

Exam

by John Boswell

FILE	18090_JOHN_BOSWELL_EXAM_246301_1572427806.DOCX (6.25M)		
TIME SUBMITTED	11-JUN-2020 11:08AM (UTC+0100)	WORD COUNT	25
SUBMISSION ID	130509575	CHARACTER COUNT	172

Exam submission answers answers answers answers answers answers answers answers answers
answers answers answers answers answers answers

ANSWER SHEET 1

QUESTION (1)

a) PERIOD OF WAVEFORM:

$$1 \text{ DIVISION} = 10 \text{ ms}$$

$$\text{PERIOD} = 4 \text{ DIVISIONS}$$

$$\text{PERIOD} = 4 \times 10 \text{ ms} = \underline{\underline{40 \text{ ms}}}$$

b) DETERMINE FREQUENCY:

$$\text{FREQUENCY} = \frac{1}{t}$$

$$t = 40 \text{ ms or } 0.04 \text{ seconds}$$

$$\text{FREQUENCY} = \frac{1}{0.04} = \underline{\underline{25 \text{ Hz}}}$$

c) DETERMINE PEAK TO PEAK AMPLITUDE:

$$1 \text{ DIVISION} = 2 \text{ V}$$

$$\text{PEAK TO PEAK} = 4 \text{ DIVISIONS}$$

$$\text{PEAK TO PEAK AMPLITUDE} = 4 \times \overset{2 \text{ V}}{2} = 8 \text{ V}$$

$$\text{PEAK TO PEAK} = 8 \text{ VOLTS}$$

ANSWER SHEET 2

QUESTION ①

d) DETERMINE RMS VALUE OF WAVEFORM:

$$V_{RMS} = V_{PEAK} \times 0.7071$$

$$V_{RMS} = 4 \times 0.7071 = \underline{\underline{2.8284}}$$



ANSWER SHEET 3

QUESTION (2)

- a) CALCULATE V_c AT TIME $t = 4 \text{ SEC}$ $R = 100 \text{ k}$
 $C = 20 \mu\text{F}$
 $V_s = 10 \text{ V}$

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

$$\tau = R \times C$$

$$\tau = 2$$

$$\tau = 100,000 \times (20 \times 10^{-6}) = 2$$

$$V_c = 10 \times (1 - e^{-\frac{4}{2}}) =$$

$$V_c = 10 \times (1 - (-2)) = 30$$

$$V_c = 30 \text{ VOLTS.}$$

- b) t (SECONDS) V_c VOLTS

0

0

1

15V

$$V_c = 10 \times (1 - e^{-\frac{1}{2}})$$

2

20V

$$V_c = 10 \times (1 - e^{-\frac{2}{2}})$$

3

25V

$$V_c = 10 \times (1 - e^{-\frac{3}{2}})$$

4

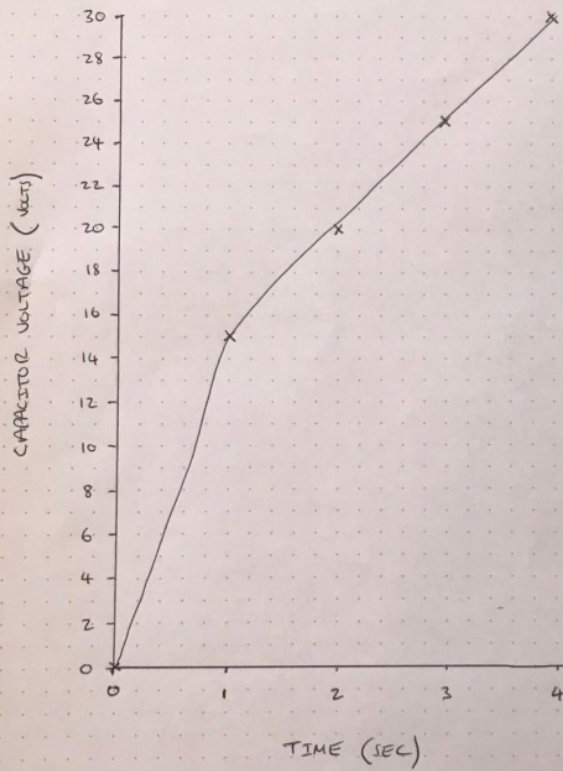
30V

$$V_c = 10 \times (1 - e^{-\frac{4}{2}})$$

QUESTION 2

b)

A GRAPH TO SHOW THE CHARGING CURVE OF
THE CAPACITOR IN QUESTION 2



ANSWER SHEET 4

QUESTION (2)

c) STORED ENERGY WHEN CAPACITOR FULLY CHARGED:-

$$E = \frac{1}{2} CV^2$$

$$C = 20 \times 10^{-6} \text{ (20}\mu\text{F)}$$

$$V = 10.$$

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

$$E = 1 \times 10^{-5} \times 100 = 1 \times 10^{-3} \text{ JOULES.}$$

d) CALCULATE TIME TAKEN FOR CAPACITOR TO REACH 0.25 MJ

ANSWER SHEET 5

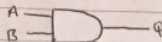
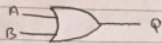
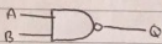
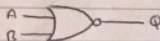
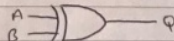
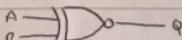
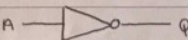
QUESTION (3)

TRUTH TABLE

7 LOGIC GATES:

SYMBOL

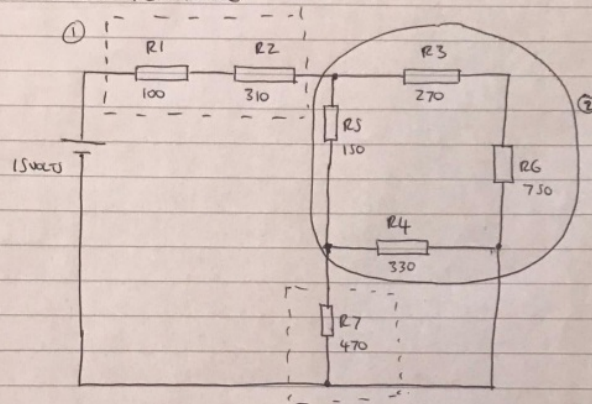
Bohr's Equation

7 LOGIC GATES:			SYMBOL	Boolean Equation	A	B	Q
1)	AND GATE		$Q = A \cdot B$				
2)	OR GATE		$Q = A + B$				
3)	NAND GATE		$Q = \overline{A \cdot B}$				
4)	NOR GATE		$Q = \overline{A + B}$				
5)	EX-OR GATE		$Q = A \oplus B$				
6)	EX-NOR GATE		$Q = \overline{A \oplus B}$				
7)	NOT GATE		$Q = \overline{A}$				

ANSWER SHEET 6

QUESTION (4)

a) TOTAL CIRCUIT RESISTANCE



$$\textcircled{1} \quad R_1 + R_2 = 100 + 310 = 410 \quad 1 = 410$$

$$\textcircled{2} \quad \begin{array}{c} R_3 \ 270 \quad R_6 \ 750 \\ \text{---} \quad \text{---} \\ | \quad \quad | \\ R_5 \ 150 \quad R_4 \ 330 \\ \text{---} \quad \text{---} \end{array} \quad 2 = 326.4$$

$$\frac{(270 + 750) \times (150 + 330)}{(270 + 750) + (150 + 330)}$$

$$(270 + 750) + (150 + 330)$$

$$\frac{1020 \times 480}{1020 + 480} = \frac{489600}{1500} = 326.4$$

$$\textcircled{3} = R_7 = 470$$

$$3 = 470$$

ANSWER SHEET 7

QUESTION (4)

a) CONTINUED

$$410 + 326.4 + 470 = 1206.4$$

$$\text{Total Resistance} = \underline{1206.4 \text{ OHMS}}$$

b) TOTAL CIRCUIT CURRENT

5

$$\text{CURRENT} = I = \frac{V}{R} = \frac{15V}{1206.4} = \underline{0.0124 \text{ AMPS. (TO 4.D.P.)}}$$

c)

d) TOTAL POWER DELIVERED BY BATTERY.

$$\text{POWER} = P = I \times V = 0.0124 \times 15$$

$$P = 0.186 \text{ WATTS.}$$

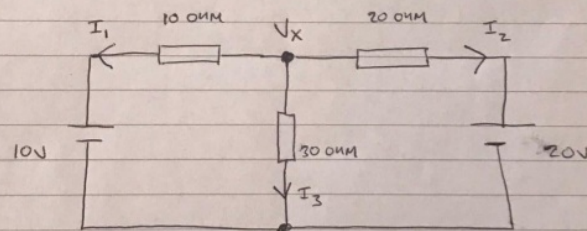
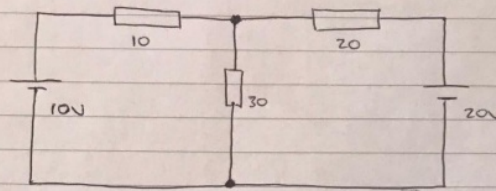
e) $I_{R7} = 124 \text{ mA}$

f)

ANSWER SHEET 8

QUESTION (5)

CALCULATE CURRENT THROUGH 30 OHM RESISTOR.



$$\text{KIRCHHOFF'S CURRENT LAW} - I_T = I_1 + I_2 + I_3$$

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

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

$$I_3 = V_x - 30$$

ANSWER SHEET 9

QUESTION ⑤

CONTINUED.....

$$I_1 \frac{V_x - 10}{10} + I_2 \frac{V_x - 20}{20} + I_3 V_x - 30 = 0$$

Exam

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

38/100

PAGE 1



Comment 1

Total marks 19

Marks available 50

$19/50 \times 100 = 38$

PAGE 2

PAGE 3



Comment 2

Question 1

a) 1 Mark

b) 1 Mark

c) 1 Mark

d) 2 Marks

Q1 total 5 Marks

PAGE 4

PAGE 5

PAGE 6



Comment 3

Question 2

a) 0 Marks

b) 2 Marks

c) 3 Marks

d) 0 Marks

Q2 total 5 Marks

PAGE 7



Comment 4

Question 3 - 3 Marks

No truth tables

Wrong equations for XOR, XNOR & NOT

PAGE 8

PAGE 9



Comment 5

Question 4

a) 1 Mark - incorrect resistor grouping

b) 2 Marks - incorrect answer propagated

c) 0 Marks

d) 2 Marks - incorrect answer propagated

e) 0 Marks

f) 0 Marks

Q4 total 5 Marks

PAGE 10



Comment 6

Question 5 - 1 Mark

Incomplete solution