Midterm Paper.

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Section — "A"

Semester — 7th Starting

Subject — Basic electromechincal

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Q :- 1/ Part (a)

Two well known formulae For calculating the total resistance of Parallel Connected resistance.

⇒ Formula for only two resistances

$$\frac{1}{R_{tot}} = \frac{1}{R_1} + \frac{1}{R_2}$$

⇒ Formula for any number of Parallel resistances:-

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots \frac{1}{R_N}$$

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Q No: 1 / Part B

Ans:- In Series Circuite, Resistance Increase while Current decrease. Resistance is reciprocal of Conductance, if resistance Increase automatically Conductance decreases.

$$R_{tot} = R_1 + R_2 + R_3 + \cdots R_n$$

$$\frac{1}{G_{tot}} = \frac{1}{G_1} + \frac{1}{G_2} + \frac{1}{G_3} + \cdots \frac{1}{G_n}$$

Now

In Parralel Circute

$$\frac{1}{R_{tot}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots \frac{1}{R_1}$$

So

$$G_{tot} = G_1 + G_2 + G_3 + \cdots G_n$$

In Parralel Circute Conductance Increase

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while Resistance decrease.

Conductance $\Rightarrow G = \frac{1}{R}$

Q: 21

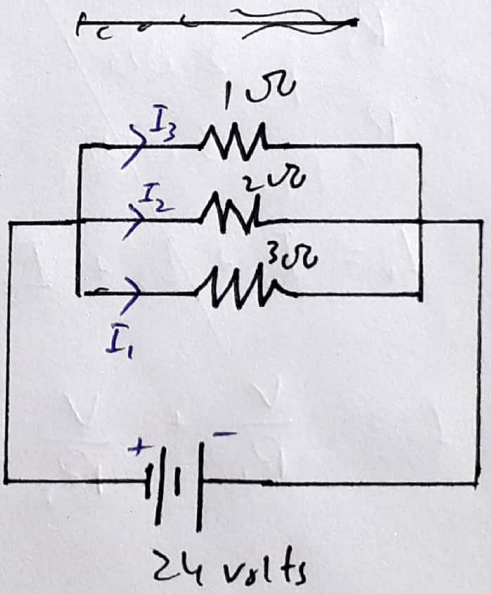
Given data:

$R_1 = 3\ \Omega$

$R_2 = 2\ \Omega$

$R_3 = 1\ \Omega$

Voltage = V = 24 v



I = ?

P = ?

Solution:- Find current

9,t Branch:

$V = I_1 R_1$

$I_1 = \frac{V}{R_1} = \frac{24}{3} = 8$

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$I_1 = 8A$ ⇒ Current 1

2nd Branch

$$I_2 = \frac{V}{R_2} = \frac{24}{2} = 12$$

$I_2 = 12A$ ⇒ Current 2

3rd Branch:-

$$I_3 = \frac{V}{R_3} = \frac{24}{1} = 24$$

$I_3 = 24A$ ⇒ Current 3

Now find amount of power dissipated.

$P = I^2R$

So

$P_1 = I_1^2 R_1$

(5)

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$P_1 = 8^3 \times 3$

$\boxed{P_1 = 192\ w}$

$P_2 = I_2^2 R_2$

$= 12^2 \times 2$

$\boxed{P_2 = 288\ W}$

$P_3 = I_3^2 R_3$

$P_3 = 24^2 \times 1$

$\boxed{P_3 = 576\ W}$

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Q: 3/ Diffrentiate :-

a) Current	Voltage
⇒ Current is rate of flow of electric charges.	⇒ voltage also called e.m.f is energy per unit charges.
⇒ Its unit is Ampere	⇒ Its unit is Volts.
⇒ Current is effect and Cannot flow without voltage	⇒ voltage is cause and can exist without current.
⇒ Current Creates magnetic feild	⇒ voltage Creates electro static feild.
⇒ Current is same through all Component Connected in Series.	⇒ voltage get distributed over Component Connected in Series.
⇒ Current get distributed over Component Connected in Parallel	⇒ voltage are same across all components Connected in Parallel.

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b) Resistance

⇒ Resistance is a property of a conductor which tell us how rauch resistor resist or oposses the current to pass through it.

⇒ Its unit is Ohm

⇒ $R = \frac{V}{I}$ ⇒ $\frac{\text{voltage}}{\text{current}}$

⇒ depend on length and Thickness

conductance

⇒ Conductance is a property of Conducter which tell us how much the resistor allow the current to pass through it.

⇒ Its unit is mho or Seimens.

⇒ $G = \frac{1}{R}$

⇒ It is the reciprocal of resistance.

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c) Energy

⇒ Energy is the capacity to do work.

⇒ Unit is Joule

⇒ Symbole is W

⇒ Energy changes from one form to another form.

⇒ Energy is known to be stored which can be used in future

⇒ Energy is used in cars, heating home, Flying etc.

Power

⇒ Power is the rate at which work is done.

⇒ unit is watt.

⇒ Symbol is P

⇒ Power cannot be transformed from one type to another.

⇒ Power quantity is not storable.

⇒ Power uses in machanical application, heat applications etc

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D/ Inductance

⇒ Inductance is property of a current carrying conductor which generates a ϕ magnetic feild around the conductor.

⇒ An inductor only effect current when current is changing and will always oppose what is happening.

⇒ Unit of Inductance is henry (H)

Capacitance:

⇒ Capacitance is a property of a device to hold and store electric charges.

⇒ More capacitance means more capacity to store charges.

⇒ Standerd unit of capacitance is Farad (F)

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E) Synchronous Motor

⇒ Construction is complicated

⇒ Not self starting.

⇒ Seperate DC source is required for roter.

⇒ Speed control is not possible.

⇒ As load increase load angle increases.

⇒ It can be used as Synchronous Condenser for P.f improvement.

Asynchronous motor.

⇒ Construction is Simpler

⇒ Self starting.

⇒ Rotor get exited by induced e.m.f So Seperate source not needed

⇒ Speed control is possible though difficult

⇒ As load increase speed keep on decreasing

⇒ It cannot be used Synchronous Condenser

⇒ phenomenon of hunting is absent.