Department of electrical Engineering:-

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Module:- 2nd
Total marks : 30
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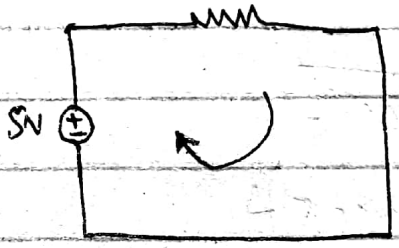
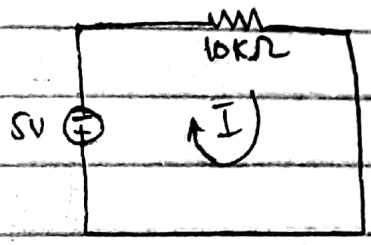
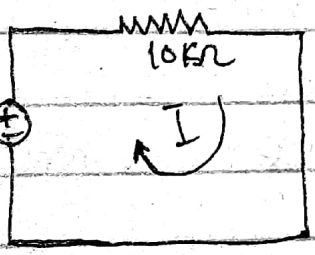
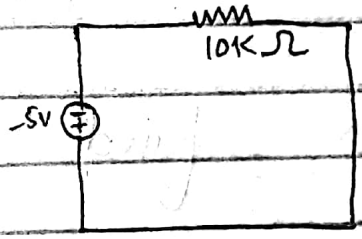
Q No 1 : (a)

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

$$P = VI \quad , \quad P = I^2R$$

To obtain result to perment a given Value for each Circuit So we need So if Current

$$V = IR$$

$$I = VR$$

$$I = \frac{5V}{10000\Omega}$$

$$I = 0.0005A$$

$$I = 0.5mA$$

For find Power we use $P = I^2(R)$

$$P = I^2R$$

$$P = (0.5mw)^2 x (10000)$$

$$P = 0.0025$$

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

For Finding Second Circuit Current and Power

We apply ohm law for finding Current

$$V = IR$$

$$I = V/R$$

$$I = V/R$$

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

$$(I = -0.0005A)$$

For Find 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

We apply ohm law = $V = IR$

$$I = V/R$$

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

$$I = 0.0005\,A$$

$$I = 0.5\,mA$$

For Finding Power in a Circuit we apply $P = I^2R$

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

$$P = 0.0025$$

$$P = 0.25\,mW$$

Q No 1:-(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.

Sol:-

ohm law $V = IR$, $R = V/I$

So we calculate R from the Slope on the graph. we can take any point on the line to get the Value of "I" and "V"

Solution:- (a)

$I = 0.01\ mA$

$V = 1V$

$R = ?$

Appling ohm law

$V = IR$

$R = V/I$

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

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

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

Solution :- (B)

through difficulty to see the Current is zero as Sloop as zero

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

$R = 1V/0$

$R = \infty$

Solution :- (c)

difficulty to See through the Current infinite as Sloop is ∞ (s)

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

OR

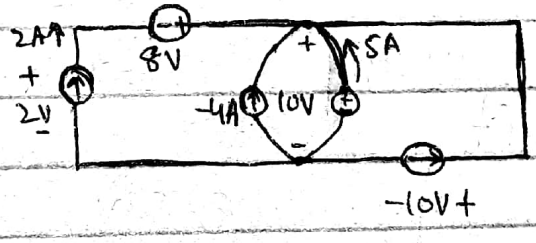
$$R = 0$$

We have this is zero resistance

$$(R = 0)$$

Q No(1) :- (B)

Determine the Power Supplied by the leftmost element in the Circuit of the following figure.



Solution:-

We apply $P = VI$ for finding Power:-

$$P = VI$$

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

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

4 W is Supplied Power in the Current direction with Positive Sign.

QNO 2 (a)

Refer to the Circuits of the following figures and answer the following

(1) How many distinct nodes are Contained in the Circuit?

(2) How many elements are Contained in the Circuit?

(3) How many branches does the Circuit have?

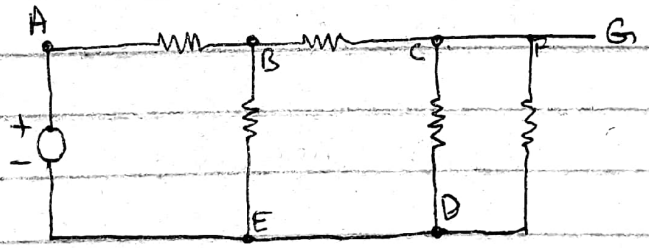
(4) Determine if each of the following loop represents a path a both or neither

(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

Q_2 (b)

For the Circuit of following figure (which is a model for the de 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: 2 (b)

Kcl total Current entering anode = total current having a nodes

$I_C = 150 \times I_b = 150 \times 100 = 15\ mA$

$I_E = 15 + 0.1 = 15.1\ mA$

$Q_{3}^{(3)}$ No (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)

we use ohm's law

$$V = IR$$

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

$$V = 1.274\ V$$

Find ~~Circuit~~ Current

$$V = IR$$

$$I = V/R$$

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

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

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

Find Power

$$\Rightarrow P(1K) = (1.274)(1.274) = (1.623\ mW)$$

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

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

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

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

Q3 (b): Determine the power absorbed by the 15 Ω resistor in the circuit of the following figure.

Ans 3(b)

First Simply the Circuit by Calculating Source and resistance equalance

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

$$R_{eq} = (6+3\,//\,15)\,//\,6\,//\,8$$

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

Now we Can Calculate voltage

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

$$V = (2\angle -2^\circ) \times (2.2174\,\Omega)$$

and from the diagram we Can See that

$$V = 6\angle^\circ$$

$$= 6\angle = (-2-2\angle) + 2.2174)$$

$$= 10.4348 \times \angle^\circ = -4.4348$$

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

$$V = -2.55V$$

Power Consumed by the 15Ω resistor well need the Voltage on that resistor that

$$P = V^2/R$$

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

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

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

and Power is

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

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