

Electronics exam

by Toby Ward

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TIME SUBMITTED	15-MAY-2020 02:25PM (UTC+0100)	WORD COUNT	6
SUBMISSION ID	127781593	CHARACTER COUNT	50



AAAAAAAAAAAAAAAAAAAA

$$1) a) 4 \times 10_{ms} = 40_{ms}$$

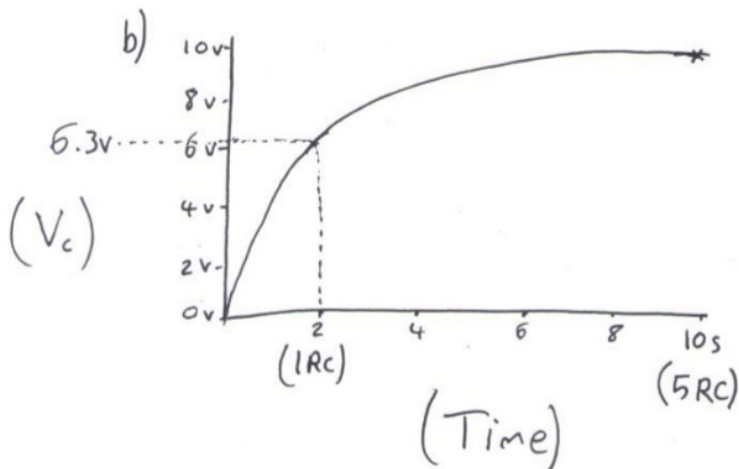
$$b) \frac{1}{0.04} = 25 \text{ Hz}$$

$$c) 4 \times 2 \text{ V} = 8 \text{ V}$$

$$d) V_{rms} = \frac{1}{\sqrt{2}} \times V_p = \frac{1}{\sqrt{2}} \times 4 \text{ V} = 2.83 \text{ V}$$

$$2) V_c = V_s(1 - e^{-t/RC})$$

$$a) 10(1 - e^{-4/(100000 \times 20 \times 10^{-6})}) = 8.65 \text{ V}$$



$$c) \frac{1}{2} CV^2 = \frac{1}{2} \times (20 \times 10^{-6}) \times 10^2 = 1 \times 10^{-3} \text{ J}, 1 \text{ mJ}$$

$$d) 0.00025 = \frac{1}{2} \times (20 \times 10^{-6}) \times V_c^2$$

$$\frac{0.00025}{0.5 \times (20 \times 10^{-6})} = V_c^2 = 25$$

$$\sqrt{25} = 5$$

$$V_c = V_s(1 - e^{-t/RC}) \quad \frac{V_c}{V_s} - 1 = -e^{-t/RC}$$

$$\frac{V_c}{V_s} = 1 - e^{-t/RC}$$

$$\ln\left(\frac{V_c}{V_s} - 1\right) = -t/RC$$

$$RC \ln\left(\frac{V_c}{V_s} - 1\right) = -t = \underline{\underline{1.395}}$$

3) AND — $A \cdot B = Q$ —

A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

 —

OR — $A + B = Q$ —

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

 —

NOT — $\bar{A} = Q$ —

A	Q
0	1
1	0

 —

NAND — $\overline{A \cdot B} = Q$ —

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

 —

NOR — $\overline{A + B} = Q$ —

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	0

 —

EXOR (XOR) — $A \oplus B = Q$ —

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

 —

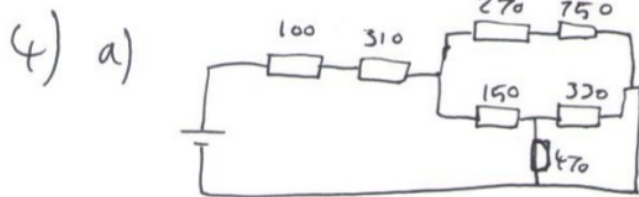
($A \cdot \bar{B} + \bar{A} \cdot B = Q$)

EXNOR (XNOR) — $\overline{A \oplus B} = Q$ —

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	1

 —

($A \cdot \bar{B} + \bar{A} \cdot B = Q$)

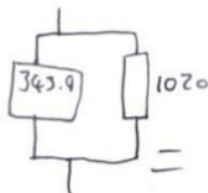


$100 + 310 = 410 \Omega$ $270 + 750 = 1020 \Omega$

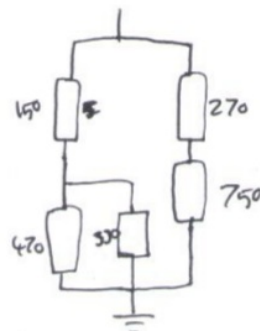
$\frac{1}{470} + \frac{1}{330} = \frac{8}{1951}$

$\frac{1}{\frac{8}{1951}} = 193.9 \Omega$

$193.9 + 150 = 343.9$



$\frac{1}{343.9} + \frac{1}{1020} = \frac{1}{257.2}$
 $\frac{1}{\frac{1}{257.2}} = 257.2 \Omega$



4 a Cont.

$$410 + 257.2 = 667.2 \Omega$$

$$b) I = \frac{V}{R} = \frac{15}{667.2} = 0.0224 A = 22.4 mA$$

$$c) \frac{257.2}{667.2} \times 15 = 5.78 V$$

$$d) P = IV = 0.0224 \times 15 = 0.336 W$$

$$e) 22.4 - 5.6 = 16.8$$

$$\frac{193.9}{343.9} \times 5.78 = 3.26 V$$

$$\frac{3.26}{470} = 6.94 mA$$

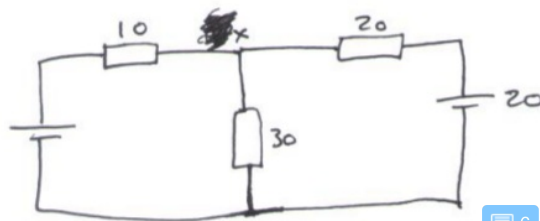
$$f) \frac{1}{150 + 470 + 270 + 750} = \frac{41}{15810}$$

$$\frac{1}{\frac{41}{15810}} = 385.6 \Omega$$

$$410 + 385.6 = 795.6 \Omega$$

$$\frac{15}{795.6} = 0.0189 A = 18.9 mA$$

5)



$$I_1 = \frac{10 - V_x}{10}$$

$$I_2 = \frac{20 - V_x}{20}$$

$$I_3 = \frac{V_x}{30}$$

$$\frac{V_x}{30} = \frac{10 - V_x}{10} + \frac{20 - V_x}{20}$$

x30

$$V_x = 3(10 - V_x) + 1.5(20 - V_x)$$

$$V_x = 30 - 3V_x + 30 - 1.5V_x$$

$$5.5V_x = 60 \quad V_x = \frac{60}{5.5} = 10.91 V$$

$$\frac{10.91}{30} = 363.7 mA$$

Electronics exam

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

86/100

PAGE 1



Comment 1

total marks 43

marks available 50

$43/50 \times 100 = 86\%$

PAGE 2



Comment 2

Question 1

a) 1 Mark

b) 1 Mark

c) 1 Mark

d) 2 Marks

Q1 total 5 Marks



Comment 3

Question 2

a) 3 Marks

b) 5 Marks

c) 3 Marks

d) 4 Marks

Q2 total 15 Marks

PAGE 3



Comment 4

Question 3 - 6 Marks

NOR truth table should be

A B C

0 0 1

0 1 0

1 0 0

1 1 1

PAGE 4



Comment 5

Question 4

a) 4 Marks

b) 2 Marks

c) 2 Marks

d) 2 Marks

e) 0 Marks

f) 2 Marks

Q4 total 12 Marks



Comment 6

Question 5 - 5 Marks