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Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fasten the book with the provided tag and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners may require you to write in ink, to dictate or have it typed and the expense of typing will be 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	2316857
2	Title of Examination Paper	Signals & Systems
3	Module Code	ACDA 4009
4	Date and Time of Examination	12:00 10/5/24
5	Examination Venue	109
6	Seat Number	
7	Number of Answer Books handed in	1

[illegible]

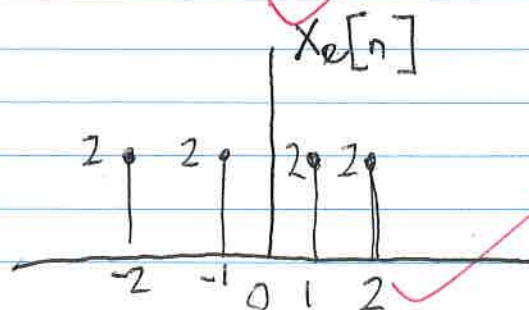
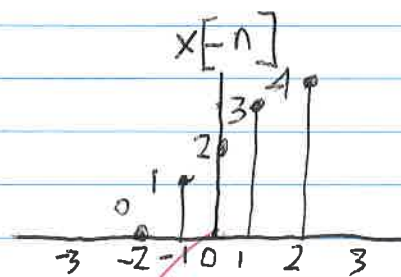
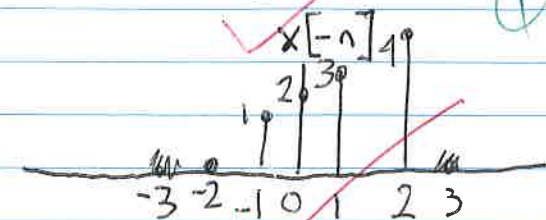
(Gweler yr ochr arall am y fersiwn Cymraeg)

$\frac{40}{100}$ He

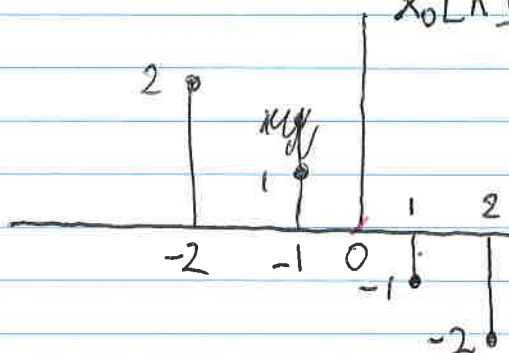
PL 1
25/5/24

1/a/

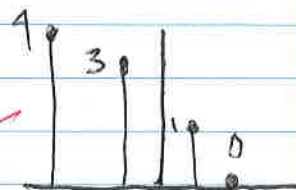
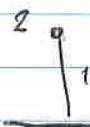
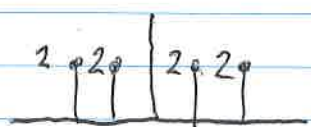
$$i) X_e[n] = \frac{1}{2}(X[n] + X[-n])$$

 $X_e[n]$

$$X_o[n] = \frac{1}{2}(X[n] - X[-n])$$

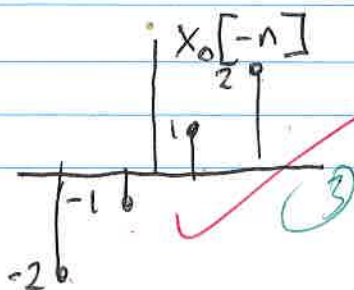
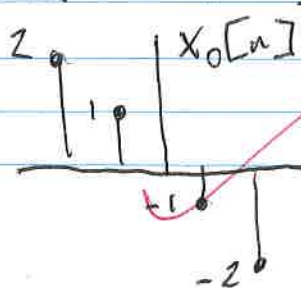
 $X_o[n]$

$$ii) X_e[n] + X_o[n] = X[n]$$



$$iii) W[n] = X_o[n], W[-n]?$$

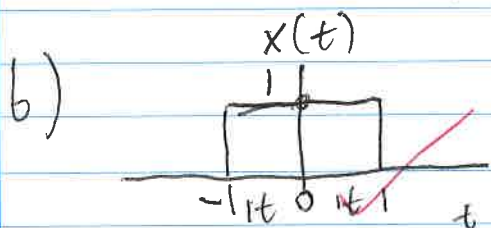
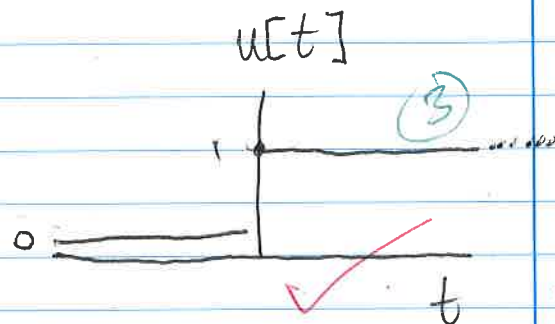
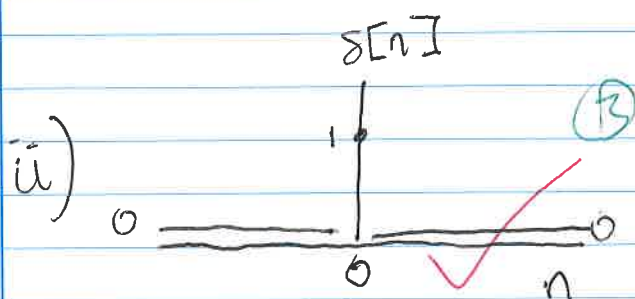
$$W[-n] = X_o[-n]$$



2/
$$s[n] = \begin{cases} 0, & n \neq 0 \\ 1, & n = 0 \end{cases} \quad u[t] = \begin{cases} 0, & t < 0 \\ 1, & t \geq 0 \end{cases}$$

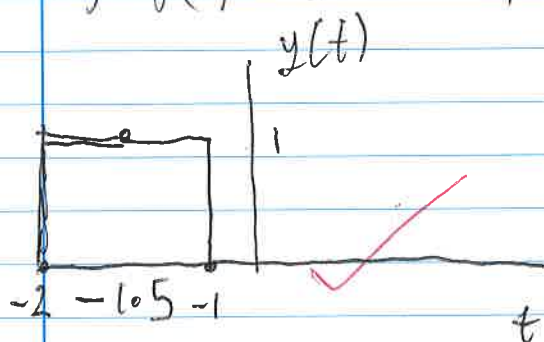
i) $s[n]$ Unit Value (0,1) (2)

$u[t]$ constant at $u[t]=1$ when $t \geq 0$
Positive rectangular signal to ∞



$$x(t) = \begin{cases} 1, & |t| < 1 \\ 0, & \text{otherwise} \end{cases}$$

ii) $y(t) = x(2t+3)$



$2t+3=0$
 $t = -\frac{3}{2}$

At $2t+3=1$
 $2t = -2$
 $t = -1$

$2t+3=-1$
 $2t = -4$
 $t = -2$

$y(1) = 15x$

$y(0) = 3x$

time Shift = -3

time Variant = $\frac{1}{2}$ (2)

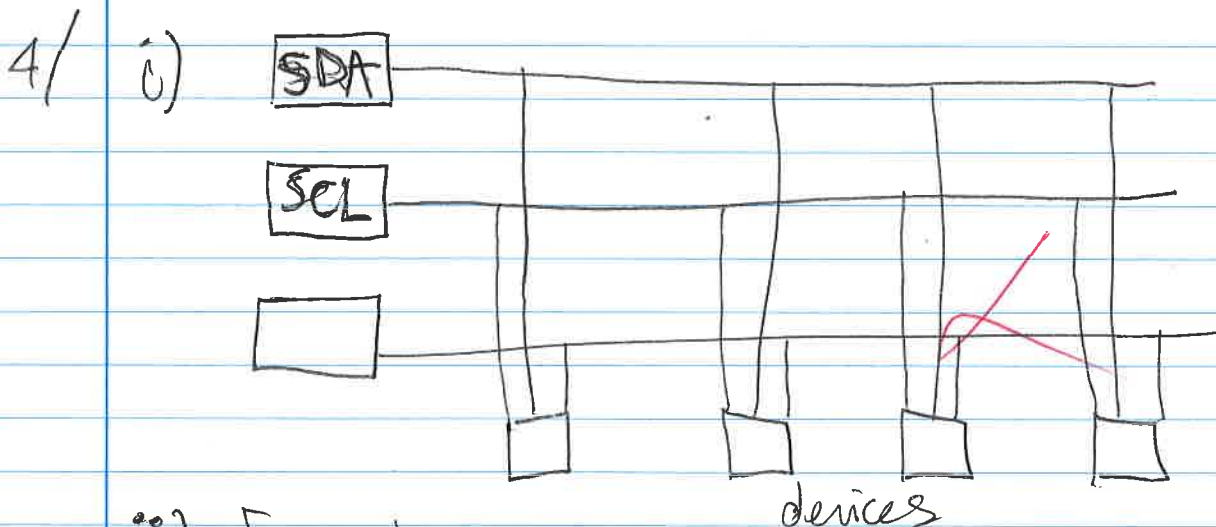
3/ i) Master-slave ✓✓

ii) duplex ✗

iii) transmission occurs between components / devices and computer / master ✓

iv) SDA / SCL ✓

v) feedback loop, pulse signalling system
master sends a signal, slave receives signal, slave sends confirmation of being recipient to master, signal transmission successful. ✓



ii) Full duplex

iii) used in printers full communication between master and slave. ✓

iv) Printers, output devices. The transmission system allows confirmations to be transmitted back to master from slave. ✓

v)

5/ "PRINT"

5052494E54

i) 50524947854

ii

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F
16	G

2

i) 0101000000101001001001001001010000111
 100001010100

ii)

1	0001
2	0010
3	~~0000~~ 0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

P = 80 10000001
 R = 82 10000010
 I = 73 01110011
 N = 78 01110000
 T = 84 10000100

0

02/20

2/20



Question No.

Examiner Only

