

(see note 2 below)

SURNAME: Owen

FORENAME(S): Harry

12 Pages

Instructions to Candidates

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	122772
2	Title of Examination Paper	ELECTRONICS 1
3	Module Code	PSDE 4004
4	Date and Time of Examination	16/05/19 09:30
5	Examination Venue	PEMBROKESHIRE COLLEGE
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	16 ✓
2	13 ✓
3	10 ✓
	~~39~~
	39
Office Use	65% ✓

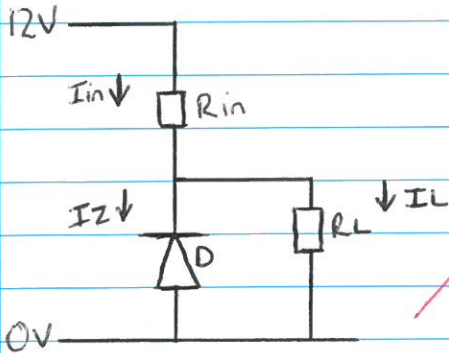
LR

Q1)

a) Zener diode = BZX79C5V6

$I_Z = 5\text{mA}$

$P_D = 500\text{mW}$



Well within limit

Power consumption of diode = $(5 \times 10^{-3}) \times 5.6 = 0.028\text{W}$

Supply current = $I_Z + I_L = (5 \times 10^{-3}) + (250 \times 10^{-3}) = (255 \times 10^{-3})\text{A}$

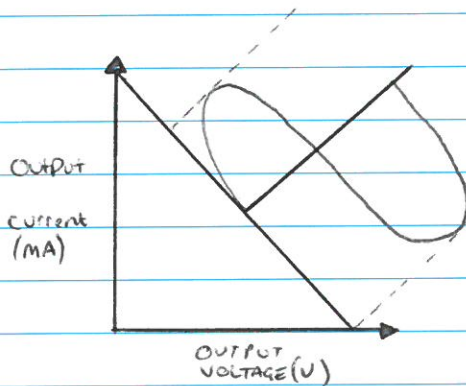
Voltage drop across $R_{in} = 12 - 5.6 = 6.4\text{V}$

$R_{in} = V_{drop} / I = 6.4 / 0.255 = 25.098\Omega$

Power Consumption of $R_{in} = V_{drop} \times I = 6.4 \times 0.255 = 1.632\text{W}$

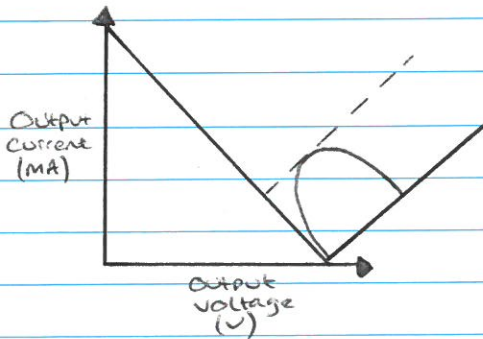
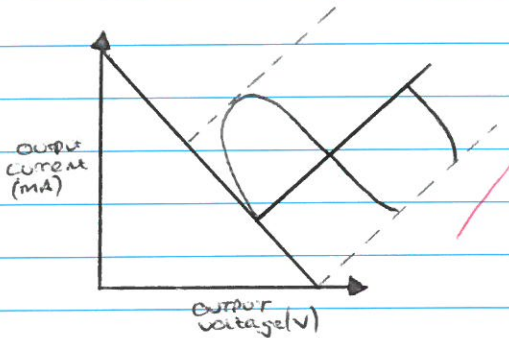
6/6

b)



— = — CLASS A

CLASS AB — = —

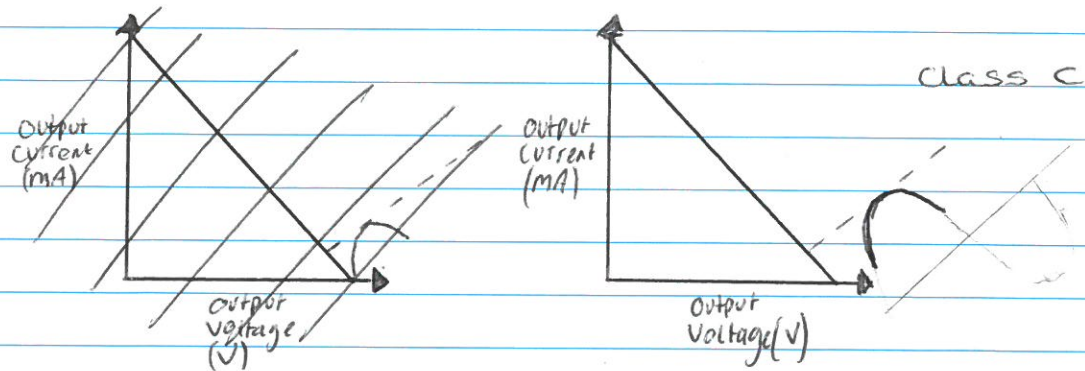


— = CLASS B

6/6



a)



Class C amplifiers are also known as tuned amplifiers. They are used within oscillators and radio frequency amplifiers.

POSITIVE = VERY EFFICIENT.

NEGATIVE = PRODUCE A LOT OF DISTORTION.

i) Resonant frequency = $\frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{(100 \times 10^{-9}) \times (1 \times 10^{-3})}}$

= 15915.49 Hz

ii) Quality factor = $\frac{2\pi f_r L}{R} = \frac{2\pi(15915.49)(100 \times 10^{-9})}{2.5} = 399.99 \times 10^{-6}$

iii) Bandwidth = $\frac{f_r}{Q} = \frac{15915.49}{399.99 \times 10^{-6}} = 39.89 \times 10^{-6} \text{ Hz}$

Correct method
wrong value

2)

b) $20 \log(20) = 26.02 \text{ dB}$ (A)

$20 \log(105) = 40.42 \text{ dB}$ (B)

$20 \log(0.6) = -4.44 \text{ dB}$ (C)

ii) $26.02 + 40.42 - 4.44 = 62 \text{ dB}$ Overall gain.

c)

- INFINITE VOLTAGE GAIN

- INFINITE BANDWIDTH

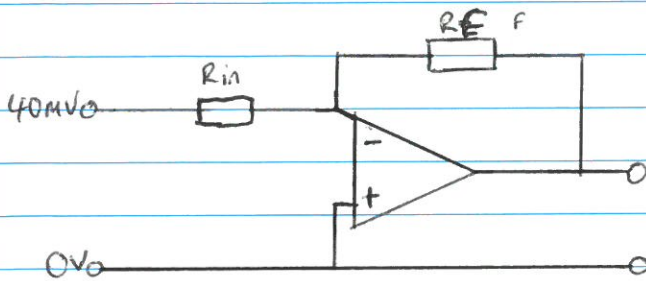
- INFINITE INPUT IMPEDANCE

- ZERO OUTPUT IMPEDANCE

- ZERO SPIKE OSCILLATION.



2)



$$\text{Gain} = \frac{V_{out}}{V_{in}} = -\frac{R_F}{R_{in}}$$

$$R_F = \left(\frac{V_{out}}{V_{in}} \right) \times R_{in}$$

$$= -500 \times 1000$$

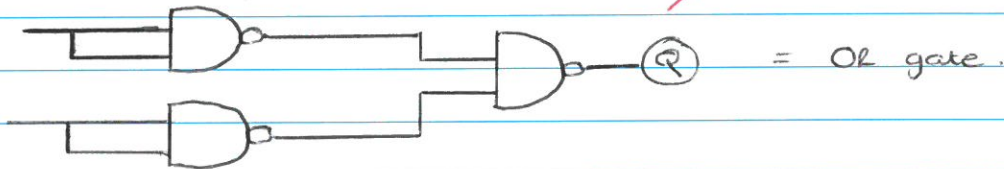
$$R_F = 500000 \Omega$$

let $R_{in} = 1K \Omega$

$\frac{5}{6}$

3)

a)

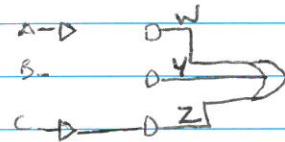


$\frac{2}{2}$

b)

i)

A	B	C	W	Y	Z	X
0	0	0	0	0	1	1
0	0	1	0	0	0	0
0	1	0	1	1	1	0
1	0	0	0	0	0	0
1	1	0	0	1	0	1
1	0	1	0	0	0	0
0	1	1	1	0	0	1
1	1	1	0	0	0	0



Truth table in the wrong order.

$\frac{3}{4}$

ii)

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

$$X = \overline{A}BC + A\overline{B}C + ABC$$

$$= \overline{A}BC + BC + AB$$

$\frac{3}{3}$

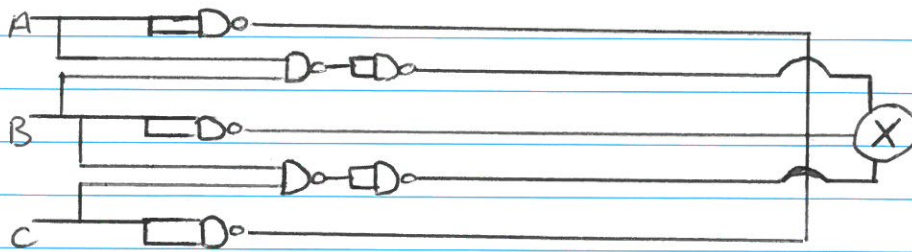
iii)

$$X = \overline{A}BC + BC + AB$$

$$\overline{X} = \overline{\overline{A}BC + BC + AB}$$

$$\overline{X} = (\overline{\overline{A}BC}) \cdot (\overline{BC}) \cdot (\overline{AB})$$

$$X = (\overline{A}BC) \cdot (BC) \cdot (AB)$$



c) TTL + CMOS

- CMOS IS MORE EXPENSIVE ON ITS OWN VS TTL BUT IS CHEAPER IN A SYSTEM DUE TO LESS REGULATION NEEDED. ~~X~~
- CMOS IS MORE SUSCEPTIBLE TO ELECTROSTATIC DAMAGE. ✓
- CMOS IS SMALLER THAN TTL DUE TO HAVING LESS OR SMALLER COMPONENTS. ✓
- CMOS IS NEWER THAN A TTL SYSTEM. ✓

2
6

