

Name :- M. Jatal Khan

ID :- 16089

Department, Bs (Civil Engineering)

Section: A

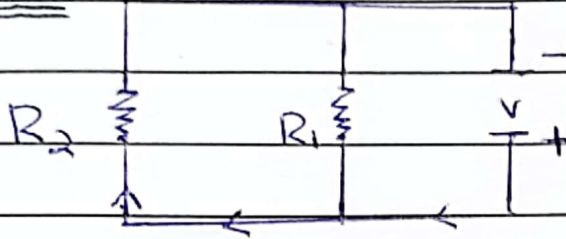
Subject: Basic Electro Mechanical.

Date :- 22 / Aug / 2020

~~Q.2~~ Q.1

Part (a)

Solution:



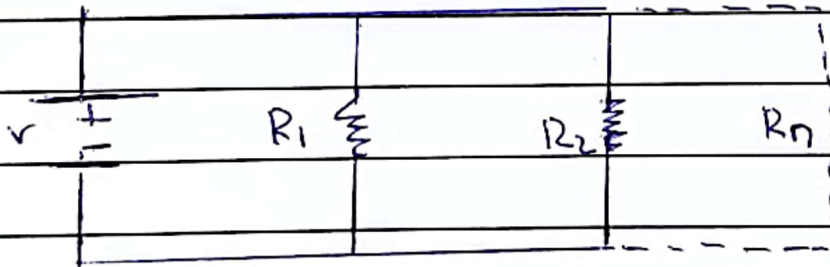
Well know formula for two Resistance

$$i) \frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R_{total} = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

Part (B)

(ii)



For any number of Resistance

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

$$R_{total} = \frac{R_1 \cdot R_2 \cdot \dots \cdot R_n}{R_1 + R_2 + R_3 + \dots + R_n}$$

Q. (2)Given:

$$V = 24 \text{ volt}$$

$$R_1 = 1 \Omega$$

$$R_2 = 2 \Omega$$

$$R_3 = 3 \Omega$$

Req.:

$$\text{Current } I = ?$$

$$\text{Power } P = ?$$

Sol.:

$$V = IR$$

$$I = \frac{V}{R}$$

$$I = \frac{24}{1}$$

$$\boxed{I = 24 \text{ mA}}$$

$$I_2 = \frac{V}{R}$$

$$I_2 = \frac{24}{2}$$

$$\boxed{I_2 = 12 \text{ mA}}$$

Date: _____

$$I_3 = V/R$$

$$I_3 = 24/3$$

$$I_3 = 8 \text{ mA}$$

To find Power for each resistor

$$P_1 = IV$$

$$P = (24)(24)$$

$$P = 576 \text{ W}$$

$$= 0.576 \text{ kW}$$

$$P_2 = IV$$

$$P_2 = (12)(24)$$

$$P_2 = 288 \text{ W}$$

$$= 0.28 \text{ kW}$$

$$P_3 = I_3 V$$

$$P_3 = (8)(24)$$

$$P_3 = 192 \text{ W}$$

$$= 0.198 \text{ kW}$$



Q3) Differentiate between the following.

a) Current & Voltage.

Current:-

Current is the rate at which charge is flowing in a circuit.

* It is the amount of charges that pass through any point of the circuit per unit time.

$$- \text{Current} = \text{charge} / \text{time}$$

OR

$$I = Q/t$$

Unit:- Coulomb / sec = Ampere (A)

Current is measured in ampere A where

$$A = 1 \text{ C s}^{-1}$$

An ampere is the flow of 1 Coulomb of charge per second.

This gives the wire a net charge of zero.



Voltage:-

Voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop enabling them to do work such as illuminating a light. In brief, voltage = Pressure and it is measured in volts (V)

Formula:- $V = IR$

Example :-

An example of direct voltage is the potential difference the terminals of an ~~el~~ electrochemical cell.

B) Resistance & Conductance:

Resistance:-

Resistance is a measure of the measure of the opposition to current flow in an electrical circuit. Resistance is measured in ohms, symbolized by Greek letter omega (Ω)

Ω Electric resistance of the conductor

$$R = \frac{V}{I} \quad \text{unit : ohm's}$$



Conductance:

Is the measure of how easily electrically flows along a certain path through an electrical element. $1/\rho$ and has the unit of Siemens per meter S/m.

(C) Power & Energy.

Power:

The capacity or ability to direct or influence the behaviour of other or the events. Move or travel with great speed force

$$P = IV$$

Unit of power is the watt (W)

Energy:

In physics energy is the Quantitative that must be transferred to an object in order to perform work on or to heat the object

The SI unit of energy is joule

The formula for the energy of motion

$$KE = \frac{1}{2}mv^2$$



(D)

Inductance & Capacitance.

Inductance :-

In electromagnetism and electronics inductance is the tendency of an electrical conductor to oppose a change in the electric current creates a magnetic field around the conductor. OR Tendency of ~~it~~ an electrical conductor to oppose a change in the electric current following through is called ~~the~~ inductance. Its unit is henry (H)

Capacitance :-

Capacitance is the ratio of the change in electric charge of a system to the corresponding change in its electric potential. There are two closely related notions of capacitance. Self capacitance and mutual capacitance. Any object that can be electrically charged exhibits self capacitance.

SI Unit :- Farad

SI base unit, $F = A^2 S^4 kg^{-1} m^{-2}$



(e)

Synchronous motor & Asynchronous motor.

* Synchronous motor:-

Construction is complicated

- Separate DC source is required for rotor excitation.

- The speed is always synchronous irrespective of the load.

- It can be used as synchronous condenser for P.f improvement.

- Speed control is possible.

* Asynchronous motor:-

- Self starting construction is simpler.

- Particularly in case of cage rotor.

→ Speed control is possible through difficult.

→ It can not be used as synchronous condenser.

→ Phenomenon of hunting is absent.

→ Motor is cheap, especially cage rotors and maintenance free.