

Electrical and Electronic Principles Exam

by Kai Tang

FILE	1748_KAI_TANG_ELECTRICAL_AND_ELECTRONIC_PRINCIPLES_EXAM_256021_1173683409.DOCX (2.23M)		
TIME SUBMITTED	15-MAY-2020 03:06PM (UTC+0100)	WORD COUNT	39
SUBMISSION ID	127790502	CHARACTER COUNT	214



Electrical and Electronic Principles Exam

Q1

Exam / Kai Tang

1. a.) 40 ms

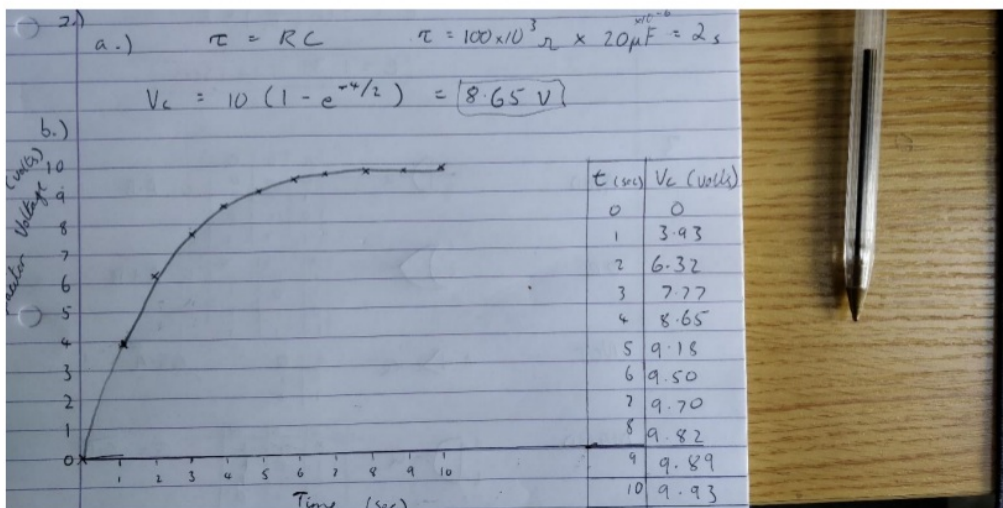
b.) $F = \frac{1}{T} = \frac{1}{40} = 0.025 \text{ Hz}$

c.) $V_{pk-pk} = 4 \times 2 \text{ V} = 8 \text{ V}$

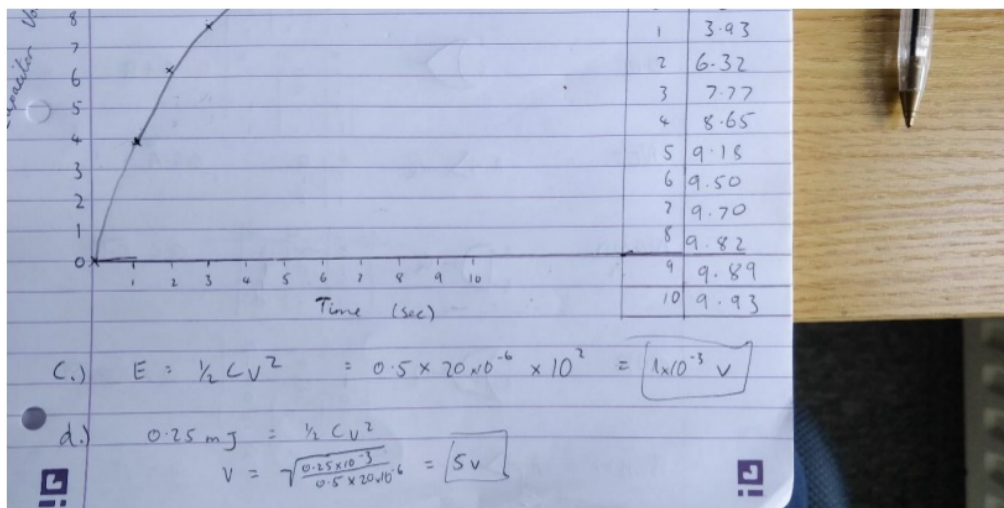
d.) $RMS = V_{pk} \times 0.7071 = 2.83 \text{ V}$

a.) 40ms b.) 0.025Hz c.) 8V d.) 2.83V

Q2



a.) 8.65V



c.) $1 \times 10^{-3} \text{ J}$ d.) 5V time = 1.39 seconds

$$V_c = V_s(1 - e^{-t/\tau})$$

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

$\ln 1 = 0 \therefore 1 \text{ connects}$

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

$$\ln\left(\frac{V_c}{V_s}\right) \times \tau = -t$$

$$t = -\ln\left(\frac{V_c}{V_s}\right) \times \tau$$

$$t = 1.39 \text{ s.d.p (Sec)}$$

Q3

3.

AND		<table><tr><th>a</th><th>b</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	a	b	Q	0	0	0	0	1	0	1	0	0	1	1	1	$Q = A \cdot B$
a	b	Q																
0	0	0																
0	1	0																
1	0	0																
1	1	1																
OR		<table><tr><th>a</th><th>b</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	a	b	Q	0	0	0	0	1	1	1	0	1	1	1	1	$Q = A + B$
a	b	Q																
0	0	0																
0	1	1																
1	0	1																
1	1	1																
NOT		<table><tr><th>a</th><th>Q</th></tr><tr><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td></tr></table>	a	Q	0	1	1	0	$Q = \bar{A}$									
a	Q																	
0	1																	
1	0																	
NAND		<table><tr><th>a</th><th>b</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	a	b	Q	0	0	1	0	1	1	1	0	1	1	1	0	$Q = \overline{A \cdot B}$
a	b	Q																
0	0	1																
0	1	1																
1	0	1																
1	1	0																
NOR		<table><tr><th>a</th><th>b</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	a	b	Q	0	0	1	0	1	0	1	0	0	1	1	0	$Q = \overline{A + B}$
a	b	Q																
0	0	1																
0	1	0																
1	0	0																
1	1	0																
Buffer		<table><tr><th>a</th><th>Q</th></tr><tr><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td></tr></table>	a	Q	0	0	1	1	$Q = A$									
a	Q																	
0	0																	
1	1																	

Q4

Exam P₂ Kai Tang

4. a.)

$R1 + R2$ 100 310	$R3 + R4$ $\frac{1}{270} + \frac{1}{330}$ 600	$R5 \cdot R6$ $\frac{1}{150} + \frac{1}{250}$ 125	R7 470
410	600	125	

$R_T = 1605 \Omega$

b.) $I = \frac{V}{R} = \frac{15}{1605}$

$I = \frac{1}{107} \text{ or } 0.0093 \text{ A}$
or 9.3mA

a.) 1605 Ohms b.) 9.3mA

b.) $I = \frac{V}{R} = \frac{15}{1605} = \frac{1}{107} \text{ or } 0.0093 \text{ A}$
or 9.3mA

c.) $I = \left(\frac{15}{1605}\right) \left(\frac{270 + 250}{270 + 250 + 1504330}\right) = \frac{0.0064 \text{ A}}{\text{or } 6.4 \text{ mA}}$

d.) $P = IV = (15/1605)(15) = \frac{0.14 \text{ W}}{\text{or } 140 \text{ mW}}$

e.) $I_{R7} = 9.3 \text{ mA} - 6.4 \text{ mA} = 2.9 \text{ mA}$
 $P = I^2 R = (2.9 \times 10^{-3})^2 \times 470 = 3.9527 \times 10^{-3}$
or 3.95mA

f.) $R_T = 400 + 600 + 125 = 1136 \Omega$
 $I = \frac{V}{R} = \frac{15}{1136} = \frac{0.013 \text{ A}}{\text{or } 13 \text{ mA}}$

c.) 6.4mA d.) 140mW e.) 3.95mA f.) 13mA



Q5

5.) $I_1 + I_2 = I_3$

$I_1 = \frac{0 \cdot V_x}{10} \quad I_2 = \frac{20 - V_x}{20}$

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

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

$\frac{2V_x}{60} = \frac{60 - 6V_x}{60} + \frac{60 - 3V_x}{60}$

$2V_x = 60 - 6V_x + 60 - 3V_x$

$11V_x = 120$

$V_x = \frac{120}{11} = \frac{10.909 \text{ V}}{\text{or } 10.91 \text{ V}}$

$I_3 = \frac{10.91}{30} = \frac{4}{11} = \frac{0.36 \text{ A}}{\text{or } 0.36 \text{ A}}$

$V_x = 10.91 \text{ V}$ current in $R_3 = 0.36 \text{ A}$



Kai Tang

15/05/2020

Electrical and Electronic Principles Exam

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

68/100

PAGE 1



Comment 1

Total Marks - 34

Marks Available - 50

$34/50 \times 100 = 68\%$



Comment 2

Question 1

a) 1 Mark

b) 0 Mark - 40ms not 40s

c) 1 Mark

d) 2 Marks

Q1 total = 4 Marks

PAGE 2



Comment 3

Question 2

a) 3 Marks

b) 5 Marks

c) 2 Marks - Energy is measured in Joules not Volts

d) 4 Marks

Q2 total 14 Marks

PAGE 3



Comment 4

Question 3 - 5 Marks

Missing XOR and XNOR.

Buffer should not be in the list

PAGE 4



Comment 5

Question 4.

a) 0 Marks - incorrect resistor grouping

b) 2 Marks - incorrect answer from a) propagated through

c) 0 Mark - incorrect resistor grouping

d) 2 Marks

e) 0 Mark - incorrect resistor grouping

f) 2 Mark - incorrect resistor grouping

Q4 total - 6 Marks



Comment 6

Question 5 - 5 Marks