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ID

= 6966

Paper

= Power Transmission  
& Distribution.

Program

= B.Tech Ele.

Submitted

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Q1:

Question = 01

Ans:

There are several method of obtaining 3-wire d.c system. However the most important one is two generator method.

Method of attaining three wire DC system.

The generator method:

In this method two shunt wound d.c generator  $G_1$  and  $G_2$  are connected in series and +ve neutral is obtained from the common point between generator. Each generator supplies load on its own side. This generator ' $G_1$ ' supplies a load current of  $I_1$  where as generator ' $G_2$ ' supplies load current of  $I_2$ , the different load current of the two sides known as out of balance  $(I_1 - I_2)$  flows through neutral wire. Two principal of this method is that two separate generators are required.

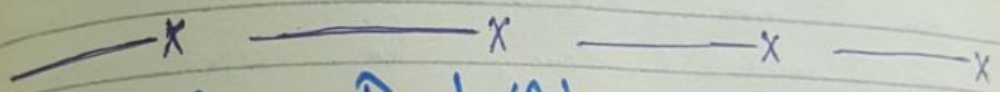
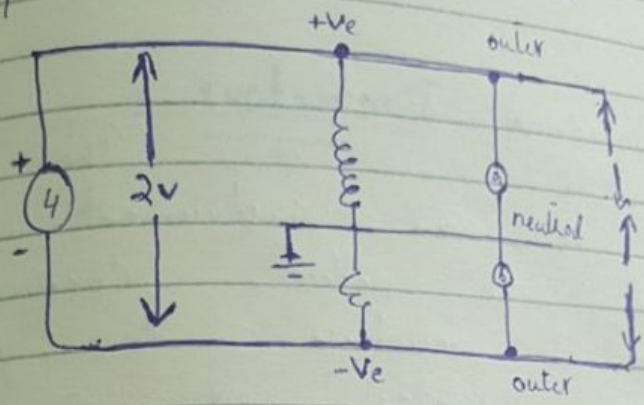
3 wire dc-generator :-

The above method is costly an account of the necessity of two gen for this reason 3-wire dc d.c generator was developed. It consist of a standard 2-wire machine with one or two coils of high reactance and low resistance connected permanently to diametrically opposite points

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The wire is obtained from the common pair as shown.



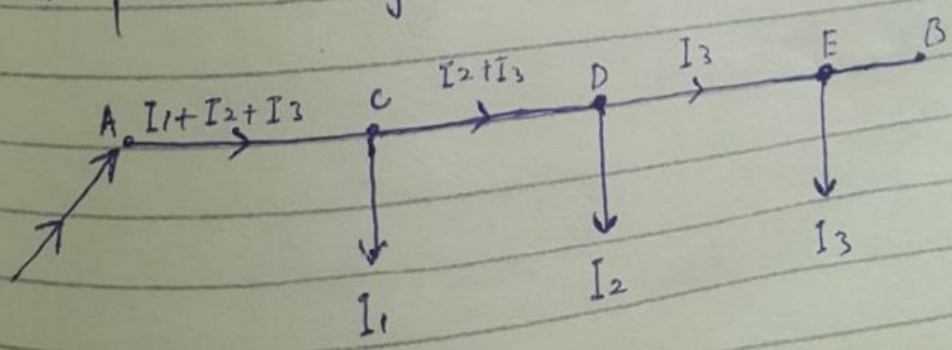
Q: 02 Part (A)

Following are the types of DC distributors.

- Distributor fed at one end.
- Distributor fed at both ends.
- Distributor fed at centre.
- Ring distributor.

1) Distributor fed at One End:

In this type of feeding supply the distributor is connected at the supply at one end and leads are taken at different point along the length of the distributor.



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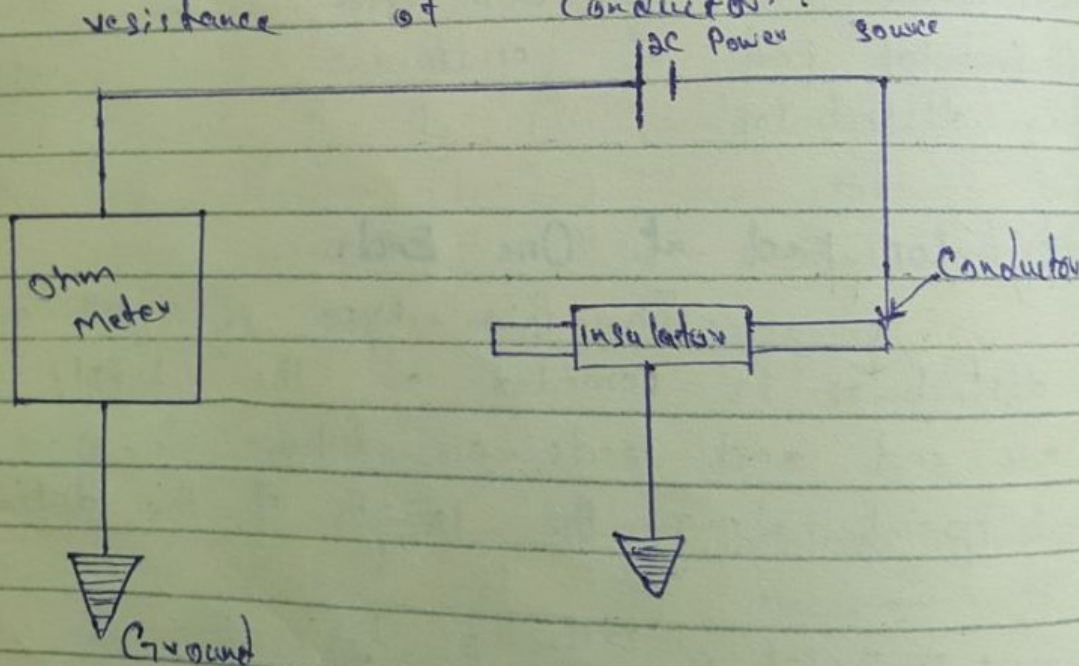
Part = B

Ans = 02

### Ground Detector

The ground detector is an instrument which is used to detect conductor insulation resistance to ground. An Ohm meter, or a series of lights, can be used to detect the insulation strength of an underground system.

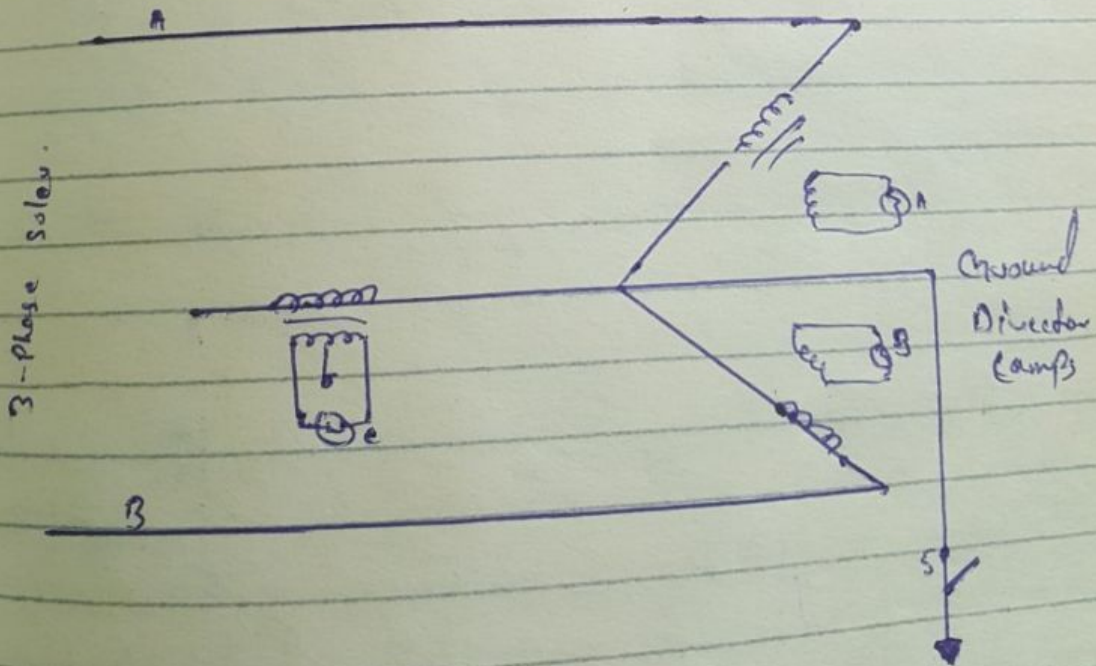
(\*) Proportional to the insulation resistance of conductor.



The ground set of three detection lamps method connected to the system is used.

To check for grounds the switch is closed and the brilliance of the lamp receive the same voltage.

The phase in which the lamp in the ground in case the primary winding of the transformer is shorted to ground and received no voltage.



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Question = 03

Answer = 03.

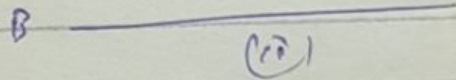
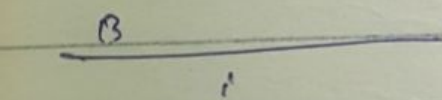
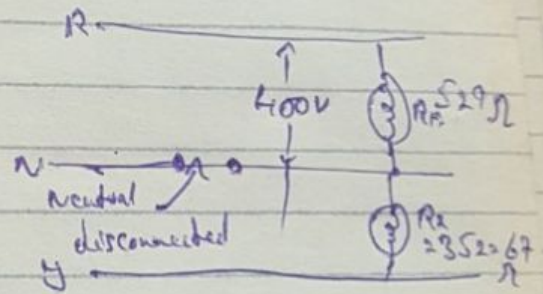
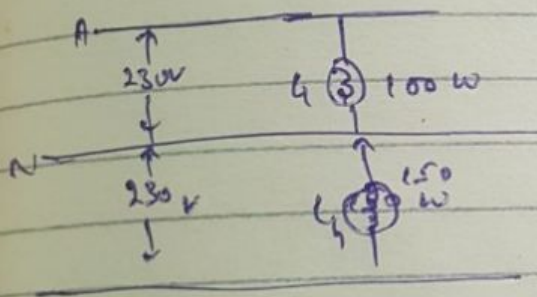
Solution:

(Lamp  $L_1$  of 100 watts) connected b/w Phase R & neutral whereas.

Lamp  $L_2$  150 watt is connected b/w phase Y & neutral.

a) Resistance  $L_1$   $R_1 = \frac{(230)^2}{100} = 529 \Omega$

Resistance  $L_2$   $R_2 = \frac{(230)^2}{150} = 352.67 \Omega$



Two lamps connected in series

P.d across combination become

Equal voltage =  $E_L = (400V)$

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Q-3 continued

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Current through Lamp =

$$I = \frac{E_1}{R_1 + R_2} = \frac{400}{529 + 352.67} = 0.454 \text{ A}$$

$$\text{Voltage across Lamp } L_1 = I R_1 = 0.454 \times 529 = 240 \text{ V}$$

$$\text{Voltage across Lamp } L_2 = I R_2 = 0.454 \times 352.67 = 160 \text{ V}$$

The voltage across 100 watt lamp increased 240 V. Across 150-watt decreased to 160 V. <sup>bright</sup> 100-watt lamp becomes 150 watt  
bec dim. it may be noted  
that 100-watt lamp happens  
related 230 V.

it may be burn out due to  
240 V. coming out.

Pages: 07

Q4:

Question = 04

The ring main is

Let assume a current of  $I$  ampere in section AB and put the total drop around the ring equal to zero.

$$\therefore 0.1I + 0.05(I-10) + 0.01(I-30) + 0.025(I-60) + 0.075(I-70) \Rightarrow 2$$

or

$$I = 29.04 \text{ A}$$

current distribution now becomes

$$\text{Drop in AB} = 29.04 \times 0.1 = 2.9 \text{ V}$$

$$\text{Drop in BC} = 29.04 \times 0.05 = 0.95 \text{ V}$$

$$\text{Drop in CD} = 30.96 \times 0.025 = 3.77 \text{ V}$$

$$\text{Drop in AE} = 40.96 \times 0.075 = 3.07 \text{ V}$$

∴

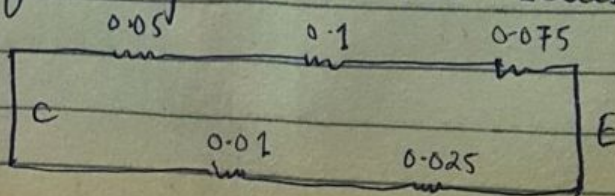
$$\text{Potential of B} = 217.1 \text{ V}$$

$$\text{Potential of C} = 216.15 \text{ V}$$

$$\text{Potential of E} = 216.93 \text{ V}$$

$$\text{Potential of D} = 216.16 \text{ V}$$

The interconnector between point C and E is shown it may be noted here that the function of the interconnector is to reduce the drop of voltage in various series.





Now

$$I = \frac{P.d \text{ between point E and c}}{\text{resistance of distributor network} + \text{interconnector}}$$

$$\begin{aligned} P.P \text{ between point E and c} &= 216.93 - 216.15 = 0.76V \\ &= \frac{0.225 \times 0.03c}{(0.225 + 0.035)} = 0.03 \Omega \end{aligned}$$

∴

$$\begin{aligned} \text{current in Inter connector} &= \frac{0.78}{(0.03 + 0.05)} = 9.75 \text{ A From E to C} \end{aligned}$$

Hence

$$-0.025 I_1 - 0.02(I_1 - 30) + 0.05 \times 9.75 = 0$$

or

$$0.035 I_1 = 0.7875$$

$$\therefore I_1 = 22.5 \text{ A}$$

$$\text{Current AE} = (0 + 22.5 + 9.75) = 42.25$$

$$\text{current in AB} = 70 - 42.25 = 27.75 \text{ A}$$

$$\text{Drop in AB} = 27.75 \times 0.1 = 2.775 \text{ v}$$

$$\text{Drop in CD} = 32.25 \times 0.025 = 0.806 \text{ v}$$

$$\text{Drop in BC} = 17.75 \times 0.05 = 0.88 \text{ v}$$

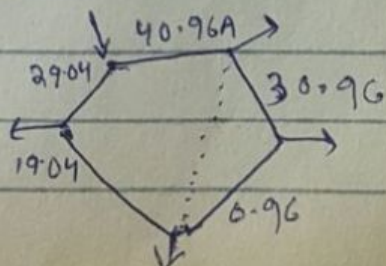
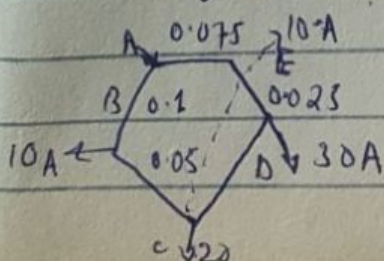
$$\text{Drop in AE} = 42.25 \times 0.075 = 3.169 \text{ v}$$

$$\text{Potential of B} = 217.225 \text{ v}$$

$$\text{potential of C} = 216.337 \text{ v}$$

$$\text{potential of E} = 220 - 3.169 = 216.83 \text{ v}$$

$$\text{potential of D} = 216.83 - 0.806 = 216.024 \text{ v}$$



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Question = 05 Part (A)

Answer =

Two wire D.C System.

As the name suggest this system uses two conductors, one is positive conductor and the other one is negative conductor.

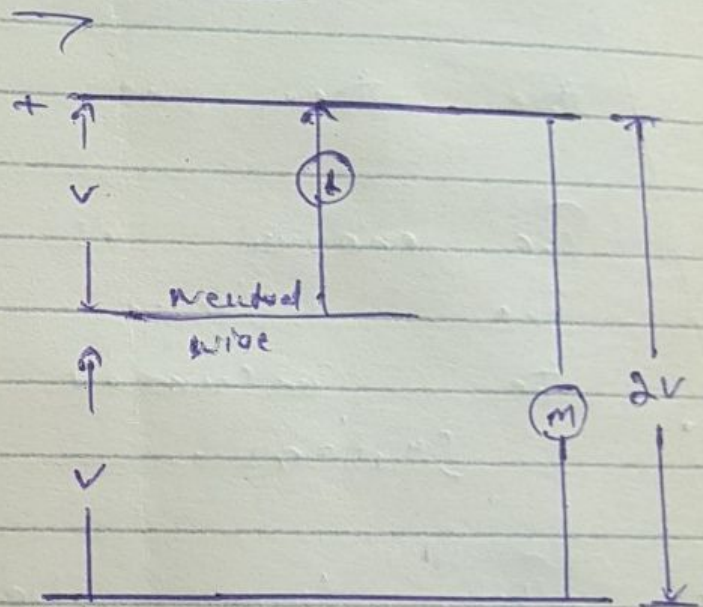
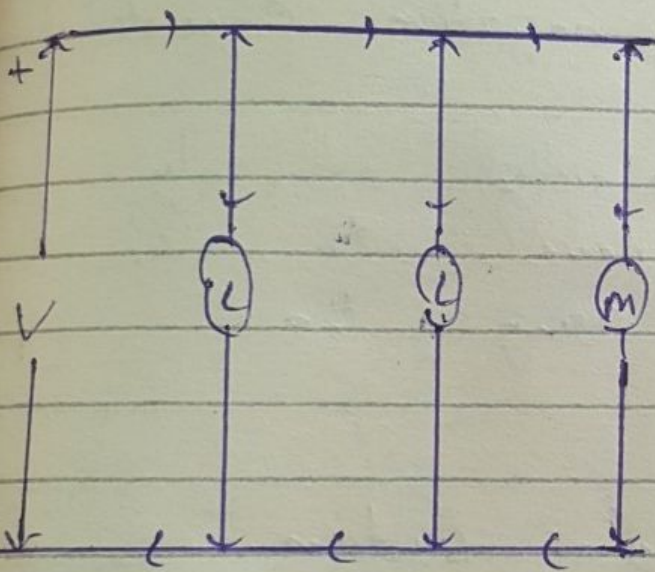
The energy is transmitted at only one voltage level to all the consumers using the system.

(\*) The two wire d.c system one is the outgoing or positive wire and the other is return or negative wire.

(\*) The loads such as the lamp, motor etc, are connected in parallel b/w two wires.

\* Diagram.

Two wire D.C.



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### Booster #

Booster is low voltage high current series wound D.C generator inserted into a D.C circuits to add or inject a certain voltage proportional to the the circuit current. the main purpose of providing booster in power system is to compensate the voltage drop of feeder.

- (\*) Booster add voltage to the feeder and compensate the voltage drop. Hence it increase the efficiency and reliability of the system. it is one of the important device of power system.