



Complete, fold and seal
(see note 2 below)

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.

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FORENAME(S): Mohamed

1	Student Number	<u>Hay 18839618</u>
2	Title of Examination Paper	<u>mathematics (test 2)</u>
3	Module Code	<u>60EN4001</u>
4	Date and Time of Examination	<u>15/05/2023</u> <u>09:30</u>
5	Examination Venue	<u>tychfa</u> <u>tychfa</u>
6	Seat Number	<u>B4</u>
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	
a	13
b	0
c	1
Q2	
a	6
b	3
c	0
Q3	
a	0
b	0
c	0
Total	23/100

23%
23% ML

Q1a
13/18

Q1a
(a)

$$z_1 = 2 + 4j \quad z_2 = 5 + 3j$$

(i)

$$z_1 + z_2$$

$$z_3 = 3 + 2j$$

$$\begin{aligned} 2 + 4j + 5 + 3j \\ = 7 + 7j \end{aligned}$$

(ii)

$$3z_1 + 2z_3$$

$$\begin{aligned} 3(2 + 4j) + 2(3 + 2j) \\ (6 + 12j) + (6 + 4j) \end{aligned}$$

$$3z_1 + 2z_3 = 12 + 16j$$

(iii)

$$z_1 \times z_2 =$$

$$(2 + 4j)(5 + 3j)$$

$$10 + 6j + 20j + 12j^2$$

$$10 + 6j + 20j + 1(-12)$$

$$10 + 6j + 20j - 12$$

$$z_1 z_2 = -2 + 26j$$

(iv)

$$z_1 + z_3^2$$

$$z_3^2$$

$$(2 + 4j)(3 + 2j)^2$$

$$(3 + 2j)(3 + 2j)$$

$$9 + 6j + 6j + 4j^2$$

$$9 + 6j + 6j + 1(-4)$$

$$9 + 6j + 6j - 4$$

$$= 5 + 12j$$

$$z_1 + z_3^2 = 5 + 12j + (2 + 4j)$$

$$v) \quad 21223?$$

$$(2+4i)(5+3i) \quad (?)$$

$$\cancel{10+20i}$$

$$10+6i+20i+12i^2 \quad \checkmark$$

$$10+6i+20i-12 \quad \checkmark$$

$$10+6i+20i-12 \quad \checkmark$$

$$(-2+26i) \quad ? \quad (?) \quad \checkmark$$

21

$$(-2+26i)(3+2i) \quad \checkmark$$

$$-6-4i+78+52i^2 \quad \checkmark$$

$$-6-4i+78-52 \quad \checkmark$$

$$-6-4i+78-52 \quad \checkmark$$

$$-58+74i \quad \checkmark$$

$$212223 = -58+74i \quad \checkmark$$

vi

$$\frac{21}{22}$$

$$\frac{2+4i}{5+3i} \quad \frac{5+3i}{5+3i}$$

$$10+6i+20i+12i^2 \quad \checkmark$$

$$10-6i+20i+12 \quad \checkmark$$

$$10-6i+20i+12 \quad \checkmark$$

$$22+14i \quad \checkmark$$

$$22+14i = 56$$

$$\frac{56}{14} = 4 \quad \checkmark$$

54

$$25-15i+15i-9i^2$$

$$25-15i+15i+9$$

$$= 34 \quad \checkmark$$

c)

$$\frac{2}{a}x^2 - \frac{8}{b} + \frac{26}{c} = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-8 \pm \sqrt{(-8)^2 - 4(2 \times 26)}}{2 \times 2}$$

=

Q1b
0

Q1c

1/9

Q2

a

0

ii

Can not be written ✓ 1

vi

Can not be written ✓ 1

→ next Page

Q2a

8/16

b)

$$3x + 2y + 4z = -5$$

$$2x + 3y + 3z = 2$$

$$5x + 2y + 5z = 3$$

$$\begin{bmatrix} 3 & 2 & 4 \\ 2 & 3 & 3 \\ 5 & 2 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -5 \\ 2 \\ 3 \end{bmatrix}$$

$$D = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 3 & 3 \\ 5 & 2 & 5 \end{bmatrix}$$

$$60 + 15 + 20 = 95$$

$$48 + 25 + 16 = 89$$

$$89 - 95 = -6$$

$$D = -6$$

Q2b

3/8

$$\begin{array}{|c|c|c|c|c|}
 \hline
 -5 & 2 & 4 & 5 & 2 \\
 \hline
 2 & 3 & 3 & 2 & 3 \\
 \hline
 3 & 2 & 3 & 3 & 2 \\
 \hline
 \end{array}$$

$$36 + -30 + 20 = 26$$

$$-75 + 18 + 16 = -41$$

$$-41 - 26 = -67$$

$$\begin{array}{|c|c|c|c|c|}
 \hline
 3 & -5 & 4 & 3 & -5 \\
 \hline
 2 & 2 & 3 & 2 & 2 \\
 \hline
 5 & 3 & 5 & 5 & 3 \\
 \hline
 \end{array}$$

$$30 + 75 + 24 = 129$$

$$90 + 27 - 50 = 67$$

$$67 - 129 = -62$$

$$\begin{array}{|c|c|c|c|c|}
 \hline
 3 & 2 & 5 & 3 & 2 \\
 \hline
 2 & 2 & 2 & 2 & 3 \\
 \hline
 5 & 2 & 3 & 5 & 2 \\
 \hline
 \end{array}$$

$$-75 + 12 + 12 = -51$$

$$27 + 20 + 20 = 67$$

$$= -24$$

uq

uq

Q2c

0/10

a)

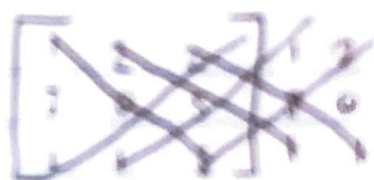
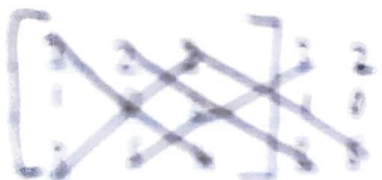


Q. 2

$$\begin{aligned}
 0 + 12 + 15 &= 27 \\
 0 + 30 + 8 &= 38 \\
 -38 + 27 &= -11
 \end{aligned}$$

iv

$$A = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 0 & 2 \\ 2 & 8 & 3 \end{bmatrix} \cdot B = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 0 & 5 \\ 1 & 2 & 1 \end{bmatrix}$$



$$\begin{aligned}
 0 + 12 + 15 &= 27 \\
 0 + 30 + 8 &= 38 \\
 11
 \end{aligned}$$

$$\begin{aligned}
 0 + 10 + 6 &= 16 \\
 0 + 5 + 18 &= 23 \\
 7
 \end{aligned}$$

$$\begin{aligned}
 (11 + 7) &= 18 \\
 28 &= 18
 \end{aligned}$$

✓ can not subtract $\times$ Q. 2

$$\begin{aligned}
 A + B \\
 11 + 7 &= 18 \quad \times \underline{0}
 \end{aligned}$$

Question No.

Examiner Only

Que

Q3

Q3