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Q.1

(A) Lumped Network

A network in which all the network elements are physically separable is known as lumped network. Most of the electric networks are lumped in Nature which consist elements like RLC voltage source etc, where as,

Distributed Network:

A Network in which the circuit elements like RL & C can not be physically separable for analysis purpose is called distributed Network

The best example of such a network is a transmission line where resistence, inductence & capacitance of a Transmission line are distributed all along its length & can not be shown as a separate elements

Q.1

(b)

We use mostly parallel electrical connection in house wireing, because the loads can be operated independently of each other. That means that you can have an electrical item turned on and running without needing to have all of other loads on and running as well. A parallel circuit also allows all of the loads on a particular circuit to continue working even when one of those loads fails. for example many homes have kitchens with 4-6 overhead "can" lights. They are wired in a parallel circuit to a single switch. If one of those light bulbs burn out, the other lights continue to work. If the lights were wired in series all of bulb would turn off the moment one bulb burn out.

The other problem with a series circuit is that it devides the total voltage of circuit by number of loads on the circuit. More loads mean less voltage per load. If the circuit contain only lights, the lights would

get dimmer with addition of more lights. A parallel circuit does not do that, Each load gets the full voltage of circuit. That means every appliance on parallel circuit is getting the full necessary voltage it was designed to get.

Q.2

(a) Importance of ohm's law for Electrical Engineer:

The importance of ohm's law for student of Electrical Engineering is very more, because in ohm's law there are three variable ① voltage, current, & Resistence & the way they interact, drives that machines that makes our modern lifestyle so convenient.

This allows electrical consultants to take only two variables and calculate the third

Using ohm's law we can then site down and:

① Design a flexible electrical system that doesn't overheat or trip breakers.

② create a lighting design that saves energy (lighting is a big energy consumer)

③ plan an electrical system that accommodates your growing buisness

④ devise a backup system that will seamlessly carry your buisness through a disruption.

* it can also be extended to describe electrical power (the rate of energy per second), because power ⇒ $P = VI$ & so you can use it to ensure your circuit provideds enough energy.

For engineering student, the most important thing about ohm's law is that it allows you to analyze circuit diagram, especially when you combin it Kirchhoff's law.

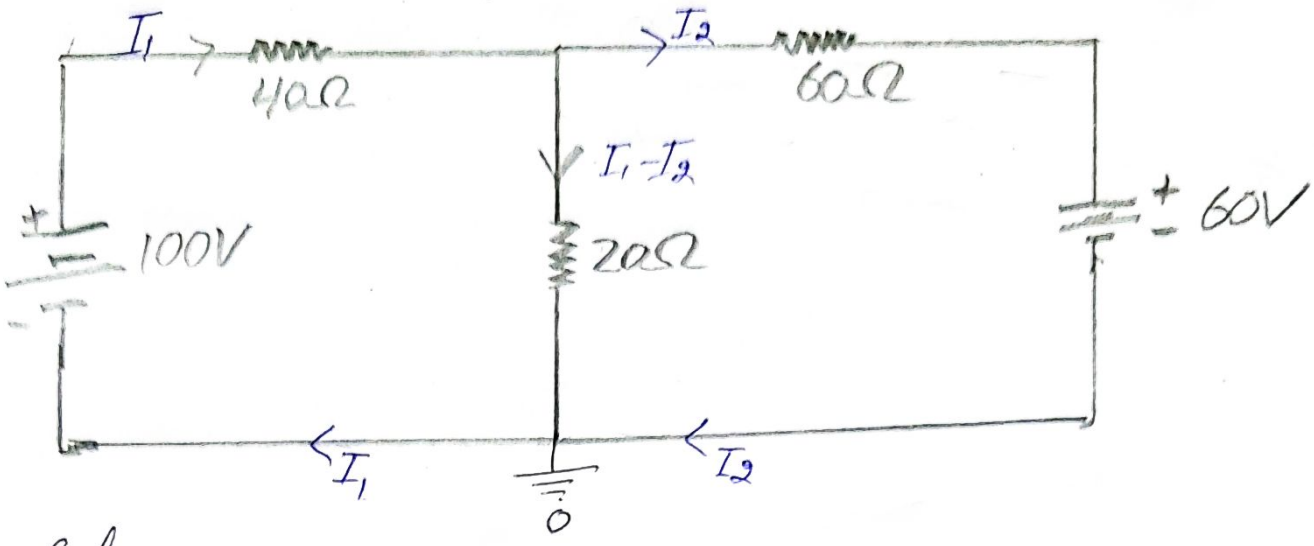
Q(2)

(b)

Resistence of conductor increase with temperature because velence band & conduction band overlap with each other, So there are acess electrons in conduction band of conductor. when you increase the temprature, more electrons will go to the conduction band from velence band by absorbing energy. So, the conduction band become crowded and there will be more collision between the electron which increases the resistence. So, with increase in temprature, the resistence of conductor increase.

The resistence of conductor increase with increase in temprature because thermal velocity of free electrons increase with increase in temprature. The result increase in numbes of collision between the free electron

Q.③



Sol:-

Applying KVL on mesh ABDA

$$100 - 40I_1 - 20(I_1 - I_2) = 0$$

$$100 - 40I_1 - 20I_1 + 20I_2 = 0$$

$$100 - 60I_1 + 20I_2 = 0$$

$$-60I_1 + 20I_2 = -100$$

OR

$$60I_1 - 20I_2 = 100 \quad \text{---} \quad (1)$$

Applying KVL on mesh BCDB

$$-60I_2 - 60 + 20(I_1 - I_2) = 0$$

$$-60I_2 - 60 + 20I_1 - 20I_2 = 0$$

$$-80I_2 + 20I_1 - 60 = 0$$

$$-20I_1 + 80I_2 = -60 \quad \text{---} \quad (2)$$

Now solving eq (1) & eq (2) by determinent method

$$\text{determinent} = \begin{bmatrix} 60 & -20 \\ -20 & 80 \end{bmatrix}$$

$$\rightarrow [60 \times 80 - (-20 \times -20)]$$

$$\rightarrow [4800 - (400)]$$

$$\rightarrow [4800 - 400]$$

$$= 4400$$

Now

$$I_1 = \frac{\begin{bmatrix} 100 & -20 \\ -60 & 80 \end{bmatrix}}{4400}$$

$$= \frac{[100 \times 80 - (-60 \times -20)]}{4400}$$

$$= \frac{[8000 - (1200)]}{4400}$$

$$= \frac{8000 - 1200}{4400}$$

$$= \frac{6800}{4400}$$

$$= \frac{68}{44}$$

$$I_1 = 1.54 \text{ Amp}$$

Now

$$I_2 = \frac{\begin{bmatrix} 60 & 100 \\ -20 & -60 \end{bmatrix}}{4400}$$

$$= \frac{[(60 \times -60) - (-20 \times 100)]}{4400}$$

$$= \frac{-3600 + 2000}{4400}$$

$$= \frac{-1600}{4400}$$

$$I_2 = -0.36A$$