



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

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.**

Complete, fold and seal
(see note 2 below)

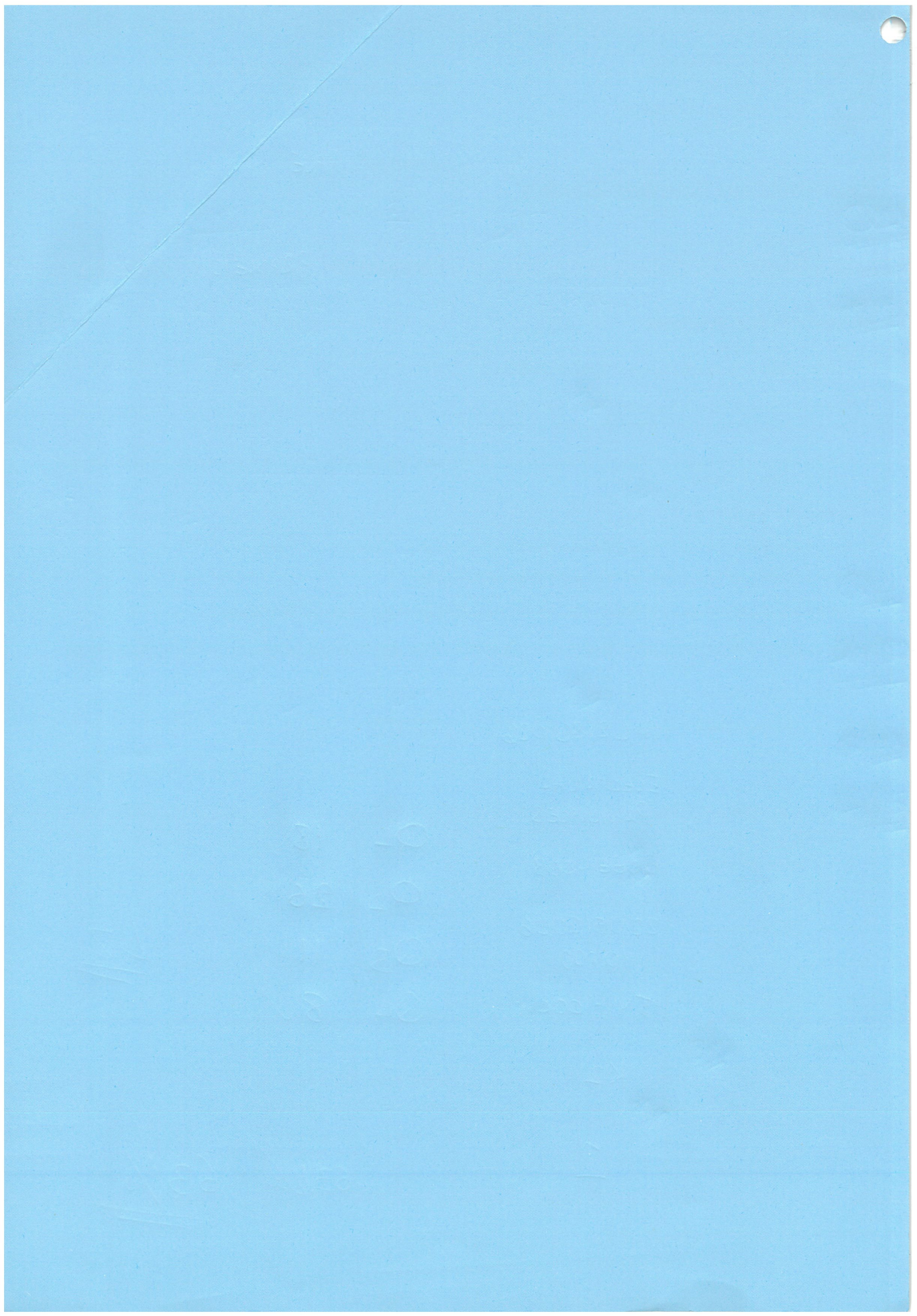
SURNAME: VALE

FORENAME(S): BRADLEIGH MORGAN

1	Student Number	VAL21861026
2	Title of Examination Paper	ELECTRICAL PRINCIPLES
3	Module Code	GOEE 4003
4	Date and Time of Examination	22/05/2026 10:00
5	Examination Venue	TY - COCH
6	Seat Number	K2
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	18 ✓
Q2	26 ✓
Q3	11 ✓
Q4	8 ✓
Total	63/100

63%



Q1.

$$(1) R_{12} = \frac{24\Omega \times 12\Omega}{24\Omega + 12\Omega} = \frac{288\Omega}{36\Omega} = 8\Omega$$

$$= R_{123} = 8\Omega + 8\Omega = 16\Omega$$

$$= R_{45} = 2\Omega + 6\Omega = 8\Omega$$

$$= R_{12345} = \frac{16\Omega \times 8\Omega}{16\Omega + 8\Omega} = \frac{128\Omega}{24\Omega} = 5.3\Omega$$

$$= R_{123456} = \frac{5.3\Omega \times 10\Omega}{5.3\Omega + 10\Omega} = \frac{53\Omega}{15.3\Omega} = 3.46\Omega$$

~~RT = 3.46\Omega~~

$$(2) I_T = \frac{V}{R_T} = \frac{20V}{3.46\Omega} = 5.78A \quad 1.30A$$

$$(3) P_T = I^2 R = 1.30^2 A \times 15.3\Omega = 25.85W$$

$$(4) V_{R6} = I \times R = 1.30A \times 10\Omega = 13V$$

$$(5) V_{AB} = 20V - 13V = 7V = 5.3\Omega \times 1.3A = 6.89V$$

$$(6) I_{R4} = \frac{6.89V}{8\Omega} = 0.86A$$

$$(7) V_{R5} = 0.86A \times 6\Omega = 5.16V$$

$$(8) V_{R3} = 0.86A - 1.3A = 0.44A$$

$$I_{123} = 0.44A$$

$$V_{R3} = 0.44A \times 8\Omega = 3.52V$$

Q1
18/20

Q1a
14/16

$$\textcircled{9} \quad I_{R1} = 0.43A \quad \times \underline{0}$$

$$\textcircled{B} \quad = \frac{1\Omega \times 2\Omega}{1\Omega + 2\Omega} = \frac{2}{3} = 0.6\Omega$$

$$= 0.6\Omega + 2\Omega + 0.5\Omega = 3.1\Omega$$

$$R_T = 3.1\Omega$$

$$V_T = 3.1\Omega \times 6A = 18.96V$$

Q2.

$$\textcircled{a} \quad \text{Mesh 1} \\ = -96V + 8I_1 + 12(I_1 + I_2) = 0$$

$$= -96V + 8I_1 + 12I_1 + 12I_2 = 0$$

$$= 20I_1 + 12I_2 = 96$$

Mesh 2

$$= -32 + 16I_1 + 12(I_1 + I_2) = 0$$

$$= -32 + 16I_1 + 12I_1 + 12I_2 = 0$$

$$= 28I_1 + 12I_2 = 32$$

$$1 = 20I_1 + 12I_2 = 96 \quad \times 3$$

$$2 = 12I_1 + 28I_2 = 32 \quad \times 5$$

$$1 = 60I_1 + 36I_2 = 288$$

$$2 = 60I_1 + 140I_2 = 160$$

Q1b4/44Q226/30Q2a12/15316/16

$$1 = -104 I_2 = 128$$

$$I_2 = \frac{-128}{104} = -1.23 \text{ A}$$

$$V_{\text{source}} = 20 I_1 + 12(1.23) = 96$$

$$= 20 I_1 + 14.76 = 96$$

$$I_1 = 20 + 14.76 = 96$$

correct method
E.C.F

$$I_1 = \frac{96}{34.76} = 2.76 \text{ A} \quad \text{E.C.F}$$

$$I_{RL} = 2.76 \text{ A} + 1.23 \text{ A} = 3.99 \text{ A}$$

correct method.
E.C.F

$$P = 7.7$$

⑧

$$R_{12} = \frac{8\Omega \times 8\Omega}{8\Omega + 8\Omega} = \frac{64\Omega}{16\Omega} = 4\Omega$$

Q2b

①

$$V_{TH} = \left(\frac{R_3}{R_3 + R_{12}} \right) \times V = \frac{6\Omega}{6\Omega + 4\Omega} \times 10V$$

14/15

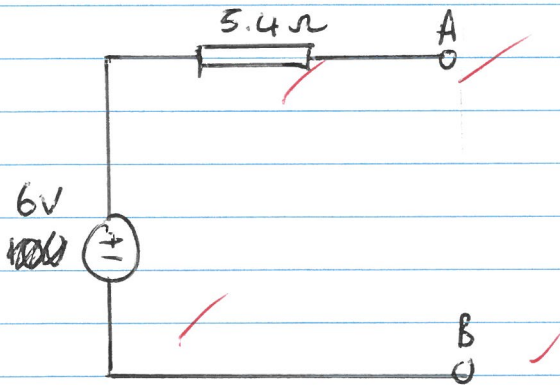
$$V_{TH}$$

$$= 6V$$

$$R_{TH} = \left(\frac{R_3 \times R_{12}}{R_3 + R_{12}} \right) + R_4$$

$$= \frac{6\Omega \times 4\Omega}{6\Omega + 4\Omega} + 3\Omega = 5.4\Omega$$

$$R_{TH} = 5.4\Omega$$



$$② R_L = R_{TH} = 5.4\Omega$$

$$③ P = I^2 R = \frac{R_L + R_{TH}}{5.4\Omega + 5.4\Omega} = 10.8\Omega$$

$$I_{TH} = \frac{V_{TH}}{R_{TH}}$$

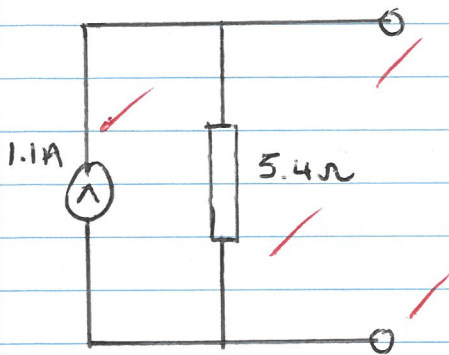
$$= \frac{6V}{10.8\Omega} = 0.5A$$

$$P = 0.5^2 \times 5.4\Omega = 1.35W$$

$$R_N = R_{TH} \checkmark$$

$$R_N = 5.4 \Omega \checkmark$$

$$I_N = \frac{V_{TH}}{R_{TH}} = \frac{6V}{5.4 \Omega} = 1.1A \checkmark$$



Q3.

$$(1) \quad 200V \quad 50Hz \quad R = 8\Omega \quad L = 32mH \quad C = 800\mu F$$

$$X_L = 2\pi fL \checkmark$$

$$X_C = \frac{1}{2\pi fC} \checkmark$$

$$X_L = 2 \times \pi \times (50) \times (32 \times 10^{-3}) \checkmark$$

$$X_L = 10.05\Omega \checkmark$$

$$X_C = \frac{1}{2 \times \pi \times (50) \times (800 \times 10^{-6})} \checkmark$$

$$X_C = 3.97\Omega \checkmark$$

$$Z = \sqrt{(8^2) + (10.05 - 3.97)^2} \checkmark$$

$$Z = 10.04\Omega \checkmark$$

Q311/20

$$(2) I_T = \frac{V}{Z} = \frac{200V}{10.04\Omega} = 19.92A$$

$$(3) V_R = I_T \times R =$$

$$V_R = I_T \times R = 19.92A \times 8\Omega = 159.36V$$

$$V_L = I_T \times X_L = 19.92A \times 10.05\Omega = 200.19V$$

$$V_C = I_T \times X_C = 19.92A \times 3.97\Omega = 79V$$

$$(4) \phi = 200V - 19.92A = 180$$

$$\phi = \tan^{-1}(180) = 89.6^\circ$$

Q4 $V_{CC} = 20V$

① $I_C = 2mA$ $V_{CE} = 10V$ $V_{BE} = 0.7V$ $I_E = I_C$

$I_E = 2mA$ ✓

$V_{RE} = I_E \times R_E$ ✓

$V_{RE} = 2mA \times 1.5k\Omega = 3V$ ✓ $V_E = 3V$ ✓

② $V_B = V_{RE} + V_{BE} = 3V + 0.7V = 3.7V$ ✓

③ $V_{R1} = V_{CC} - V_B = 20V - 3.7V = 16.3V$ ✓

④ $I_{R2} = \frac{V_B}{R2} = \frac{3.7V}{15k\Omega} = 0.24A$ ✓ mA

⑤ $R_1 = \frac{V_{R1}}{I_{R2}} = \frac{16.3V}{0.24A} = 67.9k\Omega$ ✓

⑥ $V_C = V_{CC} - V_{CE} = 20V - 10V = 10V$ ✓

⑦ $R_C = \frac{V_C}{I_C} = \frac{10V}{2mA} = 5k\Omega$ ✓

Q4

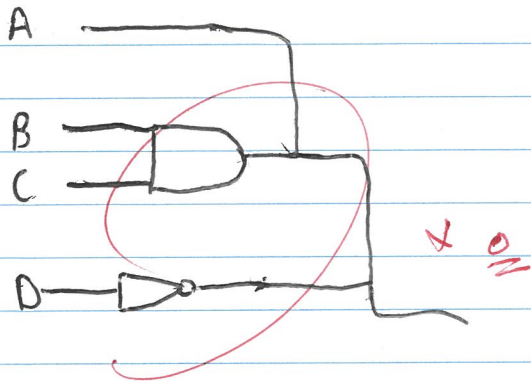
8/30

Q4a

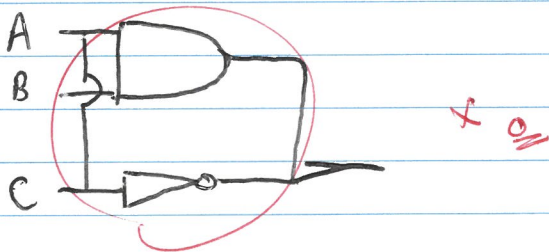
8/12

B

1

Q4b0/6

2

Q4c

C

1

$$(\overline{AB}) + (C + D) + \overline{C}$$

2

$$(A + B) + (AB) + (\overline{AB})$$

0/6

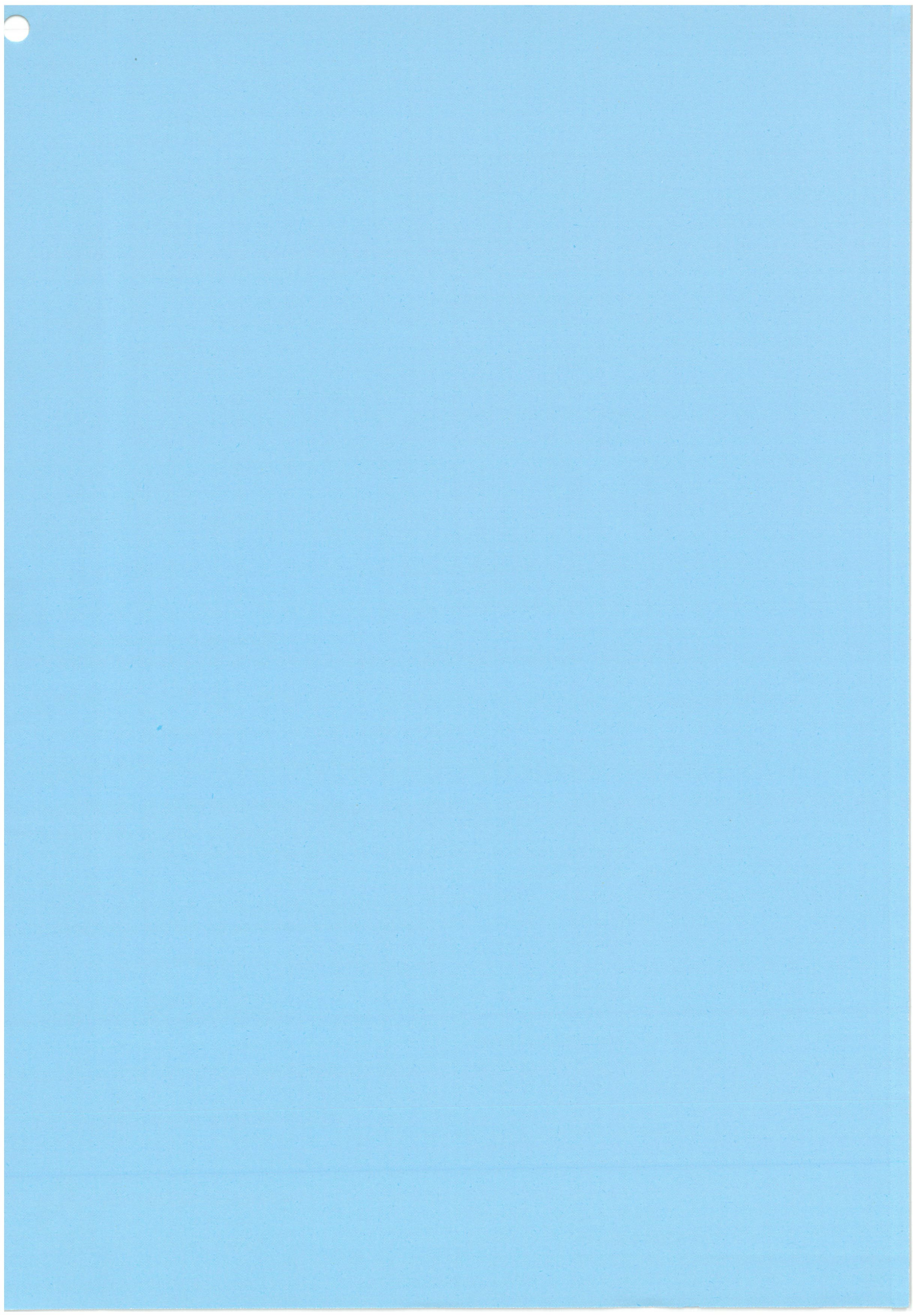
D

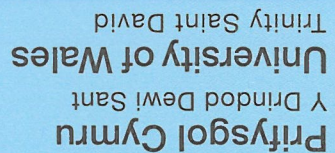
$$Y = (A + B)(\overline{B} + C)$$

$$Y = (AB)(\overline{B}C)$$

$$Y = (AB)(B + C)$$

Q4d0/6





Cyfarwyddiadau i Ymgeiswyr

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

3. Rhaid i'r atebion fod mewn llawysgriften ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgrifft annarlleneddwy, 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 gwyblywyr/gwilywyr.

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.

1	Rhif Myfyriwr	
2	Teitl y Papur Arholiad	
3	Cod y Modwl	
4	Dyddiad ac Amser yr Archoliad	
5	Lleoliad yr Arholiad	
6	Rhif Sedd	
7	Nifer y Llyfrau Atebion a gyflwynwyd	

Rhestwch nifau'r cwestiynau a ymgeistwyd gennyh	Cyfanswm
At Dibenion y Swyddfa	

(See the other side for English version)

Llenwch, plygwrch a seliwrch
(gweler nodyn 2 isod)

CYFENW:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF: