

SURNAME: Davies

FORENAME(S): Nathan Andrew

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 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.**

1	Student Number	1706135
2	Title of Examination Paper	Circuit design and analysis
3	Module Code	M5X00736
4	Date and Time of Examination	9-5-18 12:00
5	Examination Venue	Gym
6	Seat Number	G031

7	Number of Answer Books handed in	<u>1</u>
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List the numbers of the questions you have attempted	Office Use
1	9
2	3
3	4
4	8
5	7 1/2
Total	31.5/42

75%

31.5/42
Gay

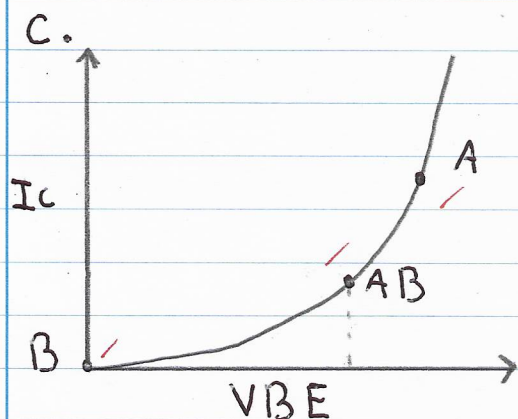
1

a. A class AB Amplifier

(1)

b. * R_1 , R_2 , D_1 and D_2 are present within this circuit to create a forward bias for the input. C_1 and C_2 are present to ~~smooth~~ smooth the input wave coming in to the circuit.

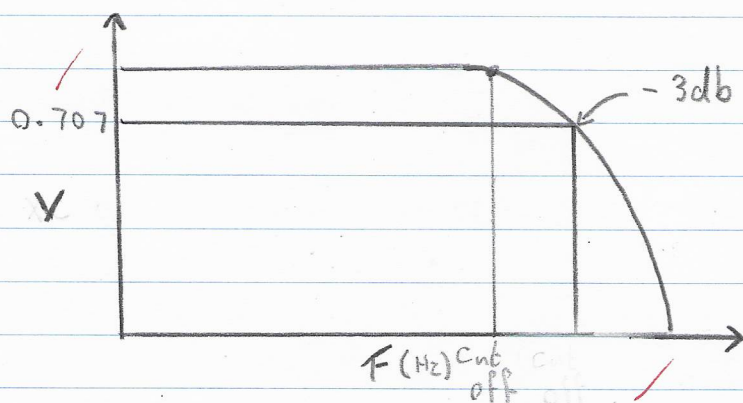
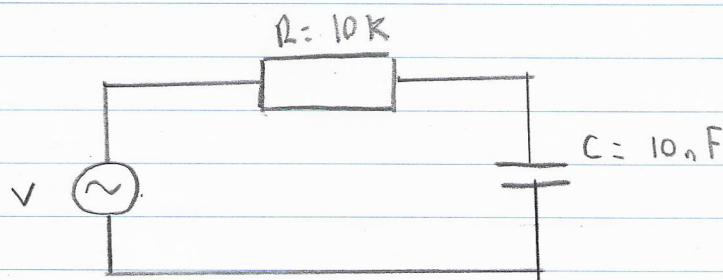
(2)



A	B	AB
• low distortion	High distortion	Low distortion
• low efficiency	High efficiency	Medium efficiency
• Current always flowing through the transistor	Current flows 180°	Current flows $> 180^\circ$

(6)

2.



This type of filter allows low frequencies through while preventing high frequencies from passing through. As can be seen on the graph as the frequencies increase they get to a certain point then the graph begins to drop off. This point is known as the cut off frequency.

(3)



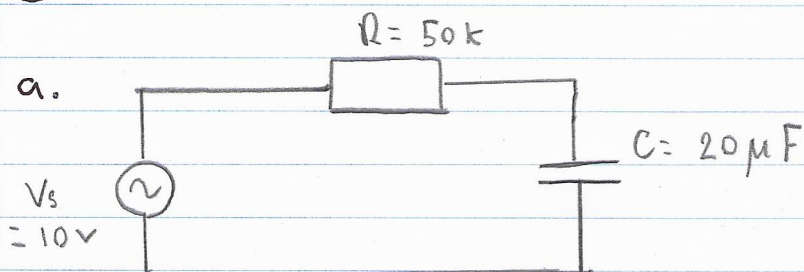
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3.

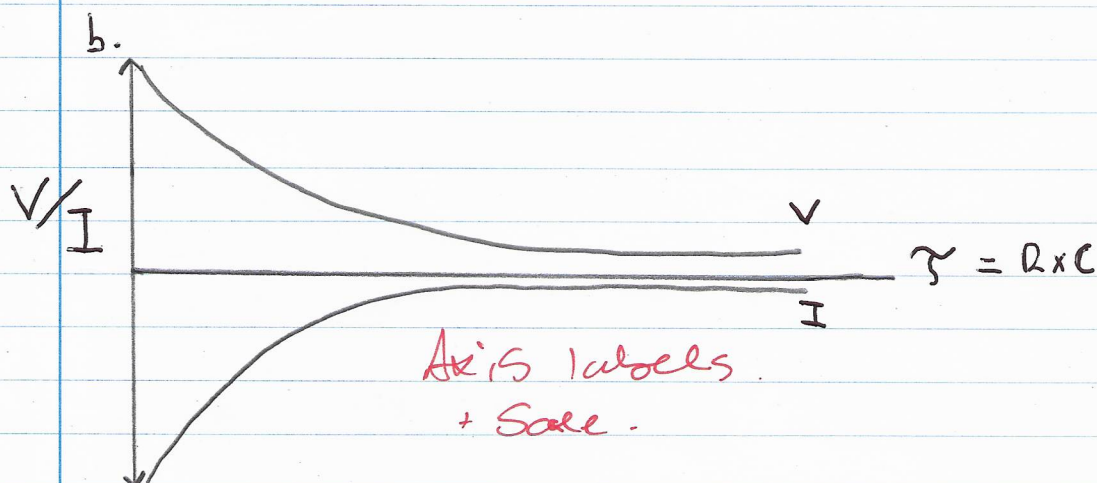


$$V_c = V_s e^{-\frac{t}{RC}}$$

$$V_c = 10 e^{-\frac{3}{50k \times 20\mu F}}$$

$$V_c = 497.87 \text{ mV}$$

3 - ✓



1 - ✓

4.

$$a) V_b = \frac{R_{b2}}{R_{b1} + R_{b2}} \times V_{cc} = \frac{22k}{100k + 22k} \times 15 = \frac{2.7V}{2.07V}$$

1 1/2 - ✓

$$b) V_e = V_b - 0.7 = \frac{2.07}{2} - 0.7 = \frac{2V}{2} - 0.7 = 0.9985V$$

2 - ✓

$$c) I_c = \frac{15}{4.7k} = 3.2 \text{ mA}$$

$$V_c = V_{cc} - (I_c \times R_c) = 15 - (3.2 \text{ mA} \times 4.7k) = 15 - 15.04 = -0.04 \text{ V}$$

1 1/2 - ✓

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4.

$$d. R_{in} = R_1 // R_2 // h_{fe} \times R_e \quad \textcircled{1}$$

$$R_{in} = 100 \text{ k}^{-1} + 22 \text{ k}^{-1} + 100 \times 1 \text{ k} \quad \times$$

$$R_{in} = \underline{10 \mu \Omega}$$

$$R_{out} = R_L$$

$$= \underline{4.7 \text{ k} \Omega} \quad \textcircled{2}$$

Av?

5.

~~49k~~

a.

$$V_1 = \frac{1 \text{ k}}{1 \text{ k} + 400} \times 28 \text{ m} = 0.02 \text{ V} \quad \checkmark$$

$$V_2 = 0.02 \times 100 = 2 \text{ V} \quad \checkmark$$

$$V_3 = \frac{1 \text{ k}}{1 \text{ k} + 1 \text{ k}} \times 2 = 1 \text{ V} \quad \checkmark$$

$$V_4 = 1 \times 12 = 12 \text{ V} \quad \checkmark$$

$$V_5 = \frac{16}{16 + 8} \times 12 = \underline{8 \text{ V}} \leftarrow \text{Output Voltage} \quad \checkmark$$

$$r_{ms} = \frac{28 \text{ m} - 0.02}{2} = 4 \text{ m} \quad \times$$

$$P = \frac{r_{ms}^2}{RL} = \frac{4 \text{ m}^2}{16} = \underline{0.25 \text{ m W}} \quad \times$$

5 1/2

b. These capacitors are not present in thevenin equivalent circuits because they are only used for biasing the input and output meaning they don't really effect the main system

2