Deparment of electrical Engineering Assignment

Course detail

Instruction	Shail Imran
Subject	LCA
Module	2nd
Total marks	30

Student detail

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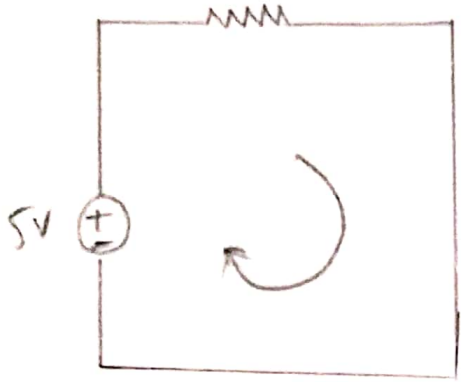
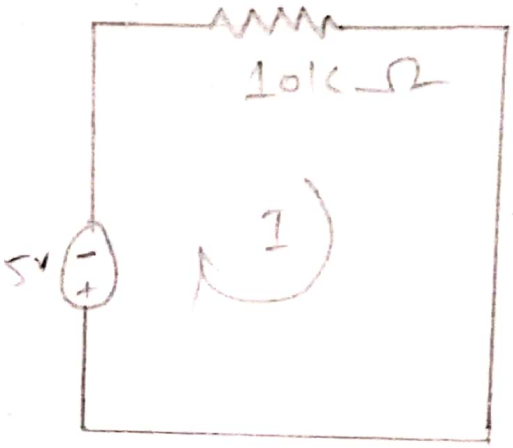
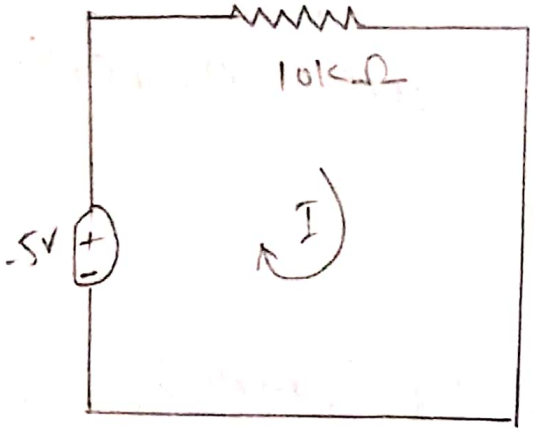
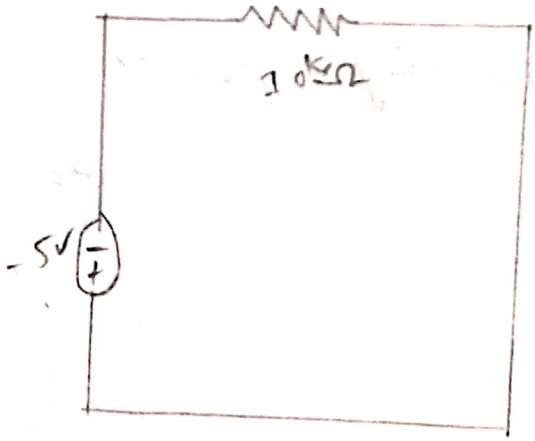
ID	1629

Q 1:- For each of the following circuits in figure. Find the circuit I and computer the power absorbed by the resistor.









Ans

Appling ohm law for finding circuit.

$$V = IR$$

$$I = V/R$$

for find power in the circuit we use

$$P = VI \text{ or } P = I^2R$$

To obtain result so we need to Permeat a given value for each circuit. So if current.

$$V = IR$$

$$I = V/R$$

$$I = 5V / 10000\ \Omega$$

$$I = 0.0005\ A$$

$$I = 0.5\ mA$$

For finding power we use = $P = I^2(R)$

$$P = I^2/R$$

$$P = I^2 R$$

$$P = (0.5mw)^2 \times (10000)$$

$$P = 0.0025$$

$$\boxed{P = 0.25 \times 10^{-3}}$$

P.T.O

For Finding Second circuit.
current and power

we apply ohm law for finding current

$$V = IR$$

$$I = V/R$$

$$I = V/R$$

$$I = -5V/10000\Omega$$

$$\boxed{I = -0.0005A}$$

For Finding power we use = $P = I^2R$

$$P = i^2R$$

$$P = (-0.0005)^2(10000)$$

$$P = -0.0025W$$

$$P = -0.25mW$$

For finding current and power in 4th circuit

First of all we find the current:.

we Appling ohm law $V = IR$

$$I = V/R$$

$$I = 5V/10000\,\Omega$$

$$I = 0.0005A$$

$$I = 0.5\,mA$$

For finding power in a circuit

we Applying $P = I^2R$

~~$P = VI$~~

$$P = (0.0005A)^2(10000\,\Omega)$$

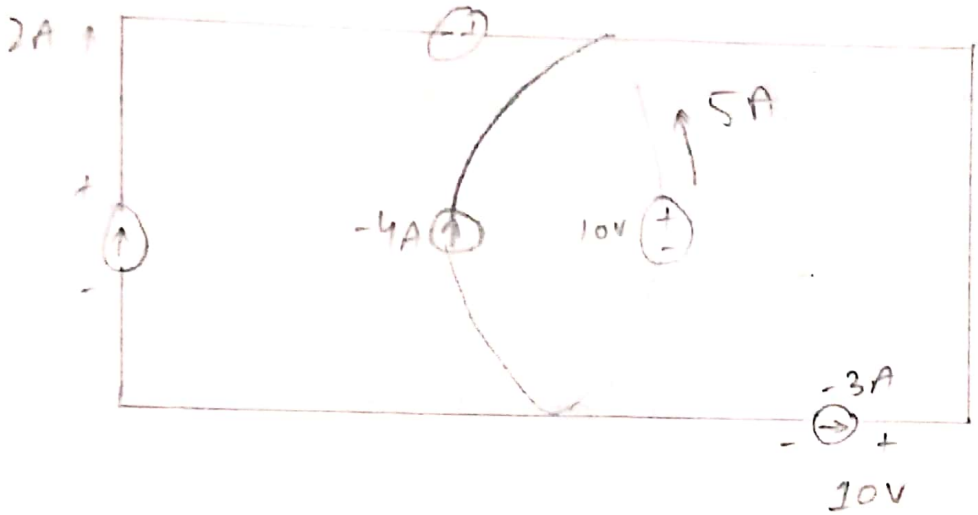
~~$P = 5(0.0005)$~~

$$P = 0.0025$$

$$P = 0.0025$$

$$\boxed{P = 0.25\,mw}$$

Q(b) Determine the power supplied by the left most element in the circuit of following figure:.



Solution: we Apply $P = VI$ for finding power:

Given: The voltage and current are given below: we can find the power in leftmost element in

$$P = VI$$

$$P = 2V \times 2A$$

$$P = 4W \text{ Supplied}$$

Don't forget that the 4W is supplied Power in the current direction conflicts with passive sign

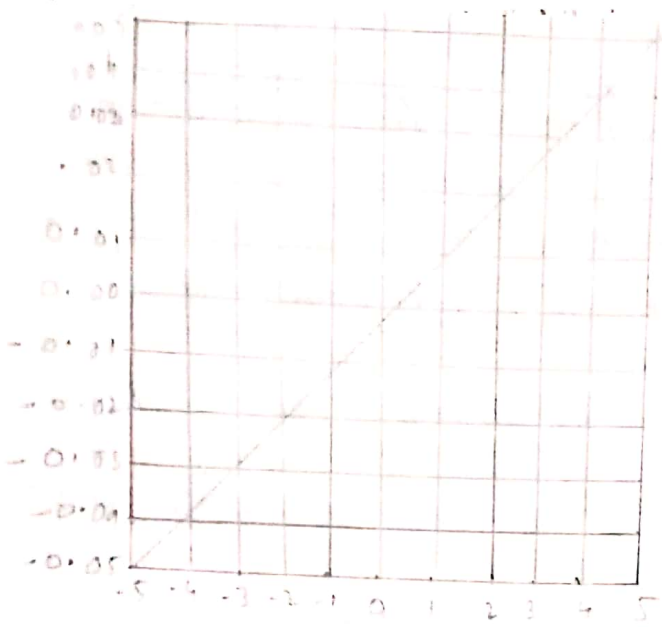
Q 1(c) Following picture depicts the circuit voltage characteristic of three diffrent resistive element. Determine the resistance of each. assuming the voltage and current are defined in according with the passive sign convention.

Solution

use Appling ohm law $V = IR$ (OR)

$$R = V/I$$

So we calculate R from the slope on the graph. we Can Take any point on the line to get the values of "I" and "V"



(a) Voltage (V)

Solution.

$I = 0.01\ mA$

$V = IV$

$R = ?$

Appling ohm law

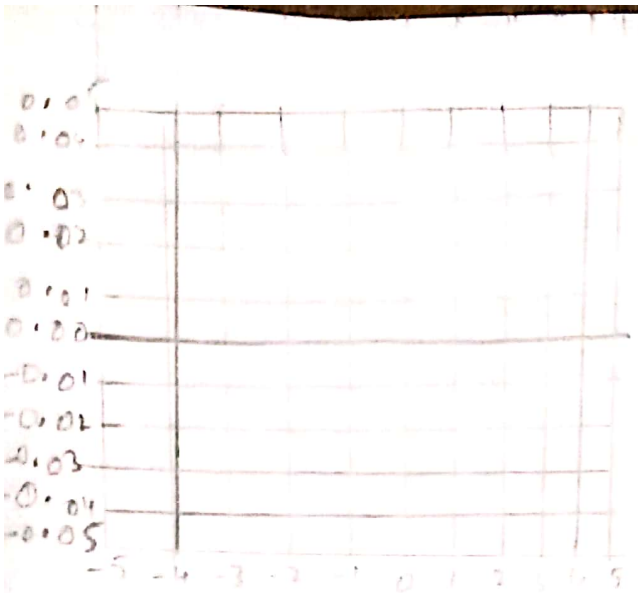
$V = IR$

$R = V/I$

$R = \frac{0.5A}{5V} \Rightarrow 10\ \mu s$

$R = 1V/0.01 \times 10^{-3}$

$\boxed{R = 100\ k\Omega}$



voltage (V)

Solution

(B) Through difficulty to see. The current is zero. as slope as zero

$V = IR \Rightarrow R = V/I$

$R = 1V/0 \Rightarrow \boxed{R = \infty}$

(Solution) C

Through difficulty to see the current infinite as slope is

$$\infty \ (S)$$

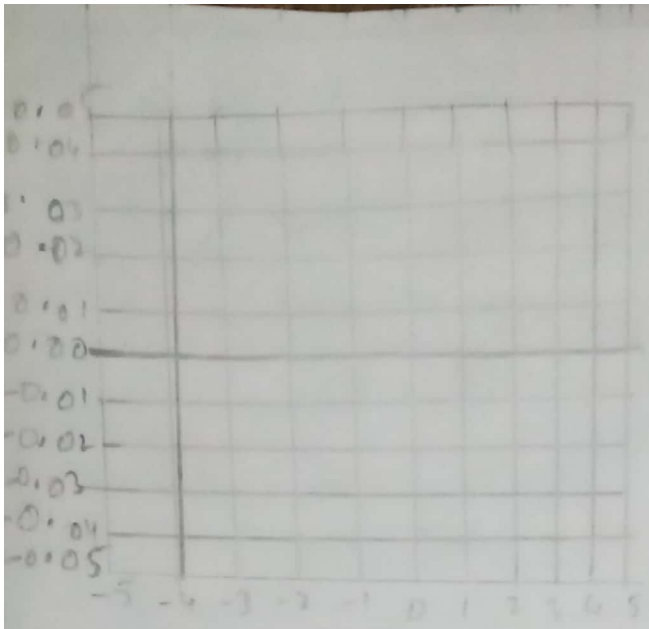
$$R = \frac{1}{\infty}$$

OR

$$R = 0$$

we have this is zero resistance

$$\boxed{R = 0}$$

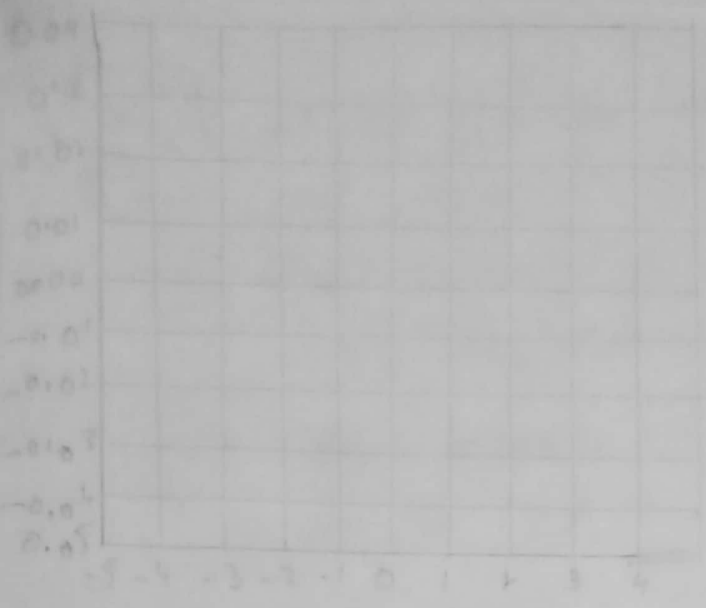


Solution

(B) Through difficulty to see. The current is zero. as slope as zero

$V = IR \Rightarrow R = V/I$

$R = 1V/0 \Rightarrow \boxed{R = \infty}$



voltage (v)

(Solution) c

Through difficulty to see the current infinite as slaope is

$$\infty \ (S)$$

$$R = \frac{1}{\infty}$$

OR

$$R = 0$$

we hence this is zero resistance

$$\boxed{R = 0}$$

Q2a) Refer to the circuit of following figure and answer the following:

(1) How many distinct nodes are contained in the circuit.

(2) How many element are contained on the circuit.

(3) How many branch does the circuit have?

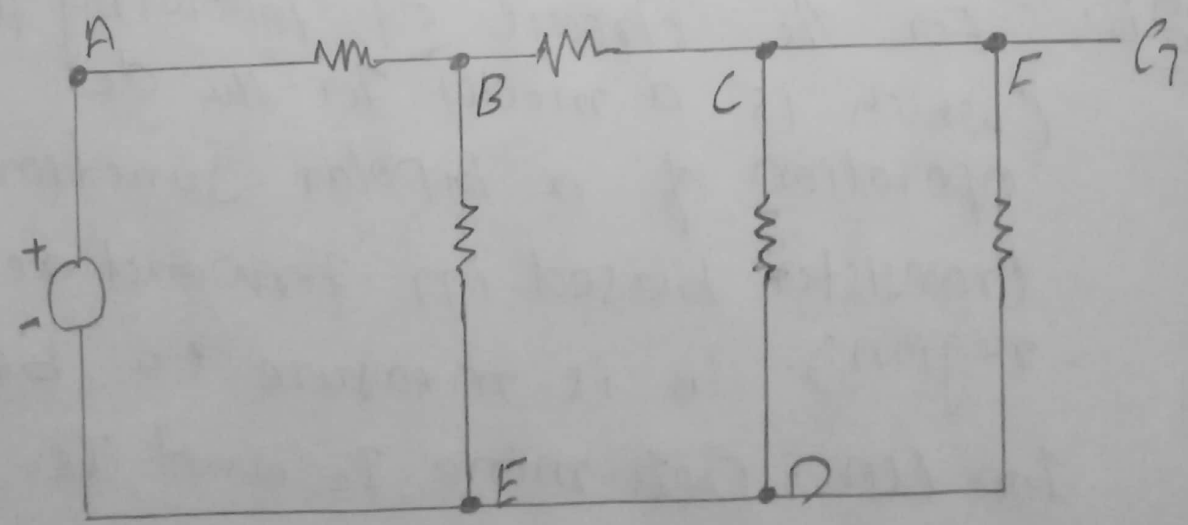
(4) Determine if each of the following represent a path, a loop, both or neither.

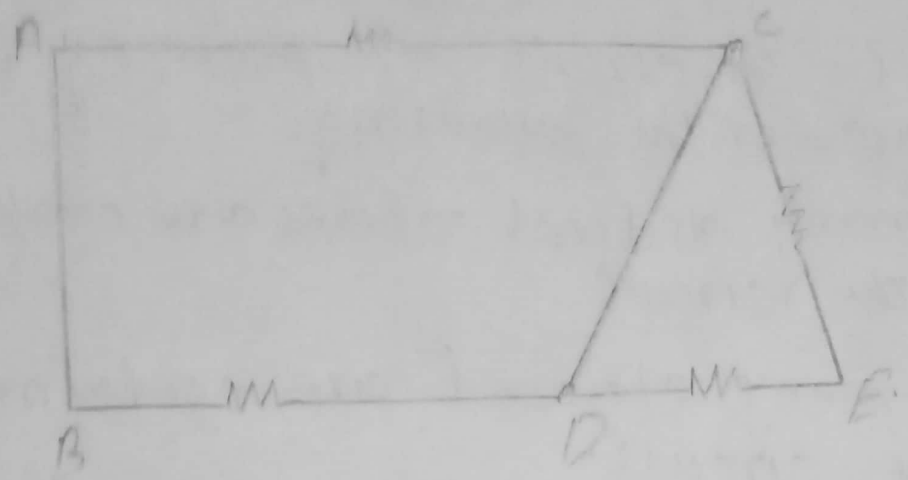
(i) A to B

(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





Ans 2(a)

(1) Nodes = 4

(2) Element = 5

(3) Branch = 5

(4)

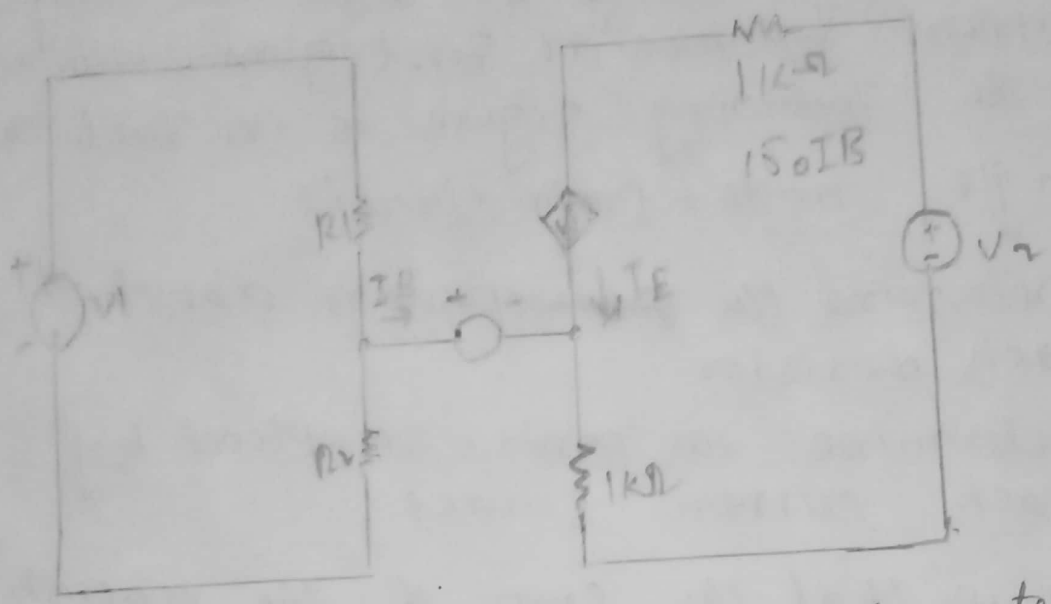
(i) Neither

(ii) Only path

(iii) path and loop

(iv) Neither.

Q2b: 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 measure to be 100 μA. Determine I_c and I_E.



Ans 8b KCL total current entering anode = total current leaving a nodes

$I_C = 150 \times I_b = 150 \times 100 = \boxed{15\ mA}$

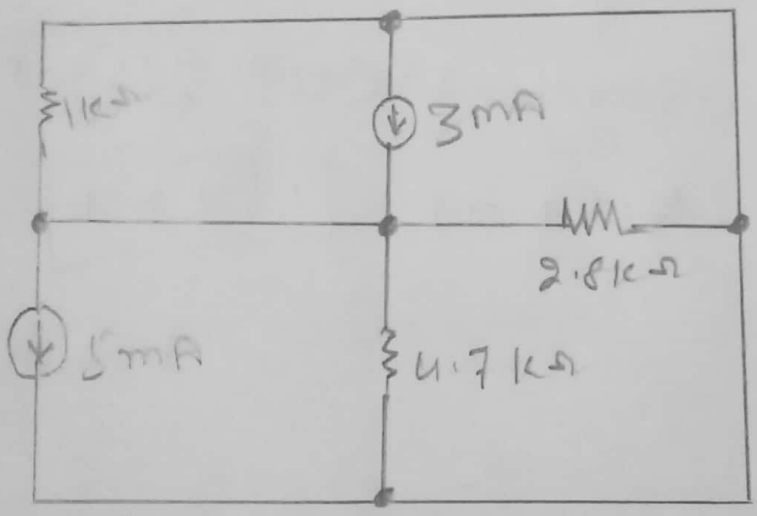
$I_E = 15 + 0.1 = \boxed{15.1\ mA}$

Q3a: Although drawn so that it may not appear obvious at first glance, the circuit of the following figure is in fact a single node-pair circuit.

(a) Determine the ~~following~~ power absorbed by each resistor.

(b) Determine the power supplied by each current source.

(c) Show that the sum of the absorbed power calculate in (a) is equal to the sum of the supplied power calculate in (b)



we use ohm's law

$$V = IR$$

$$V = 2\times10^{-3}\times637$$

$$\boxed{V = 1.274\,V}$$

Find current

$V = IR$

$I = V/R$

$\Rightarrow I_1 = V/R_1 \Rightarrow \frac{1.274}{1000} = 1.274\,mA$

$\Rightarrow I_2 = V/R_2 = \frac{1.274}{2800\,\Omega} \Rightarrow 0.455\,mA$

$\Rightarrow I_3 = V/R_3 = \frac{1.274}{4700} \Rightarrow 0.271\,mA$

Find power:

$\Rightarrow P(1k) = (1.274)(1.274) = 1.623\,mW$

$\Rightarrow P(4.7k) \Rightarrow (1.274)(0.271) = 0.345\,mW$

$\Rightarrow P(2.8k) \Rightarrow (1.274)(0.271) = 0.5797\,mW$

$\Rightarrow P(5mA) = (1.274)(-5) = \boxed{-6.37mW}$

$\Rightarrow P(3mA) = (1.274)(3) = \boxed{3.822mW}$

Q 3b: Determine the power absorded by the 15 Ω resistor on the circuit of the following figure:

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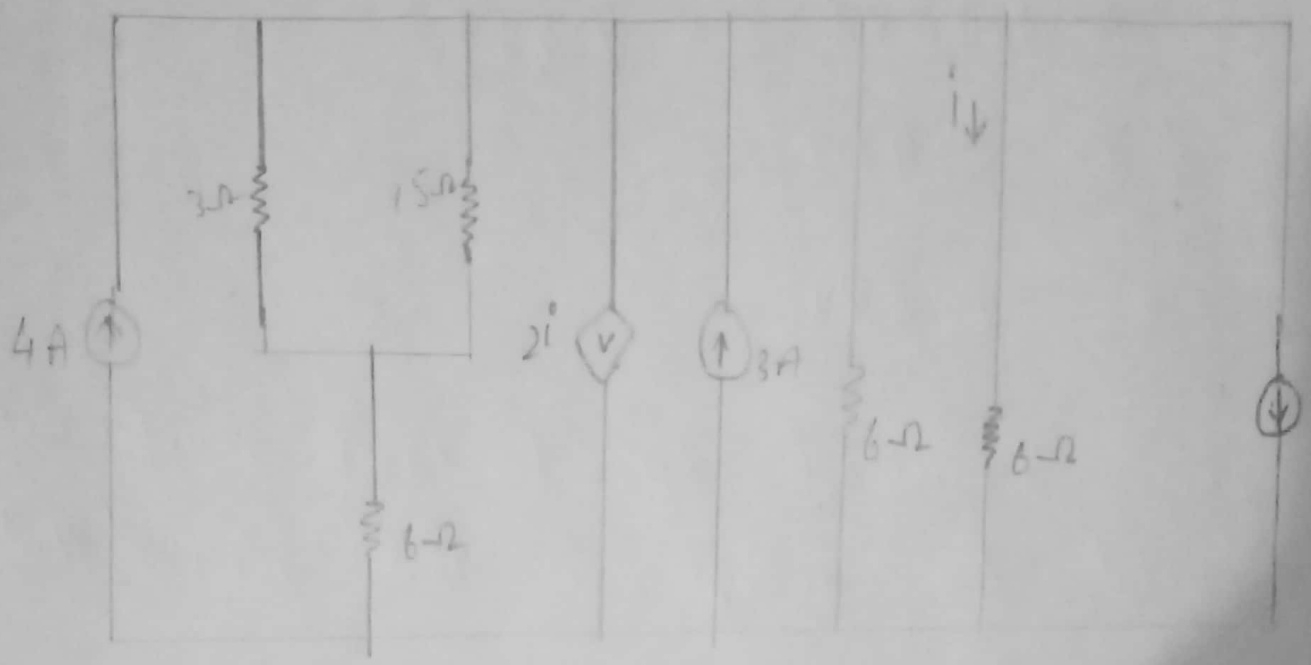

Ans 3(b) First Simply The circuit by Calculating Source and resistance equalance

$$I_{eq} = 4 - 2i^{\circ} + 3 - 9 = 2 - 2i^{\circ}$$

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

$$R_{eq} = 8.5 // 3 = 2.2174\ \Omega$$

Now we can Calculate voltage:

$$V = I_{eq} + R_{eq}$$

$$V = (-2 - 2i^{\circ}) \times (2.2174\ \Omega)$$

and from The diagram we can see that

$$V = 6i^\circ$$

$$= 6i^\circ = (-2 - 2i^\circ) + 2.2174)$$

$$= 10.4348 \times i = -4.4348$$

$$\boxed{I = 0.42A}$$

$$\boxed{V = -2.55V}$$

Power consumed by the 15Ω resistor will need the voltage on that resistor that

$$P = V^2/R$$

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

$$V_{15\Omega}\ \frac{6}{6+2.5}\ 5V$$

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

and power is:

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

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

Thanks you sir!