



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)

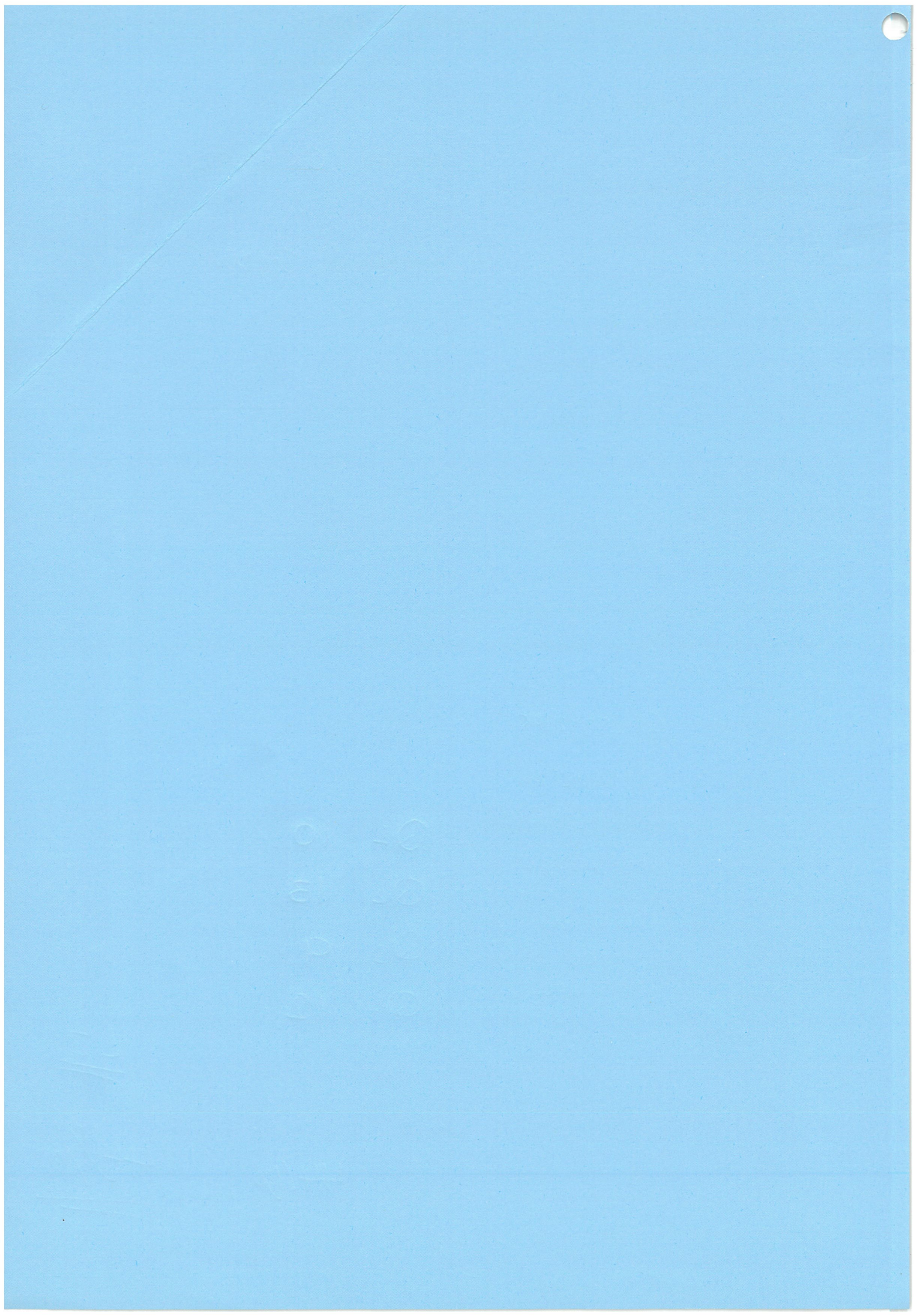
SURNAME: GRIFFITHS

FORENAME(S): JORDAN RAY

1	Student Number	GRI25892795
2	Title of Examination Paper	ELECTRICAL AND ELECTRONIC PRINCIPLES
3	Module Code	GOEE4003
4	Date and Time of Examination	22-05-26 10-00
5	Examination Venue	MAIN HALL TY COCH
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	10 ✓
Q2	13 ✓
Q3	9 ✓
Q4	12 ✓
Total	44/100 ✓

L2
44%



1.

a.

$$1. \quad \frac{R_1 \times R_2}{R_1 + R_2} = \frac{24 \times 12}{24 + 12} = \frac{288}{36} = 8 \Omega$$

$$8 + R_3 = 8 + 8 = 16 \Omega$$

$$R_4 + R_5 = 2 + 6 = 8 \Omega$$

$$\frac{16 \times 8}{16 + 8} = \frac{128}{24} = 5.33 \Omega$$

$$\frac{5.33 \times 10}{5.33 + 10} = \frac{53.3}{15.33}$$

$$R_1 = 3.48 \Omega \quad \times$$

$$2. \quad I = \frac{R_1}{V} = \frac{3.48}{24} = 145 \text{ mA} \quad \times$$

$$3. \quad P = I^2 R = 0.145^2 \times 3.48 = 0.073 \text{ W}$$

correct
method
E.C.F

$$4. \quad V = IR = 0.145 \times 10 = 1.45 \text{ V} \quad \text{E.C.F}$$

$$5. \quad V = IR = 0.145 \times 5.33 = 0.77 \text{ V} \quad \times$$

$$6. \quad I = \frac{V}{R} = \frac{0.77}{16.8} = 45.8 \text{ mA} \quad \times$$

$$7. \quad V = IR = 0.145 \times 8 = 1.16 \text{ V} \quad \times$$

$$8. \quad V = IR = 0.145 \times 16 = 2.32 \text{ V} \quad \times$$

$$9. \quad I = \frac{V}{R} = \frac{0.77}{24} = 32 \text{ mA} \quad \times$$

Q1

10/20

Q5a

6/16

$$b. \frac{1 \times 2}{1+2} = \frac{2}{3} = 0.67 \Omega$$

$$R_1 = 0.5 + 0.67 + 2 = 3.17 \Omega$$

$$V = IR = 1 \times 4 = 4V$$

$$I = \frac{V}{R} = \frac{4}{0.67} = 5.97 A$$

$$V = IR = 5.97 \times 3.17 = 18.9V$$

Q1b4/44

2. $R_1 = 4\Omega$, $R_2 = 4\Omega$, $R_3 = 8\Omega$, $R_4 = 8\Omega$

① ~~Apply KVL in loop 1~~ $\Rightarrow 12A$

$$-96 + 4I_1 + 12(I_1 + I_2) = 0 \quad +4I_1$$

$$16I_1 + 12I_2 = 96 \quad \underline{\underline{3}}$$

② ~~Apply KVL in loop 2~~ $\Rightarrow 16A$

$$-32 + 4I_2 + 12(I_2 + I_1) = 0 \quad +8I_2$$

$$12I_1 + 16I_2 = 32 \quad \underline{\underline{2}}$$

$$16I_1 + 12I_2 = 96 \quad \times 4$$

$$12I_1 + 16I_2 = 32 \quad \times 3$$

E.C.F

correct method

$$56I_1 + 48I_2 = 384$$

$$12(16.4) + 16I_2 = 32$$

$$36I_1 + 48I_2 = 96$$

correct method

$$172.8 + 16I_2 = 32$$

$$20I_1 = 288$$

$$16I_2 = -140.8$$

$$I_1 = \frac{288}{20}$$

$$I_2 = -8.8A$$

20

E.C.F

E.C.F

$$I_1 = 14.4A$$

$$I_{oc} = I_1 + I_2 = 14.4 - 8.8 = 5.6A$$

E.C.F

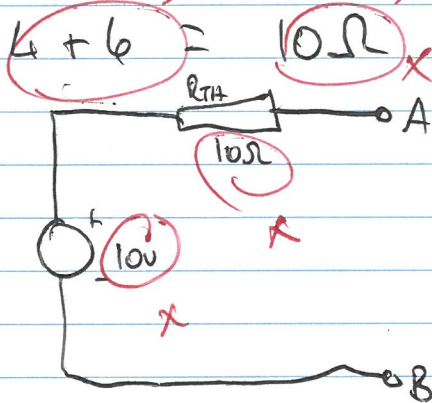
$$P = I^2 R = 5.6^2 \times 12 = 376.32W$$

correct method

E.C.F

Q213/30Q2a12/15

b. $\frac{R_1 \times R_2}{R_1 + R_2} = \frac{8 \times 8}{16} = 4 \Omega$



Q2b

1/15

3.

$$1. Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \times 50 \times (800 \times 10^{-6})} = 3.97 \text{ units?}$$

$$X_L = 2\pi f L = 2\pi \times 50 \times (32 \times 10^{-3}) = 10.05 \text{ units?}$$

$$Z = \sqrt{8^2 + (10.05 - 3.97)^2} = \sqrt{64 + 36.97} = 10.05 \Omega$$

$$2. I = \frac{V}{R} = \frac{200}{10.05} = 19.9 \text{ A}$$

$$3. V = IR = 19.9 \times 8 = 159.2 \text{ V}$$

V_C = ?V_L = ?

$$\begin{aligned} 4. \phi &= \tan^{-1} \frac{X_L - X_C}{R} \\ &= \tan^{-1} \frac{10.05 - 3.97}{8} \\ &= \tan^{-1} \frac{6.08}{8} \\ &= \tan^{-1} 0.76 \\ \phi &= 37.7^\circ \end{aligned}$$

Q37/20

$$4. I_c = 2\text{mA}, V_{CE} = 10\text{V}, V_{BE} = 0.7\text{V}$$

$$I_E = I_c$$

$$1. V_E = I_E \times R_E = 2 \times 10^{-3} \times 1500 = 3\text{V}$$

$$2. V_B = V_E + 0.7 = 3.7\text{V}$$

$$3. V_{R1} = V_{CC} - V_B = 20 - 3.7 = 16.3\text{V}$$

$$4. I_{R2} = \frac{V_{R1}}{R_2} = \frac{16.3}{15000} = 1.1\text{mA}$$

$$5. R_1 = \frac{20}{0.001} = 20\text{k}\Omega$$

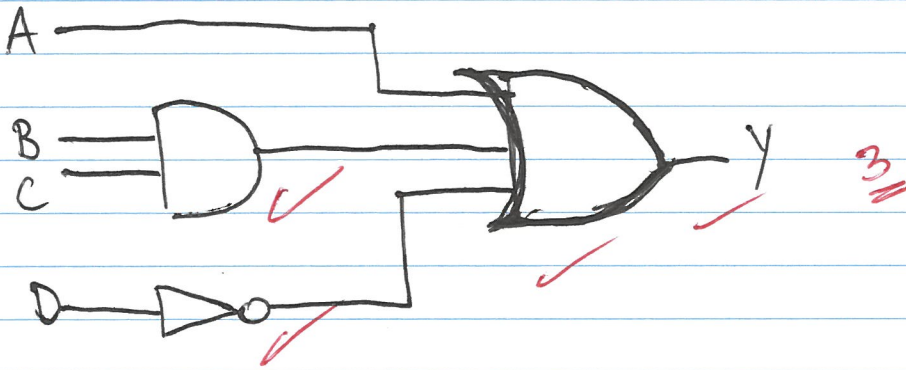
$$6. V_C = V_{CC} - V_{CE} = 20 - 10 = 10\text{V}$$

$$7. R_C = \frac{V_C}{I_c} = \frac{10}{2 \times 10^{-3}} = 5\text{k}\Omega$$

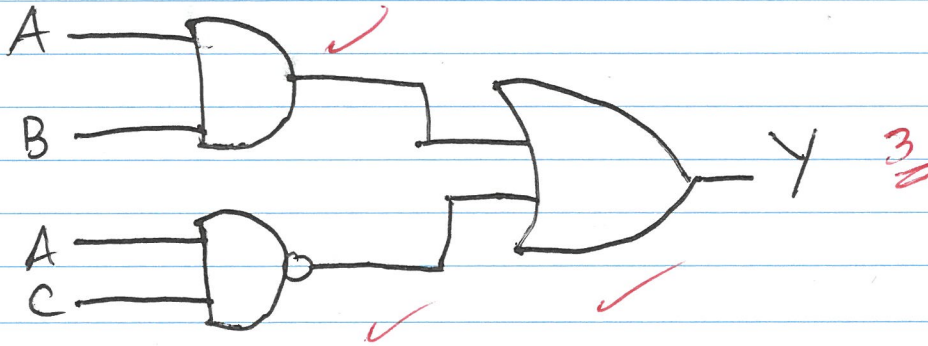
Q412/30Q4a6/12

b.

1.

Q4b3/6

2.



c.

1.

output: ~~AB~~

?

Q4c0/6

d.

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

$$(\bar{A} + \bar{B})(\bar{B} + C)$$

20

Q4d0/6

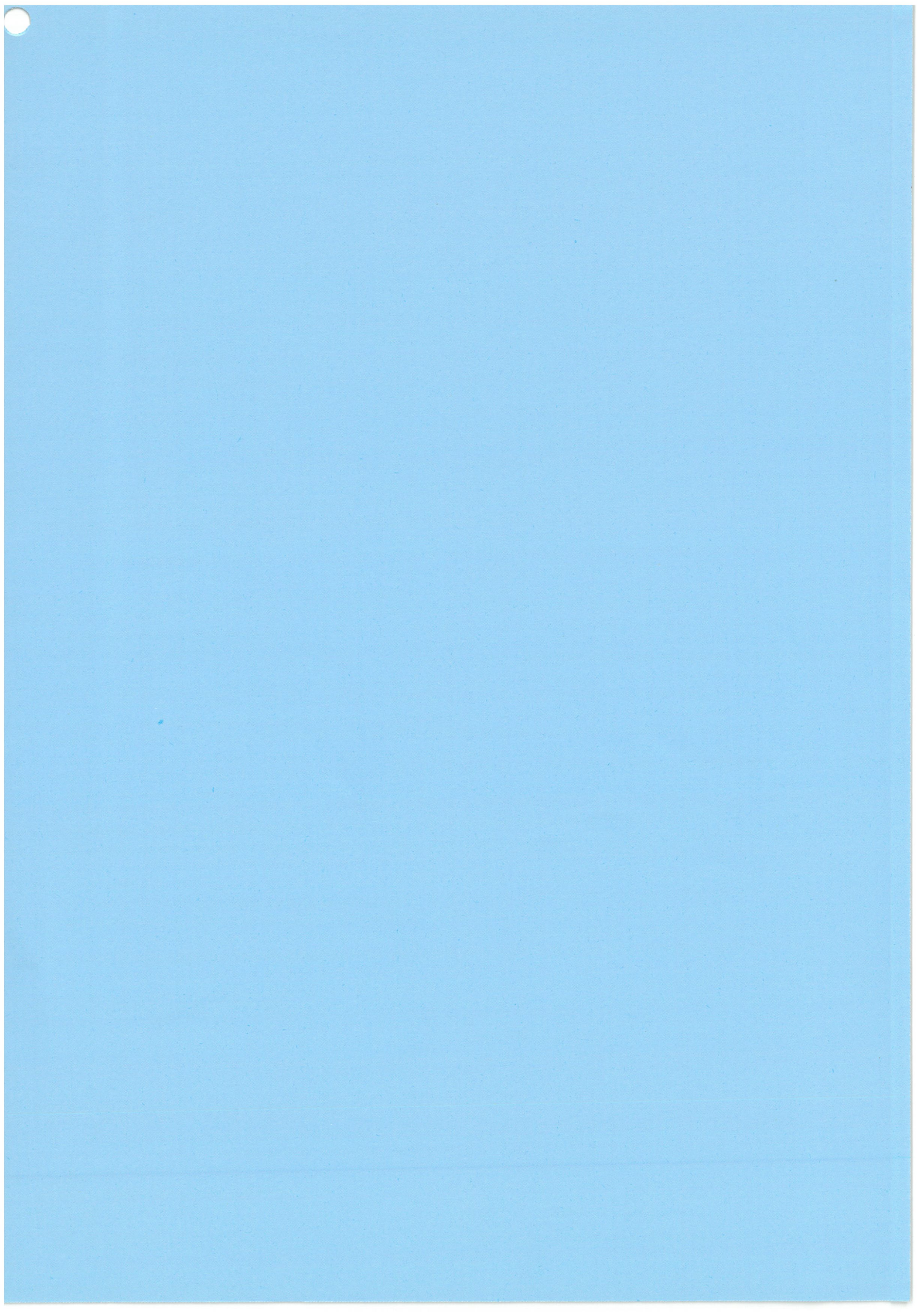


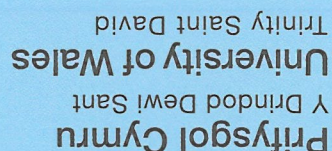
Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn





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 ef a'i seilio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llwyngriten ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgrïpt annarlennadwy, neu drehnu iddi gael ei theipio a chael yr ymgeisydd i dalu.

4. Ysgriptennwch 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 gwyliwr/gwyliwyr.

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 Arholiad	
5	Lleoliad yr Arholiad	
6	Rhif Sedd	
7	Nifer y Llyfrau Atebion a gyflwynwyd	

[illegible]

(See the other side for English version)

Llenwch, plygwh a selwch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF: