

(see note 2 below)

FORENAME(S): Paul

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12 Pages

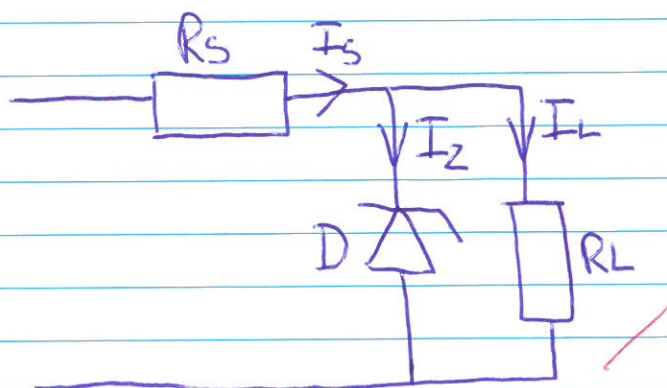
1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense 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.**

1	Student Number	141589
2	Title of Examination Paper	Electronics 1
3	Module Code	PSDE 4004
4	Date and Time of Examination	16/05/19
5	Examination Venue	Pembrokeshire College
6	Seat Number	0
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	17 ✓
2	14 ✓
3	13 ✓
	<del> </del>
	44
Office Use	73% ✓

L. 2

Q1a)

Diode = BZX79C5V6

$$I_Z = 5\text{mA} \quad \checkmark$$

$$V_Z = 5.6\text{V} \quad \checkmark$$

$$\text{Max power} = 500\text{mW} \quad \checkmark$$

$$\bullet P = I_Z \times V_Z = 5 \times 10^{-3} \times 5.6 = \underline{28\text{mW}} \quad \checkmark$$

$$P = 28\text{mW} \text{ (Within } 500\text{mW Max)} \quad \checkmark$$

$$\bullet I_S = I_L + I_Z = \cancel{250\text{mA}} + 5 = \underline{255\text{mA}} \quad \checkmark$$

$$\bullet \text{Voltage drop} = V_{in} - V_Z = 12 - 5.6 = \underline{6.4\text{V}} \quad \checkmark$$

$$\bullet R_S = \frac{V}{I_S} = \frac{6.4}{255 \times 10^{-3}} = \underline{25.09\Omega} \quad \checkmark$$

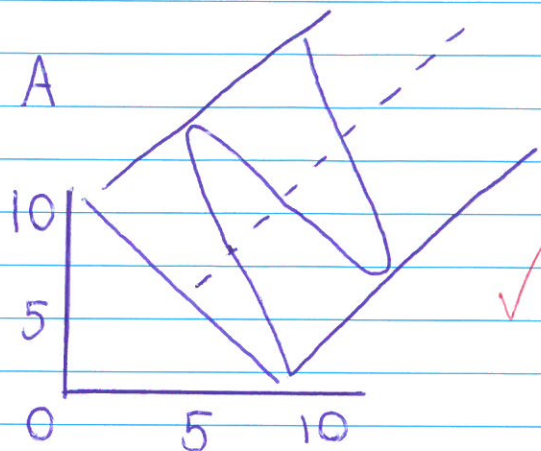
$$\bullet \text{rating} = I_S \times 5.2 = 255 \times 10^{-3} \times \underline{5.2} = \underline{1.326\text{W}} \quad \checkmark$$

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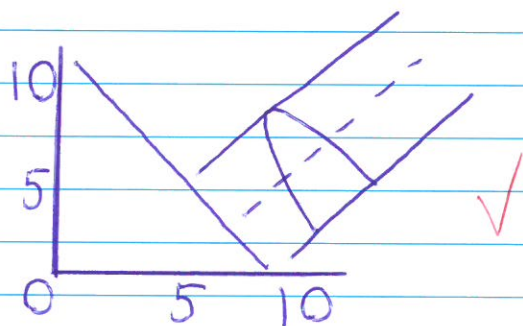


1b)

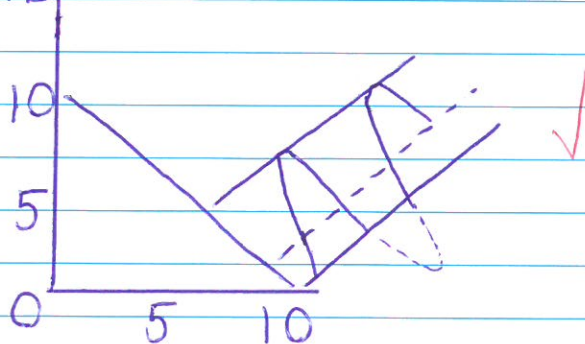
• Class A



• Class B



• Class AB

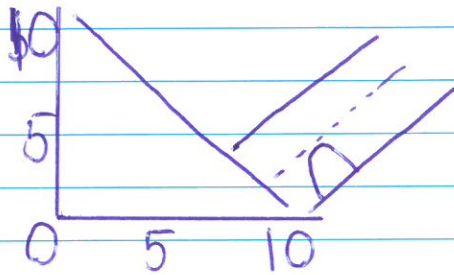


6/6



- 1c) A C Class Amplifier is called a tuning amplifier as the signal which it generates is a lot smaller this is why they are using in radio communication

• Class C



6/2

- 1d) $C = 100 \text{ nF}$ $L = 1 \text{ mH}$ $R = 2.5$

• Resonant Frequency = $f_r = \frac{1}{2\pi\sqrt{LC}}$

$$f_r = \frac{1}{2 \times \pi \sqrt{1 \times 10^{-3} \times 100 \times 10^{-9}}} = \underline{\underline{15.92 \text{ KHz}}}$$

• Quality Factor = $Q = \frac{2\pi f_r L}{R}$

$$Q = \frac{2 \times \pi \times 15.92 \times 10^3 \times 1 \times 10^{-3}}{2.5} = \underline{\underline{40.01}}$$

• Bandwidth = $B = \frac{f_r}{Q}$

$$B = \frac{15.92 \times 10^3}{40.01} = \underline{\underline{397.9 \text{ Hz}}}$$

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Q2b) i) Gain (dB) = $20 \log(AV)$

• $20 \log(20) = 26.02 \text{ dB}$ ✓

• $20 \log(105) = 40.42$ ✓

• $20 \log(0.6) = -4.44$ ✓

ii) Total gain

$T_g = 26.02 + 40.42 - 4.44 = \underline{\underline{62 \text{ dB}}}$ ✓

(4)

c) Ideal Characteristics are:

• Infinite amount of gain ✓

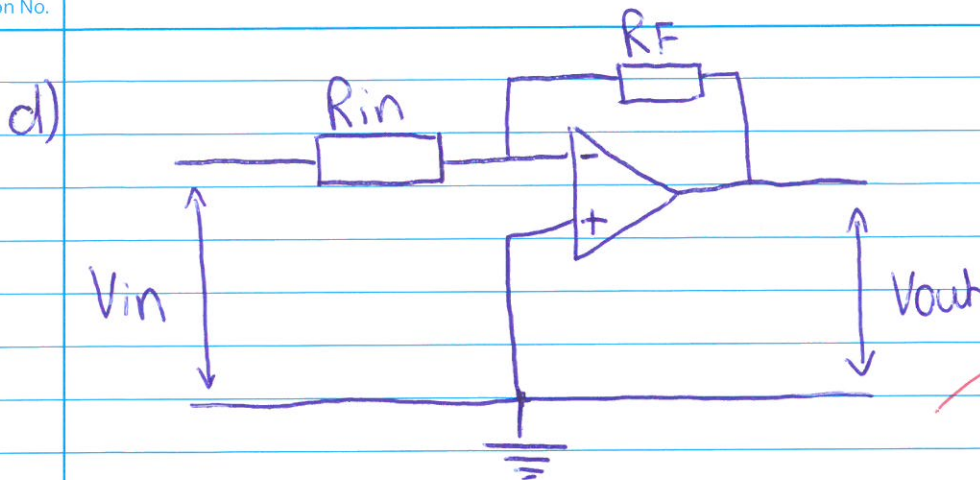
• Infinite amount of input impedance ✓

• Infinite bandwidth ✓

• Zero ~~out~~ output impedance ✓

(5)

✓



from -20 to 40 mA

Gain (inverting), $A_v = \frac{V_{out}}{V_{in}} = \frac{-R_f}{R_{in}}$

$= \frac{-20}{40 \times 10^{-3}} = -500$

$R_f = R_{in} \times 500$

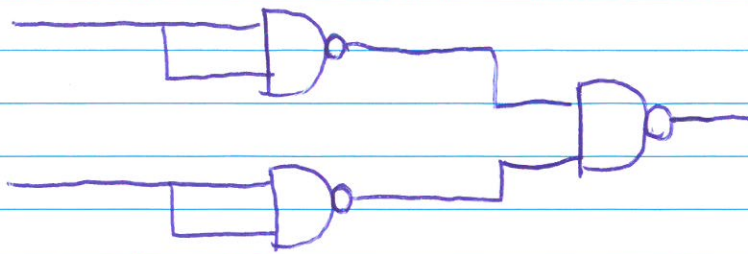
Select value for R_{in} (2.5 k Ω)

$R_f = 2500 \times 500 = \underline{\underline{1.25 \text{ M}\Omega}}$

6/6

✓

3a)



2/2

OR gate made by using NAND gates

b) i)

A	B	C	R	S	T	U	V	W	X
0	0	0	1	1	0	0	1	1	1
0	0	1	1	0	0	0	0	0	0
0	1	0	1	1	1	1	1	1	1
0	1	1	1	0	1	0	0	1	1
1	0	0	0	1	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0
1	1	0	0	1	0	1	0	1	1
1	1	1	0	0	0	0	0	0	0

Same

ii) • Boolean exp

$$= \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C}$$

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• Karnaugh map

A \ BC	00	01	11	10
0	1	0	1	1
1	0	0	0	1

There are more groups.

• Simplified boolean = $B + BC$ ~~xxx~~ x

iii) De Morgans

$$\bullet X = \overline{B + BC}$$

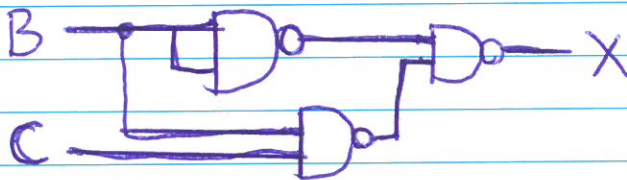
$$\overline{X} = \overline{B + BC}$$

$$\overline{X} = \overline{B} \cdot \overline{(BC)}$$

$$X = \overline{\overline{B} \cdot \overline{(BC)}} \quad \checkmark$$

Correct method
wrong equation

• Drawing to NAND gates



Correct circuit
for equation
above.

c) • Cmos Components are more expensive ?

• Cmos components use less power when in idle however use alot more compared to TTL when in use

• ~~TTL are more likely to~~

• Cmos are more likely to be damaged from electrostatic charges

2/3
✓

Question No.

Examiner Only