Department of Electrical Engineering

Assignment

Date: 13/04/2020

Course Details

Course Title: Linear Circuit Analysis **Module:** 2

Instructor: **Total Marks:** 30

Student Details

Name: Saheeb Ul Hassan **Student ID:** 16318

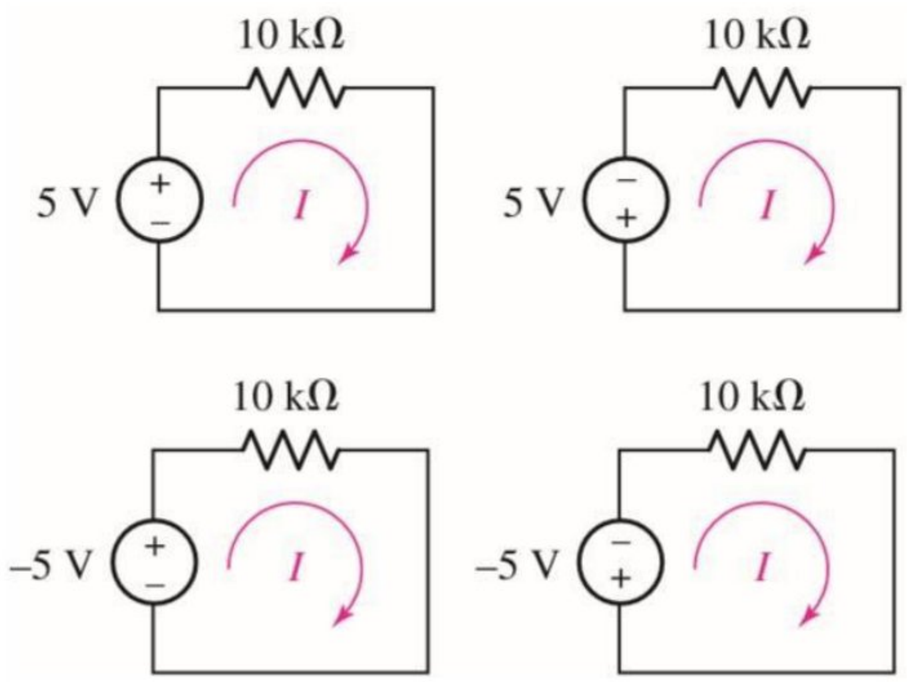
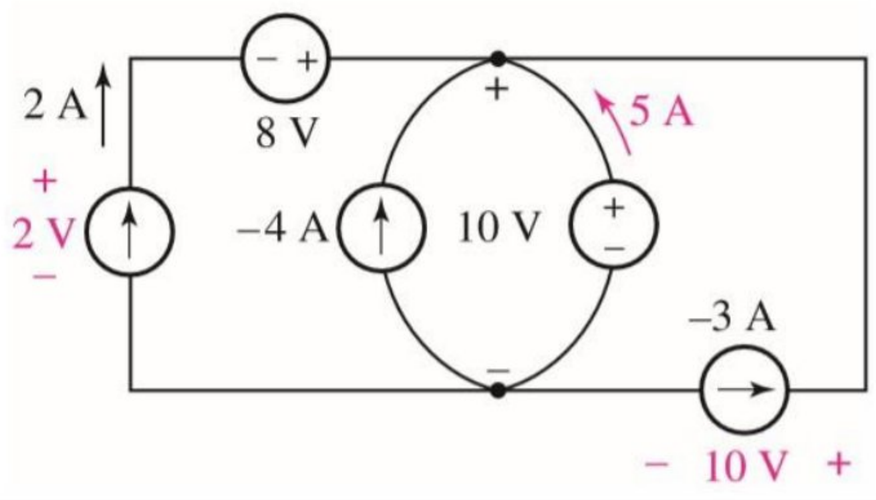
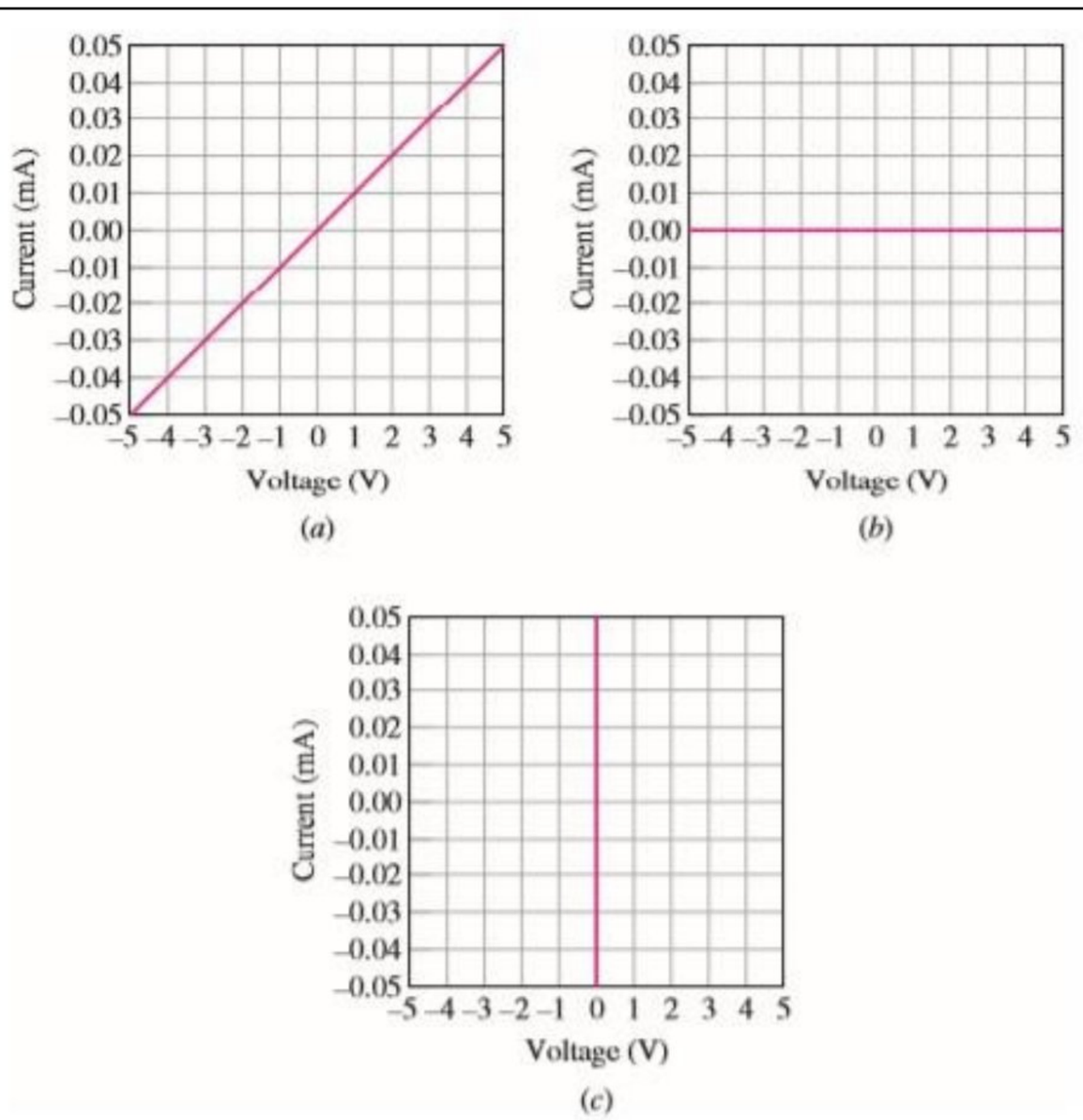
Q1.	(a)	For each of the circuits in figure, find the current I and compute the power absorbed by the resistor 	Marks 3 PLO1
	(b)	Determine the power supplied by the leftmost element in the circuit of following	Marks 4

		figure 	PLO1
	(c)	Following figure depicts the current-voltage characteristic of three different resistive elements. Determine the resistance of each, assuming the voltage and current are defined in accordance with the passive sign convention.	Marks 3 PLO1
			
Q2.	(a)	Refer to the circuits of following figures, and answer the following: 1. How many distinct nodes are contained in the circuit?	Marks 4

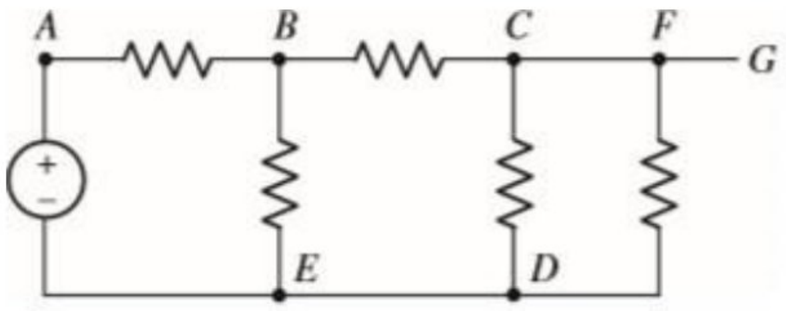
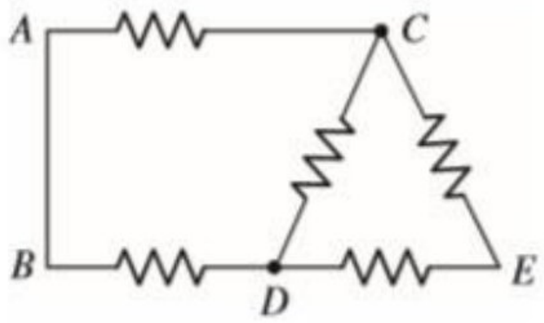
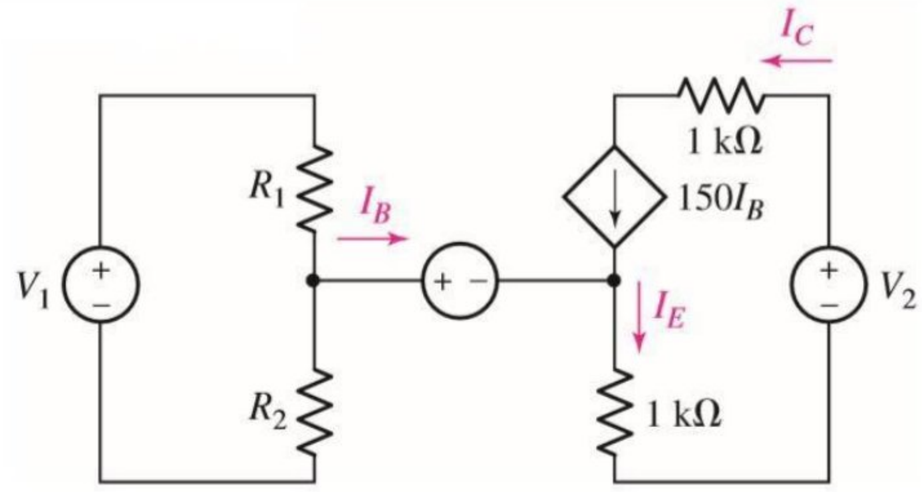
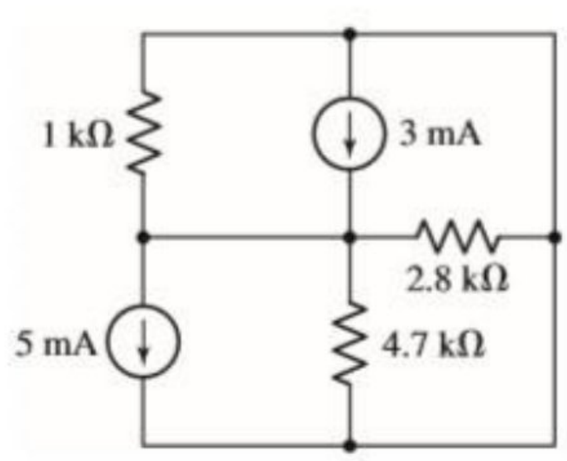
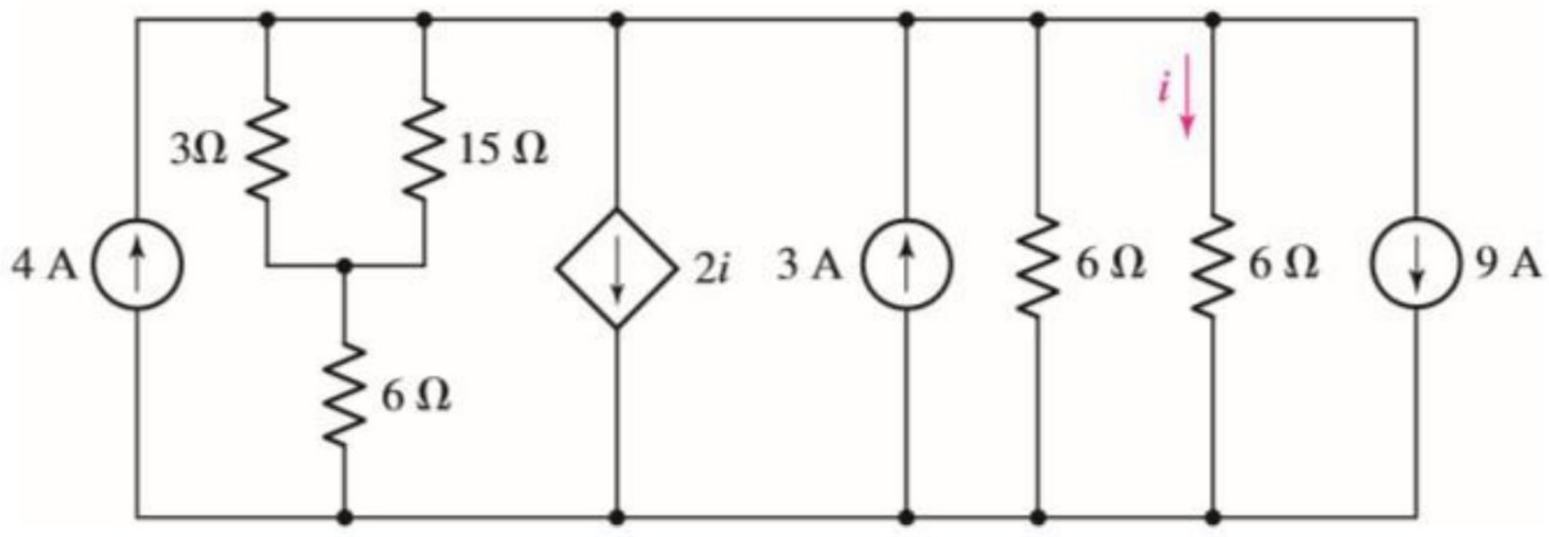
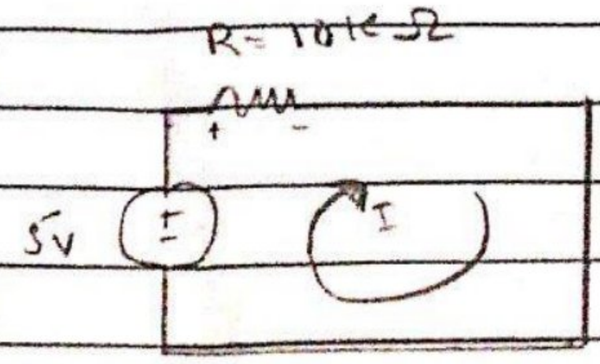
		2. How many elements are contained in the circuit? 3. How many branches does the circuit have? 4. Determine if each of the following represents a path, a loop, both, or neither: i. A to B ii. B to D to C to E iii. C to E to D to B to A to C iv. C to D to B to A to C to E   	PLO2
	(b)	For the circuit of following figure (which is a model for the dc operation of a bipolar junction transistor biased in forward active region), I_B is measured to be 100 μA. Determine I_C and I_E	Marks 6 PLO2
		 	
Q3.	(a)	Although drawn so that it may not appear obvious at first glance, the circuit of following figure is in fact a single-node-pair circuit. a. Determine the power absorbed by each resistor. b. Determine the power supplied by each current source. c. Show that the sum of the absorbed power calculated in (a) is equal to the sum of the supplied power calculated in (b).  	Marks 5 PLO1
	(b)	Determine the power absorbed by the 15□resistor in the circuit of following	Marks 5

		figure 	PLO1

Date _____ ① ID #16318
Saheeb ul Hassan

Answer:-
Q1 (a)



$P = IV$

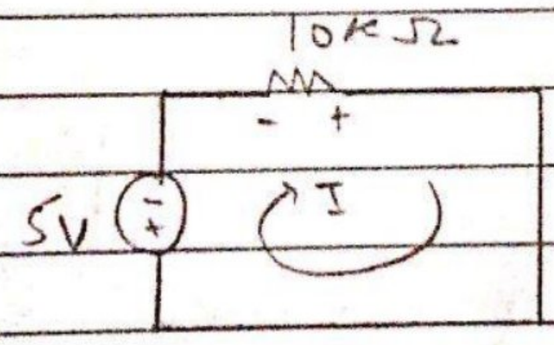
$I = 5/10 = 1/2 = 0.5\,mA$

Both V & I Ad here to passive sign convention

$P = IV$

$\Rightarrow (0.5)(5)$

2.5 watt



$P = IV$

$I = -5/10 = -0.5\,mA$

V & I doesnot adhere to Passive sign convention

The power absorbed by R = $(-I)(-V)$

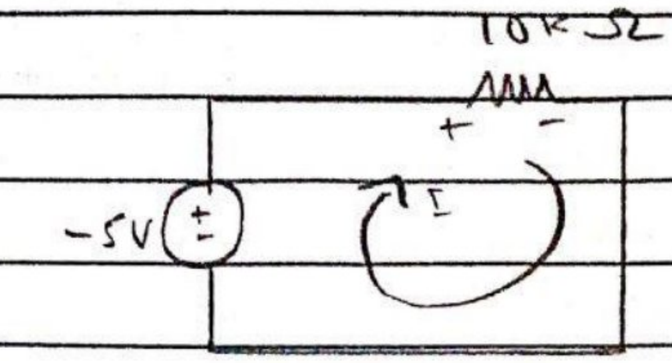
$= (-0.5)(-5) = -2.5$ watt

SM Kidios

(i) 1

(a)

Answer



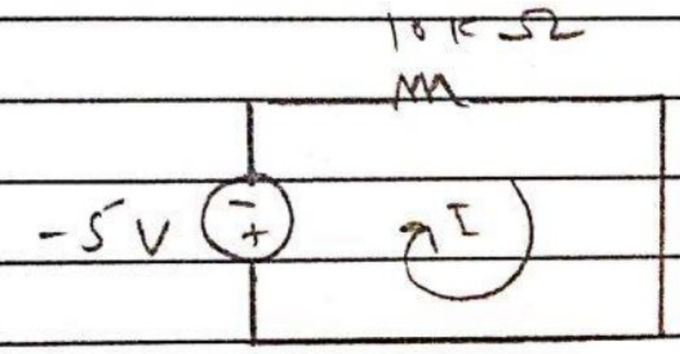
Current = I = V/R

= -5/10 = -0.5mA

P = (V)(I)

= (-5)(-0.5)

= 2.5mwatt Power absorbed



Current = I = V/R

= -5/10 = -0.5mA

Power absorbed by Resister

P = (I)(V)

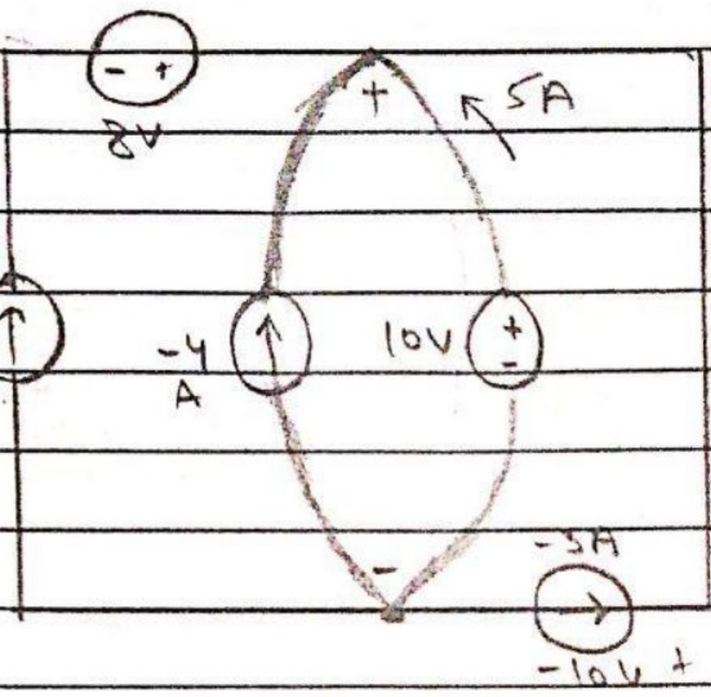
= (0.5)(5)

= 2.5 mwatt

Date_____

Answer:

Q1 (b)



$P = VI$

$= (2)(2)$

$= 4$ watt Power is supplied to the circuit.

Date_____

Q1(c) Linear Graph

Answer:-

(i) $R = V/I$

$R = -5/0.5 \Rightarrow$ 100 ohm's

(ii) As circuit is "0 Amp" and voltage is being increased the Resist must be infinity (∞)

(iii) $V = IR$

$R = V/I$

$R = 0$

Date _____ (5)

Answer:

Q2 (a)

1) As we know that
Node :- Point between two or more than two element is known is node. So count the nodes.
There are 9 nodes in the circuit.

2) There are 5 resistor so the number of elements in circuit is 5

3) Branch which is a section between two nodes. So the number of braches in circuit is 5

(4) (i) neither (ii) Path only (iii) Path and loop (iv) neither

Date_____

Answer :-

Q2 (b)

"KLC"

$I_B + I_C = I_E$

else

$I_C = 150 \cdot I_B$

$\boxed{I_C = 15mA}$

Now calculat I_E :-

$I_E = 15 \cdot 10^{-3} + 100 \cdot 10^{-6}$

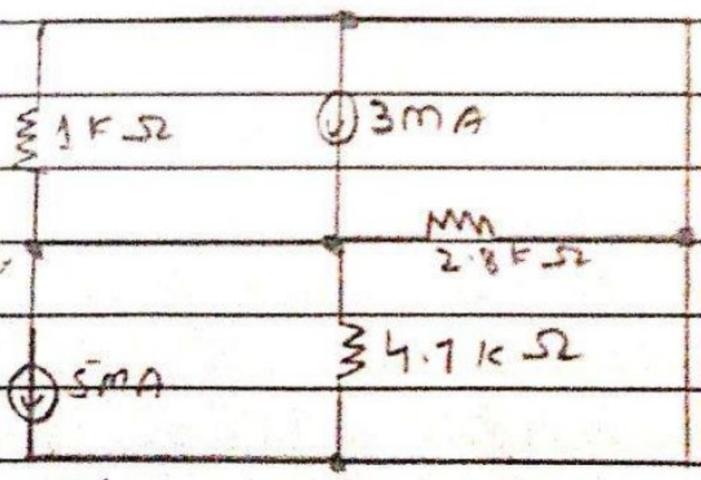
$\boxed{I_E = 15.1mA}$

$I_C = 15mA$

$I_E = 15.1mA$

Answer :-

Q3 (a)



Finding P(2.8KΩ), P(4.7KΩ), P(1KΩ)
P(5mA), P(3mA)

Find re vaile in a better Force

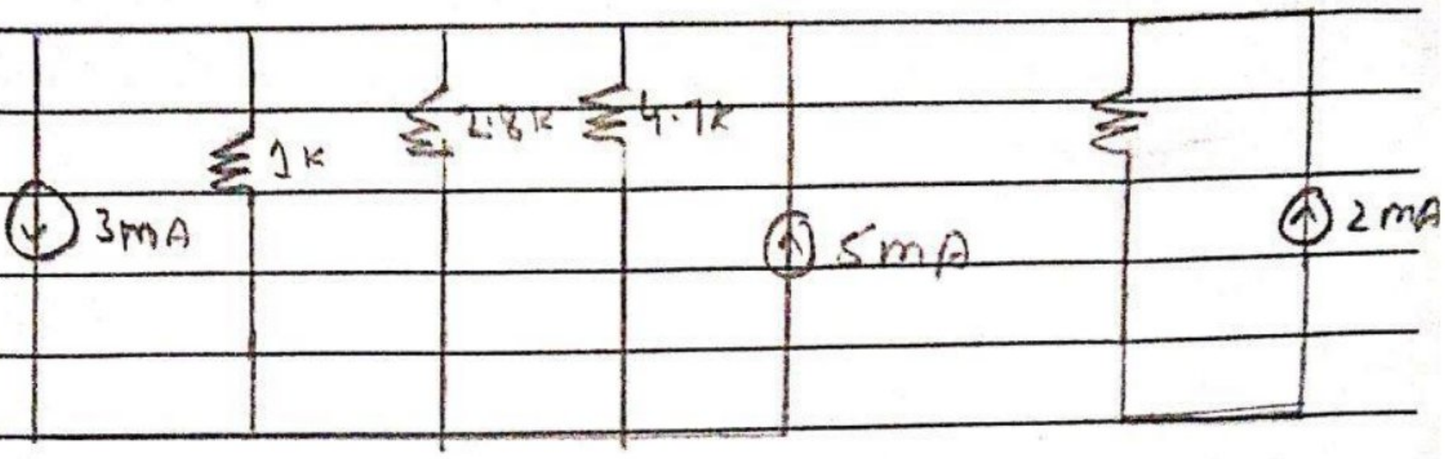
Find v by Combain similar element SM Notes

Date _____

Answer :-

Q3 (a)

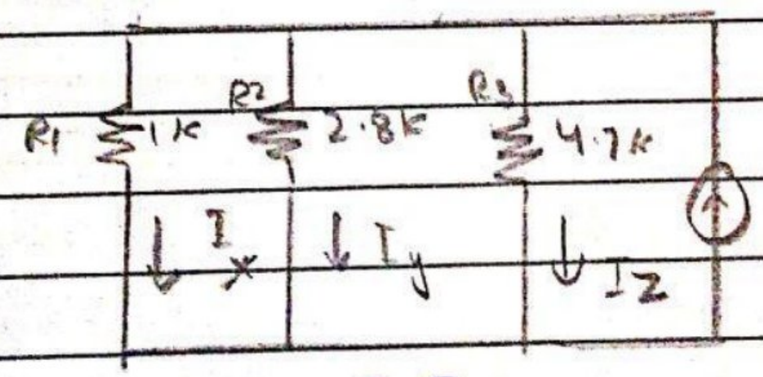
Continue



By using ohm's law

$V = IV$

$V = 2 \times 10^{-3} \times 637 = \boxed{1.274V}$



$V = IR$

~~$V = 2 \times 10^{-3} \times 637 =$~~

$I = V/R$

$I_y = V/R_1 \Rightarrow \frac{1.274V}{1000\Omega} = 1.274mA$

$I_y = V/R_2 = \frac{1.274V}{2800\Omega} \Rightarrow 0.00455$

$I_y = 0.455mA$

Date_____

Answer Q3 (a) continue

$$I_z = \frac{V}{R_3} = \frac{1.274V}{4700} = 0.000271$$

$$I_z = 0.271\,mA$$

$$P = VI$$

$$P(2.8K) = (1.274)(0.271) = 0.5797\,mwatts$$

$$P(4.7K) = (1.274)(0.271) = 0.346\,mwatts$$

$$P(1K) = (1.274)(1.274) = 1.623\,m\,watts$$

$$P(5mA) = (1.274)(-5) = -6.37\,m\,watts$$

$$P(3mA) = (1.274)(3) = 3.822\,m\,watts$$

Answer Q3 b

"Calculation"

$$i_{eq} = 4 - 2i + 3 - 9 = -2 - 2i$$

$$R_{eq} = (6+3||15)||6||6$$

$$R_{eq} = 8.5||3 = 2.21745\,\Omega$$

"Calculation of voltage"

$$V = i_{eq} \cdot R_{eq}$$

Answer Q3 b continue

$$v = i_{eq} \cdot R_{eq}$$

$$v = (-2-2i) \cdot 2.2174 K\Omega$$

From diagram we know that

$$v = 6i$$

$$6i = (-2-2i) \cdot 2.2174$$

$$10.4318 \cdot i = -4.4318$$

$$i = -0.425\ A$$

$$U = -2.55\ V$$

Now

$$P = \frac{V^2}{R}$$

$$P_{15\Omega} = \frac{V^2_{15\Omega}}{15\Omega}$$

$$V_{15\Omega} = \frac{6}{6+25} \cdot V$$

$$V_{15\Omega} = 1.8\ V$$

and

$$P_{15\Omega} = \frac{1.8^2}{15\Omega}$$

$$\boxed{P_{15\Omega} = 0.216\ W}$$