

12 Pages

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.**

(see note 2 below)

SURNAME: R. Hill

FORENAME(S): Edward

1	Student Number	P151512
2	Title of Examination Paper	Circuit Design and Analysis
3	Module Code	M5X01136/ M5X00736
4	Date and Time of Examination	9/05/18 12:00
5	Examination Venue	MA107 A
6	Seat Number	4
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	0 1/2
2	1
3	2
4	5
5	10
Office Use	24.5 / 42

(Gweler yr ochr arall am y fersiwn Cymraeg)

58.3 %

24.5/42
Gay

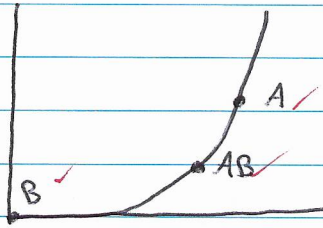
1a) Fig Q1 is a Class AB amplifier.

(1)

b) ~~ETC2 and C2~~ C1 and C2 provide input ~~bias~~ voltage biasing and ~~smooth the incoming~~ Smooth/buffer the incoming signal. C3 buffers and smooths the output signal. $\times$ AC coupling. / block DC.
D1 & D2 Control the ^{direction} ~~flow~~ of current through the amplifier.
R1 & R2 Control the voltage ~~potting~~ through the circuit. $\frac{1}{2}$
The overall circuit provides signal Amplification.

(1/2)

c)



The Bias points of A, AB & B Amplifiers.

	A	AB	B
Distortion	Low ✓	Med $\times$	high ✓
Noise	Low	Med	high
Efficiency	Low $\times$	Med ✓	high ✓
Gain	high ✓	Med ✓	low ✓
Quiescent current	high ✓	Med ✓	low/no ✓

(5)



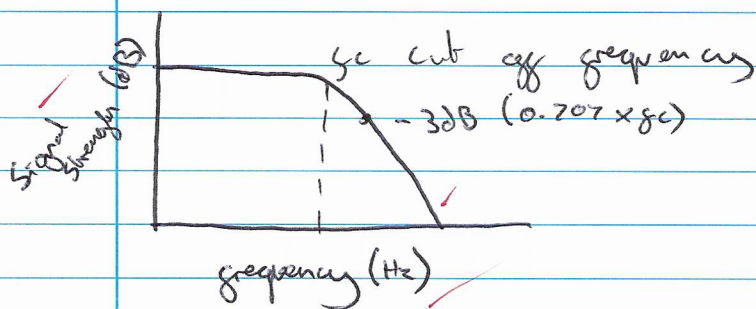
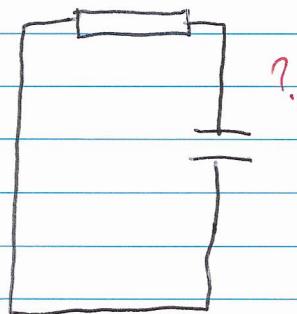
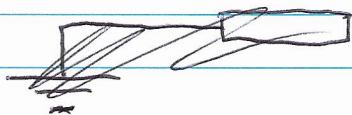
Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn

2



$$R = 10k\Omega$$

$$C = 10nF$$

$$f_c = \frac{1}{2\pi RC} = \frac{1}{2\pi \times 10k \times 10^{-8}}$$

$$= 6.28 \times 10k \times 10^{-8}$$

$$= 62800 \times 10^{-8}$$

$$= 0.00628$$

$$= \frac{1}{0.00628}$$

$$= \frac{1}{628 \times 10^{-3}}$$

$$= ?$$

(T)



Question No.

Examiner Only

Arholwr yn unig

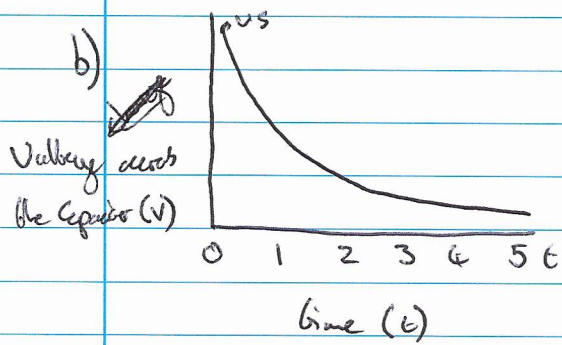
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3)

a)

t		e^{-t}	$e^{-t/RC}$	Vs
-1				
-2				
-3				
-4			?	
-5				

0.



Capacitor discharge over 5t (time constants)

2 ✓

(4)



Question No.

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4

$$a) V_b = \frac{22k}{100k+22k} \times V_{cc} = \frac{22k}{122k} \times V_{cc}$$

(1/2)

~~$$22k$$~~
~~$$\frac{10000}{22000} \times 122000$$~~

$$b) V_e = V_b - 0.7$$

(1)

$$c) V_c = 15V$$

$$V_c = 15V \times \frac{I_c}{R_c} = 15V \times \frac{I_c}{4.7k}$$

$$I_c = I_e$$

$$I_e = \frac{V_e}{R_e} = \frac{V_e}{1k}$$

(1/2)

$$d) R_{in} = R_{B1} // R_{B2} // H_{fe} \times R_e$$

$$= 100k // 22k // 100 \times 1k$$

$$= \frac{1}{\frac{1}{100k} + \frac{1}{22k} + \frac{1}{100 \times 1k}}$$

(1)

$$R_{out} = R_c = 4.7k\Omega$$

(2)



Question No.

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Arholwr yn unig

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5

$$a) 29 \mu V_{pk-pk} \times \frac{1k}{1k+400} = 2 \mu V$$

$$2 \mu V \times 100 = 2 V$$

$$2 V \times \frac{1k}{2k} = 1 V$$

$$1 V \times 12 = 12 V$$

$$12 V \times \frac{16}{2k} = 96 V_{pk-pk}$$

$$\frac{\sqrt{2}}{2} \times 96 V = 0.707 \times 96 V$$

$$= 5.56 V_{rms}$$

$$5.56 V \times R = \frac{V^2}{R} = \frac{5.56 V^2}{16} = 2 \Omega$$

b) ~~Capacitors~~ The voltage input to ~~the~~ the two stage Amplifier is assumed to be constant and therefore DC Capacitors have little to no effect on DC voltage. So have negligible impact & can be ignored for simplicity.

8

2