       |
| 2 | Title of Examination Paper       | Electrical Technology        |
| 3 | Module Code                      | PSDE4021                     |
| 4 | Date and Time of Examination     | 16 May 2018<br>16:00 - 18:00 |
| 5 | Examination Venue                | Pembrokeshire College        |
| 6 | Seat Number                      | 4                            |
| 7 | Number of Answer Books handed in |                              |

| List the numbers of the questions you have attempted | Office Use |
|------------------------------------------------------|------------|
| 1                                                    | 13         |
| 3                                                    | 11         |
| 4                                                    | 12         |
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2nd made  
/SDP

(Gweler yr ochr arall am y fersiwn Cymraeg)



**Prysgol Cymru**  
Y Drindod Dewi Sant  
**University of Wales**  
Trinity Saint David

## Llyfr Atebion Arholiadau

**Cyfarwyddiadau i Ymgeiswyr**

12 Tudalen

1. Rhowch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhowch eich enw yn y lle a ddarparwyd ar y dde, pigychw ef a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

- 3 Rhaid i'r atebion fod mewn llawysgriften ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgript annarllennadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
- 4 Ysgrifennwch eich atebion mewn inc.
- 5 Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.
- 6 Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
- 7 Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyliliwr/gwylwyr.
- 8 Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchiadau.

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(See the other side for English version)

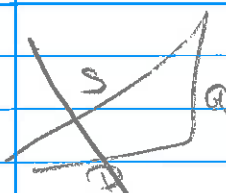
Ulenwch, plygwrch a seliwrch

(gwelel nodyn 2 isod)

**CYFENN:**

ENW(AU) CYNTAF:





$$S = I \times V \quad (\text{A VA})$$

$$P = I \times V \times \cos \theta \quad (\text{W})$$

$$Q = I \times V \times \sin \theta \quad (\text{VAR})$$

$$\sin = \cos^{-1} 0.7$$

$$= 0.795$$

$$BC = AC - AB$$

$$AC = A \times \sin(\text{inverse } \cos)$$

$$= A \cos$$

$$AB =$$

$$BC = A \cos - AB \cos$$

$$= BC \cos$$

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

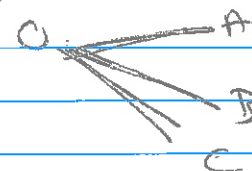
$$\frac{1}{2\pi f X_C}$$

$$\frac{R_1 \times R_{234}}{R_1 + R_{234}} = R_T$$

$$f = \frac{\omega}{2\pi} \quad \omega = 3142$$

$$I_T = \frac{V}{R_T}$$

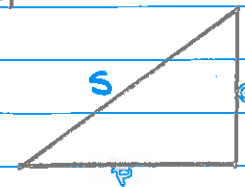
$$I_1 =$$



$$OA = \sqrt{OC^2 - AC^2}$$

$$= OA \cos$$

1. a)



$$S = \text{apparent power } (V \times I)$$

$$P = \text{real power } (V \times I \times \cos \theta)$$

$$Q = \text{reactive power } (V \times I \times \sin \theta)$$

b)

i)

$$V \times I$$

$$= 240 \times 5$$

$$= 1200 \text{ VA}$$

ii)

$$V \times I \times \cos \theta$$

$$= 1200 \times \cos(0.7)$$

$$= 1199.9 \text{ W} \checkmark$$

iii)

$$V \times I \times \sin \theta$$

$$= 1200 \times \sin(0.8)$$

$$= 860.83 \text{ VA}$$

$$\sin = \cos^{-1}(0.7)$$

$$= 0.8$$

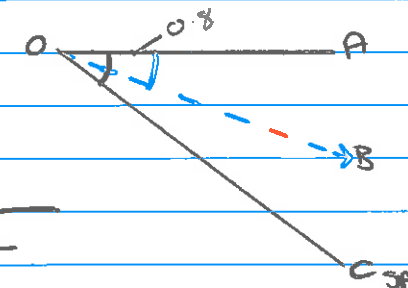
c)

$$BC = AC - AB$$

$$AC = S \times \sin(0.8)$$

$$= 3.587 \text{ A}$$

$$OA = \sqrt{3.587^2 -}$$



$$AB = 3.587 \times \tan(0.8) \quad BC = AC - AB$$

$$= 3.69 \text{ A}$$

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

$$= \frac{240}{5}$$

$$= 48$$

$$\frac{1}{2\pi f X_C} = \frac{1}{2\pi \times 50 \times 48} = 66.3 \mu\text{f}$$

(13)  
SDP

3.

a) Current law

- The total current flowing into a junction is equal to the current flowing out of the same junction. /

Voltage law

- The algebraic sum of the voltage in any closed loop circuit is equal to zero.

3

b.

$$R1 // (R2 \times (R3 // R4))$$

$$R_{34} = \frac{R_3 \times R_4}{R_3 + R_4} = 2k\Omega$$

$$\begin{aligned} R_{234} &= R_2 + R_{34} \\ &= 1 + 2 \\ &= 3k\Omega \end{aligned}$$

vi)

$$R_T = \frac{R_1 \times R_{234}}{R_1 + R_{234}} = \frac{3 \times 3}{3 + 3} = 1.5k\Omega$$

iv)

$$I_T = \frac{V}{R_T} = \frac{15}{1.5} = 10A \quad mA$$

ii)

$$I_1 = \frac{V}{R_1} = \frac{15}{3} = 5A \quad mA$$

iii)

$$\begin{aligned} I_2 &= I_T - I_1 \\ &= 10 - 5 \\ &= 5A \quad mA \end{aligned}$$

iii)

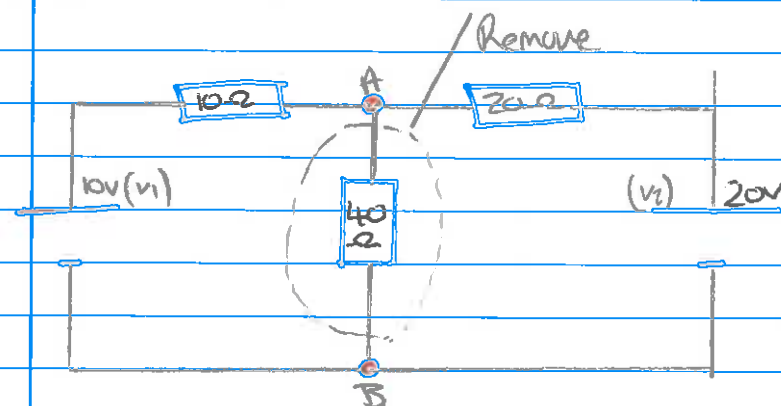
$$\frac{I_2 \times R_4}{R_3 + R_4} = \frac{5 \times 6}{3 + 6}$$

$$= 3.3A$$

v)

$$\begin{aligned} P &= V \times I \\ &= 15 \times 10 \\ &= 150 \quad mW \end{aligned}$$

b



$$R_T = \frac{10 \times 20}{10 + 20} \quad V = 20$$

$$= 6.6 \Omega$$

$$I = \frac{V}{R_{T_{\text{tho}}}} = \frac{20}{6.6}$$

$$= 3.03 \text{ A.}$$

2

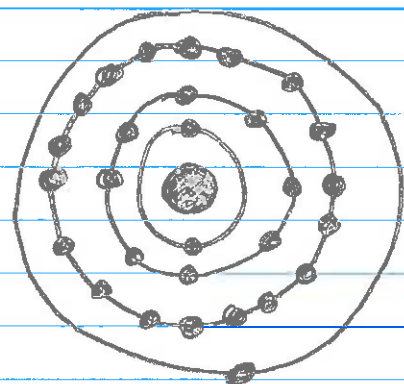
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SDP

| Question No. |  | Examiner Only |  | Question No. |  | Examiner Only |  |
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| Question No.    | Examiner Only  | Question No.                                                                | Examiner Only  |
|-----------------|----------------|-----------------------------------------------------------------------------|----------------|
|                 |                | 4                                                                           |                |
|                 |                | a) i) Electromotive force                                                   |                |
|                 |                | - Causes the <del>current</del> electric current to rise                    |                |
|                 |                | ii) 20v      4C                                                             |                |
|                 |                | $20 \times 4$<br>$= 80 \text{ J} \checkmark$                                | 2              |
|                 |                | iii) if powered for 10s.                                                    |                |
|                 |                | $\frac{80}{10} = 8 \text{ W} \checkmark$                                    | 2              |
|                 |                | b) i) Electric current                                                      |                |
|                 |                | - The flow of power through a wire, with electrons moving.                  |                |
|                 |                | ii) 4s      1A      charge of electrons $= 1.603 \times 10^{-19} \text{ C}$ |                |
|                 |                | $4 \times 1$<br>$= 4 \text{ C}$                                             | 2              |
|                 |                | $4 \times (1.603 \times 10^{-19})$<br>$= 6.412 \times 10^{-19}$             |                |
| Arholwr yn unig | Rhify Cwestiwn | Arholwr yn unig                                                             | Rhify Cwestiwn |

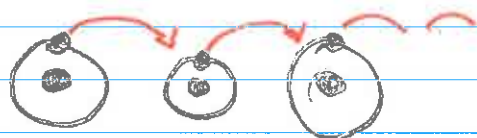
C.



copper 29.

Due to copper having only 1 electron on its outer shell, it is a very good conductor. When current flows the electron on the outer shell moves from

one atom to another causing the flow of electrons.



This diagram shows the electron moving from one atom to another.

The copper atom no matter how hard it tries will always have one on the outer shell.

3

3

(12)

JDP