

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)

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FORENAME(S): Adam Spencer

1	Student Number	P147250
2	Title of Examination Paper	Circuit design
3	Module Code	M5X01136
4	Date and Time of Examination	9/5/18
5	Examination Venue	MBG03
6	Seat Number	N/A
7	Number of Answer Books handed in	3/3

List the numbers of the questions you have attempted	Office Use
1	3
2	1
3	4
4	2 1/2
5	2
Office Use	12.5 / 42

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29.8%

135/42
Gay

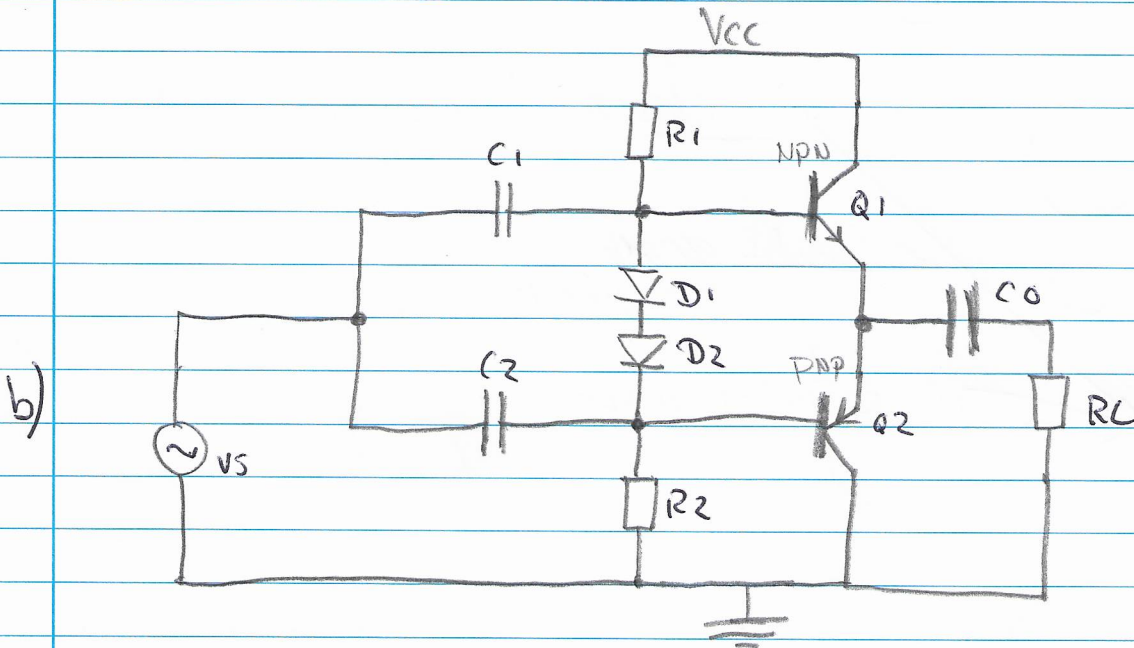
Q1

Question No.

Examiner Only

a) class A B ✓

1

i) $R1 // R2 // D1 // D2 // C1 // C2 + (C0)$?

come back here.

ii) $Q1 = \text{NPN}$, $Q2 = \text{PNP}$, $Q1 = \text{positive half}$ of the cycle while $Q2 = \text{negative half cycle}$

$D1$ and $D2$ put the flow of voltage one way as $D1$ helps to reduce and balance $Q2$ transistor and put temperature low, so $Q1$ some $D2$ reduce ~~current~~ ^{voltage} and through $Q2$ because $Q1$ can produce.

c) class A; has one transistor and signal is 360° of full cycle. ✓

class B has two transistors but they are different one is NPN and other is PNP, the NPN transistor pushes the currents through so that the $C0$, into while the PNP transistor pulls the currents this is called push and pull. But the class B has no capacitors or resistors in the front, which V_s is directly to the transistors.

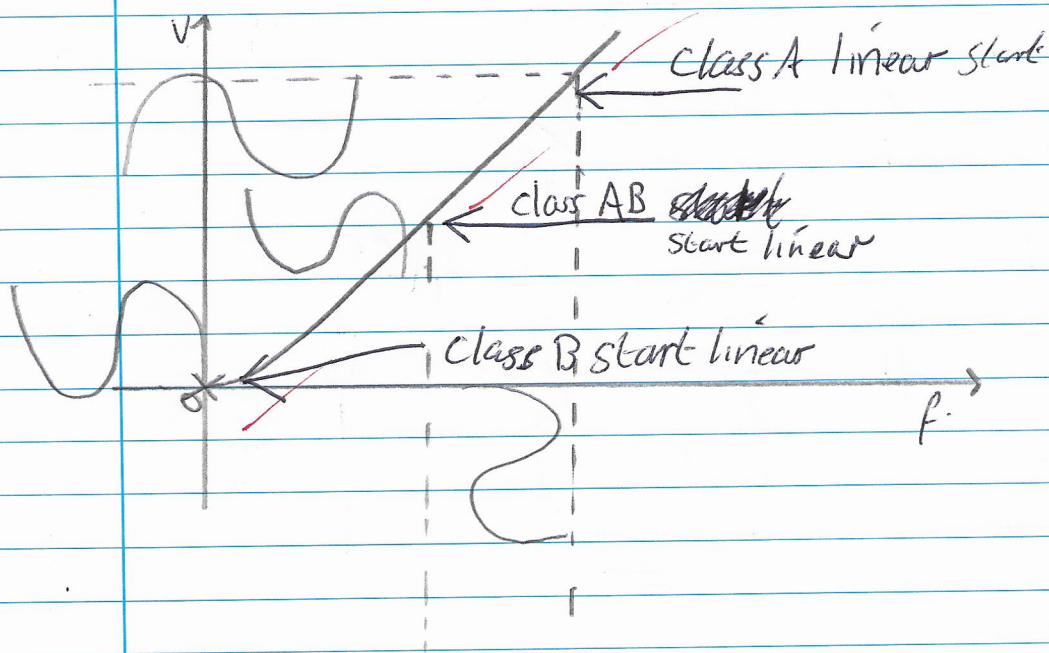
P. T. O.

Q1

Question No.

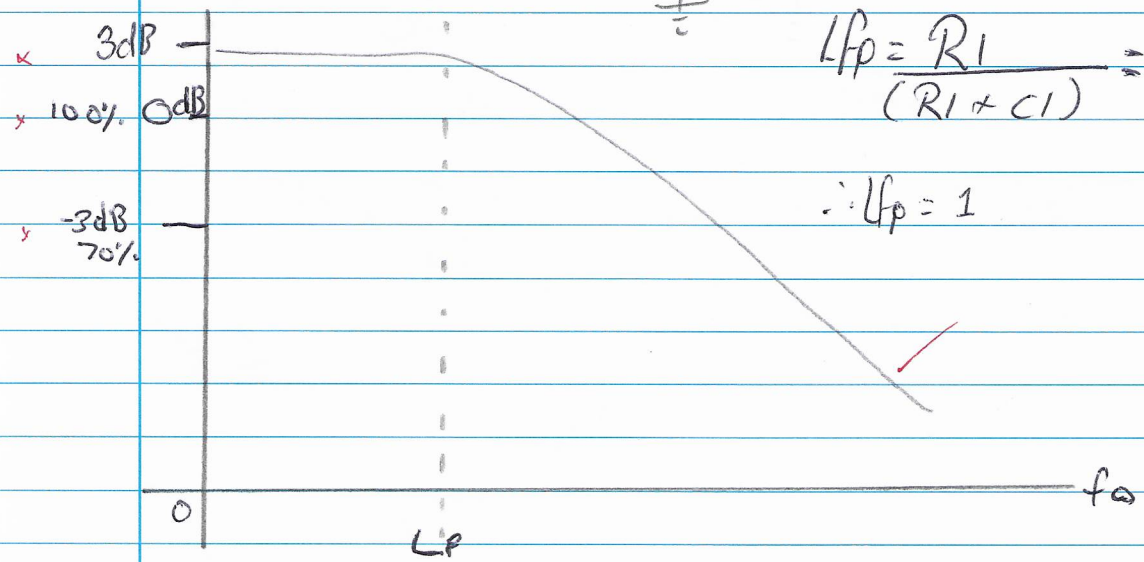
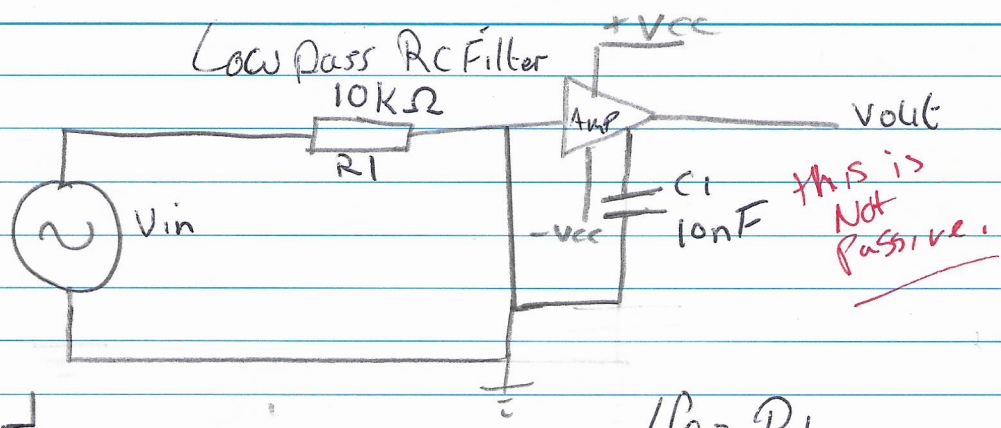
Examiner Only

- c) Class AB does more than push and pull, it separates the cycles in similar way the class B does but at the end of the "CO", they become one cycle again just like the class A.



2

2)

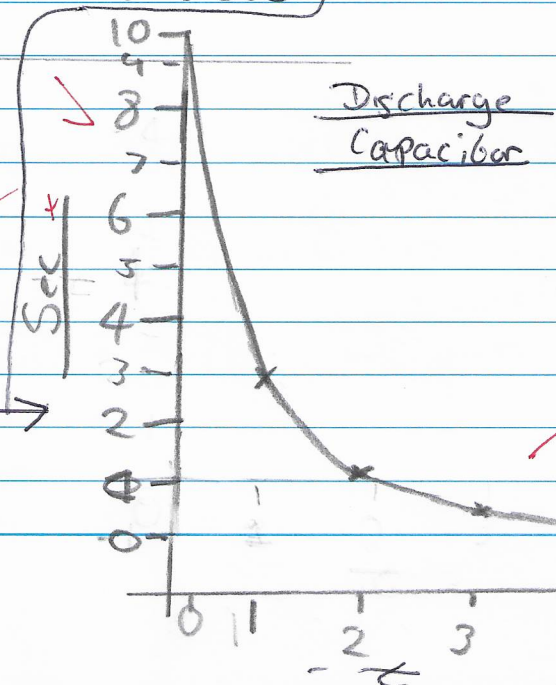


①

3) $V_c = V_s e^{-t/R.C}$ $V_c =$

a) $V_c = 10e^{-\frac{1}{50k} \times 20 \times 10^{-6}} = 3.6 \text{ Sec}$

t	Sec
0	10
1	3.678
2	1.353
3	0.4978
4	0.183



③

b)

①



Examiner Only

Question No.

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Q2

Question No.

Examiner Only

$$\frac{15}{2} = 7.5V$$

$$4) V_{be} = 0.7V$$

$$\text{Let } V_{cc} = I = \frac{V_{cc}}{R_c} = \frac{15}{4.7k} \approx 3mA$$

$$I = 0.003A$$

Remember: Ohm's Law

$$V = I \times R$$

$$I = \frac{V}{R}$$

$$R = \frac{V}{I}$$

~~15 = 15~~

$$I = \frac{V_{cc}}{R_{cc}} = \frac{7.5}{4.7k} = 0.001A (1mA)$$

$$\text{Ic} // I_E = 0.001A (1mA)$$

$$V_b = \frac{R_{B1}}{R_{B1} + R_{B2}} \times V_{cc} = \frac{100k}{100k + 22k} \times 15$$

wrong ratio values used.

$$\therefore V_B = 12.29V$$

~~15 = 15~~

$$I_E = 1mA \quad V_E = I_E \times R_E = 1V$$

$$\therefore V_E = 1V$$

$$V_{be} = 0.7V \quad \text{What if}$$

$$V_B - V_{be} = 12V - 0.7V = 11.3V$$

$$\frac{100k}{100k + 22k} \times 7.5 = 6.14V$$

$$V_B - V_{be} = 6.14 - 0.7 = 5.4$$

$$\therefore V_C = 5.4V$$

$$\therefore V_b = 6.14 \quad \times$$

Remember: $R_{in} \approx R_{B1} // R_{B2} // h_{FE} \cdot R_E$

$$R_{out} \approx R_C$$

$$A_v \approx \frac{R_C}{R_E}$$

*

d)

$$R_{in} = \frac{R_{B1}}{R_{B1} + R_{B2} + h_{FE}} \times R_E$$

$$= \frac{100k}{100k + 22k + 100} \times 1000 = 0.819$$

$$\therefore R_{in} = 0.819$$

$$A_v = \frac{R_C}{R_E} = A_v = \frac{4700}{1000} = 4.7V$$

Should have NO. units.

$$R_E = 0.819?$$

5)

$$a) V_S = 28 \text{ mV}_{\text{pk-pk}} = \frac{28 \times 10^{-3}}{2} = 14 \times 10^{-3} \text{ if?}$$

 $R_1 // R_2$

$$R_1 = 400 \Omega \quad R_3 = 1k \quad R_5 = 8 \quad \frac{R_1}{R_1 + R_2} \times V_S$$

$$R_2 = 1k \Omega \quad R_4 = 1k \quad R_6 = 16$$

$$A_1 = 100 \quad A_2 = 12$$

$$V_1 = \frac{400}{400 + 1000} \times 28 \times 10^{-3} = 8 \times 10^{-3} \text{ mV}$$

h1 + R2 wrong way round

$$V_1 = 8 \text{ mV} = 8 \times 10^{-3}$$

$$V_2 = \frac{400}{400 + 1000 + 100} \times 8 \times 10^{-3} = 0.002 \text{ mV}$$

$$V_2 = 2 \times 10^{-3} = 2 \text{ mV}$$

$$V_2 = \frac{400}{400 + 100} \times 8 \times 10^{-3} = 6.4 \text{ mA?}$$

 V_2

$$\text{if } V_2 = 6.3 \times 10^{-3} = \frac{1000}{1000 + 12} \times 6.4 \times 10^{-3} = 6.2 \times 10^{-3}$$

$$\frac{V_2}{R_2} = \frac{6.3 \times 10^{-3}}{16} = 3.93 \times 10^{-4}$$

$$V_{\text{out}} = \frac{V_2}{R_L + R_5} = \frac{6.3 \times 10^{-3}}{16 + 8} = 2.65 \times 10^{-4}$$

$$V_{\text{out}} = \frac{16}{16 + 8} \times 6.3 \times 10^{-3} = 4.2 \times 10^{-3}$$

- b) Because capacitors ~~filter~~ filter AC out and turns AC into DC. X
This would change the pk+pk into a single peak.