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Subject :- Power Transmission and Distribution

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Date :- 25-09-2020

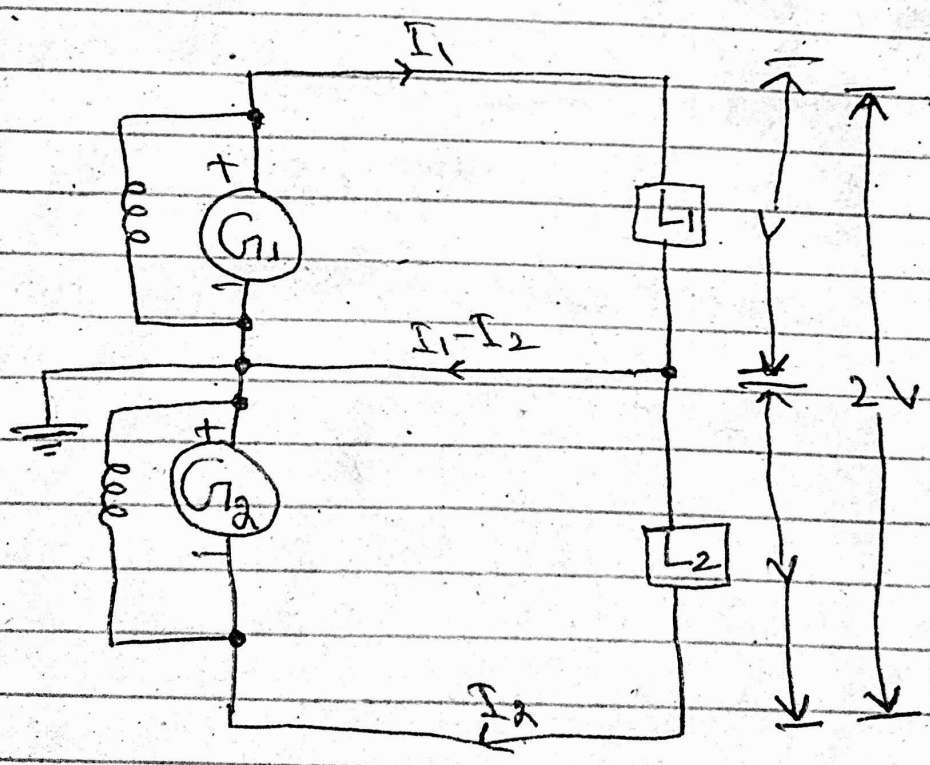
Q No 1: Explain two generator method of obtaining 3-wire DC system.

Ans: There are several methods obtaining 3-wire DC system. However, the most important ones are:

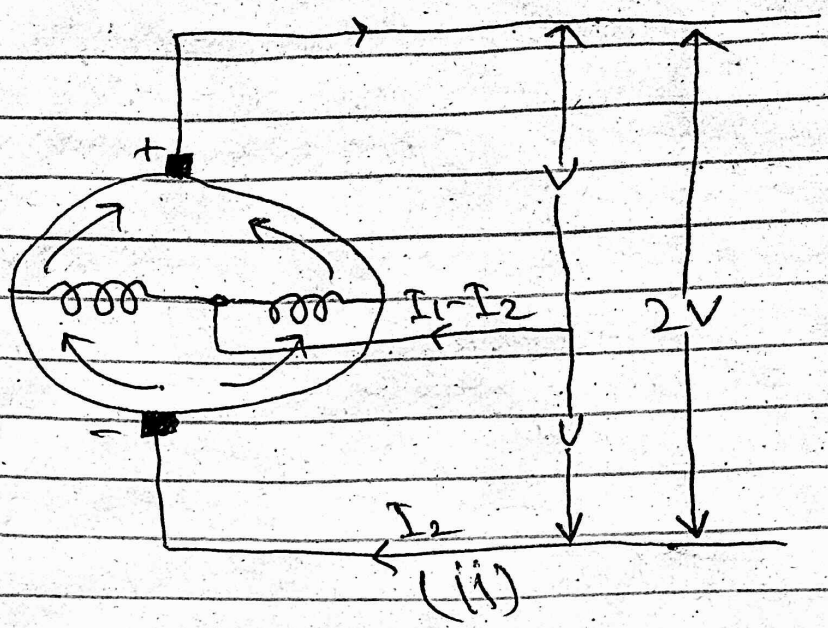
1) Two Generator method:

In this method, two shunt wound DC generator G_1 and G_2 are connected in series and the neutral is obtained from the common point b/w generator as shown in fig. 12.6(i). each generator supplies the load on its own side. Thus generator G_1 supplies a load current of I_1, whereas generator G_2 supplies a load current of I_2.

the difference of load current on the two sides, known as out of balance current $(I_1 - I_2)$ flows through the neutral wire. the principal disadvantages of this method is that two separate generators are required.



(i) Fig 12.6

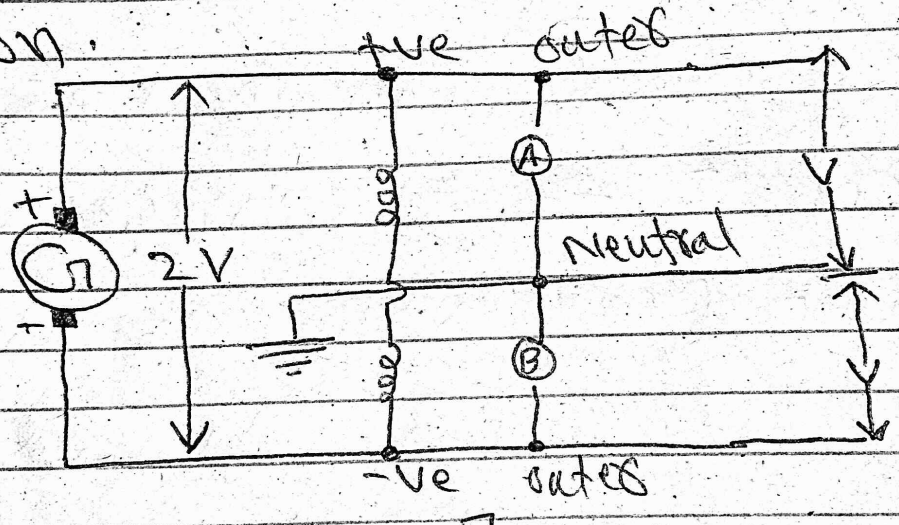


(ii)

(2) three wire Dc. Generator :

⇒ The above method is costly on account of the necessity of two generator for this reason, 3-wire Dc generator was developed as shown in fig 12.6(ii). It consist of a standard 2 wire machine with one of two coiles of High

reactance and low resistance, connected permanently to diamatrically opposit points of the armature winding. The neutral wire is obtained from the common point as shown.



12.7

(3) Balancer set: the three wire system can be obtained from wire DC system by the use of balancer set as shown in fig 12.7. G is the main 2-wire dc generator and supplies to the whole system. the balancer set consist of two identical dc shunt machines A and B coupled mechanically with their armatures and field winding joined in series across the outer. the junction of their armature is earthed and neutral wire is taken

out from neoe. the balanceS set has the additional advantage that it maintains the ~~P.E~~ P.D on two sides of neutral equal to each other.

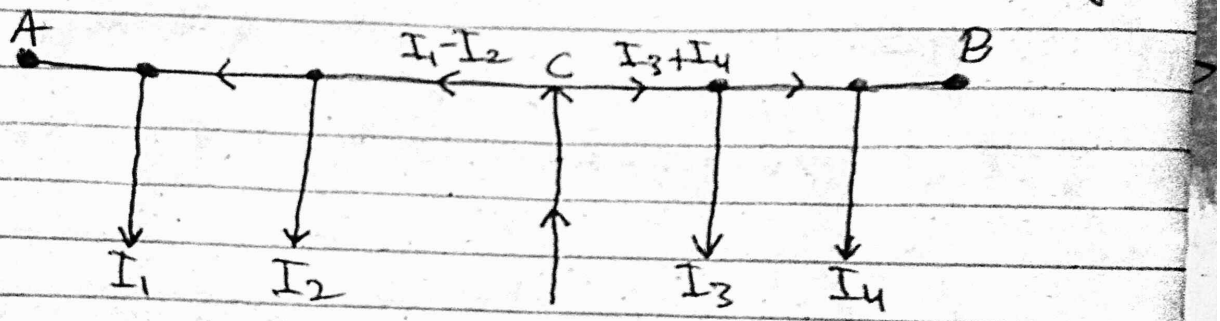
Q No 28 (A) write down the types of DC distributor. Also explain any one type.

Ans:- there are four types of DC Distributer which are given below.

(1) distributer fed at one ends
(2) distributer fed at both ends.
(3) distributer fed at centre ends
(4) Ring distributor.

=) Distributor fed at the centres:- In this type of feeding, the centre of the distributor is connected to the supply mains

as shown in fig. it is equivalent to two singly fed distributors, each distributor having a common feeding point and length equal to the half of the total length.



Q.No2:-

(B) Explain Ground Detectors:-

Ans: 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 ungrounded distribution system. most power distribution system in use today are of the

grounded variety; However, some ungrounder system still exist.

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Q No 38:-

Solution:-

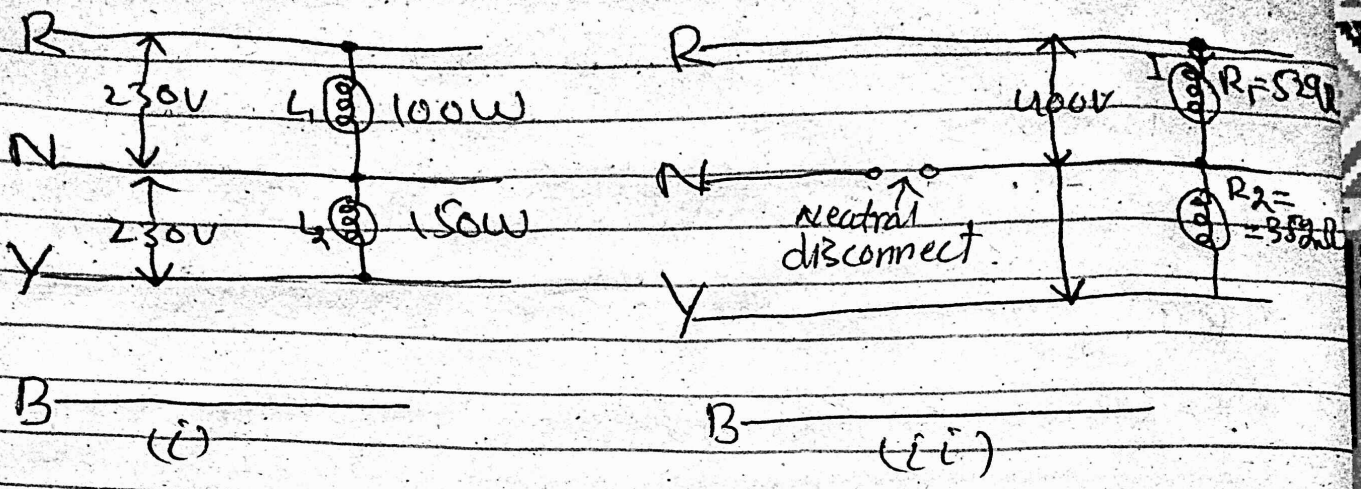
fig 14.21(i) shows the lamp connection. The lamp L_1 of 100 watts is connected b/w phase R and neutral whereas lamp L_2 of 150 watts is connected b/w phase Y and the neutral.

Resistance of Lamp L_1, $R_1 = \frac{(230)^2}{100} =$

$= 529\,\Omega$

Resistance of Lamp L_2, $R_2 = \frac{(230)^2}{150} =$

$= 352.67\,\Omega$



current Through Lamps,

$$I = \frac{\mathcal{E}_L}{R_1 + R_2} = \frac{400}{529 + 352.67} = 0.454\,A$$

$$I = 0.454\,A$$

⇒ voltage across Lamp L_1 =

$$V_{L_1} = IR_1 = 0.454 \times 529$$

$$V_{L_1} = 240\,V$$

⇒ voltage across Lamp L_2 =

$$V_{L_2} = IR_2 = 0.454 \times 352.67$$

$$V_{L_2} = 160\,V$$

comments :- The voltage across 100 watt lamp is increased to 240V whereas that across 150watt is decreased to 160V. therefore, 100 watt lamp becomes brighter and 150 watt lamp becomes dim. it may be noted here that if 100 watt lamp happens to be rated at 230V, it may burn out due to 240V coming across it.

Q.No4:- A two wire dc-distributor ABCDEA in the form of a ring main is fed at point A at 220V and is loaded as under:
10A at B; 20A at C; 30A at D; and 10A at E. the resistance of various section (go and return) are:

AB = 0.1Ω; BC = 0.05Ω; CD = 0.01Ω
DE = 0.025Ω and EA = 0.075Ω.
Determine

(1) The point of minimum potential
(2) current in each section of distributor.

Solution:-

(i) According KVL, the voltage drop in the closed loop ABCDEA is zero i.e

$$I_{AB}R_{AB} + I_{BC}R_{BC} + I_{CD}R_{CD} + I_{DE}R_{DE} + I_{EA}R_{EA} = 0$$

OR

$0.1I + 0.05(I-10) + 0.01(I-30) + 0.025(I-60) + 0.075(I-70)$

$= 0$ $\qquad = 0$

OR

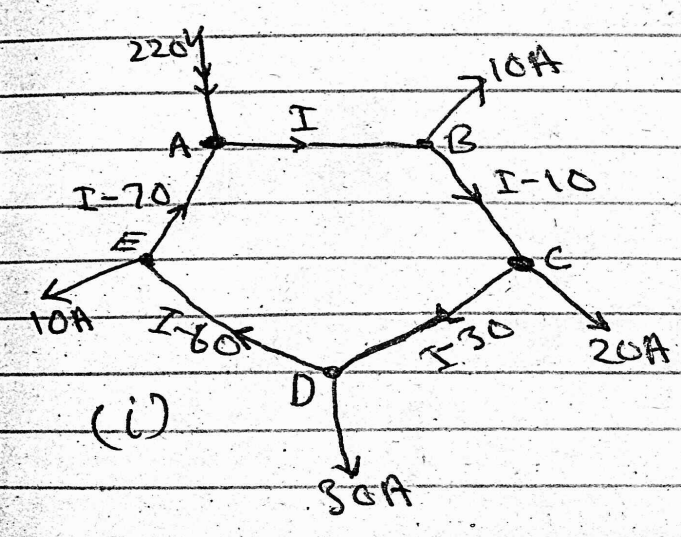
$0.26I = 7.55$

$I = \frac{7.55}{0.26} = 29.04\,A$

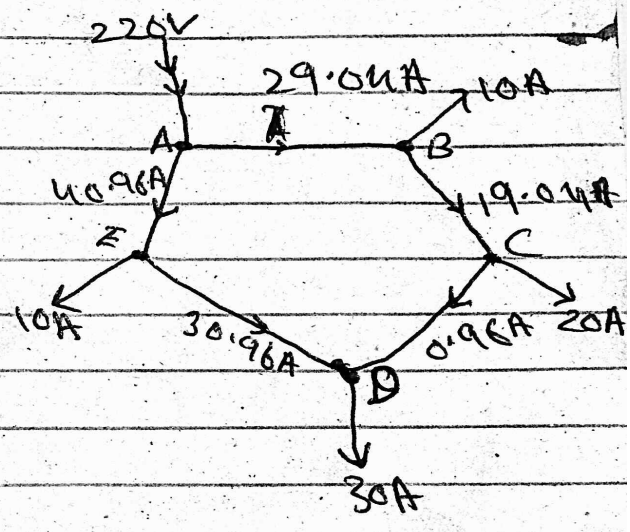
$I = 29.04\,A$

The actual distribution of current is as shown in fig. 2(ii) from where it is clear that C is the point of minimum potential.

C is the point of minimum potential.



(i)



(ii) current in section AB = I = 29.04 A from A to B

current in section BC = I − 10 = 29.04 − 10 = = 19.04 A from B to C.

current in section CD = I − 30 = 19.04 − 30 = = −0.96A = 0.96A from D to C.

current in section DE = I − 60 = 19.04 − 60 = −30.96A = 30.96A from E to D

current in section EA = I − 70 = = 29.04 − 70 = −40.96A = 40.96A from A to E.

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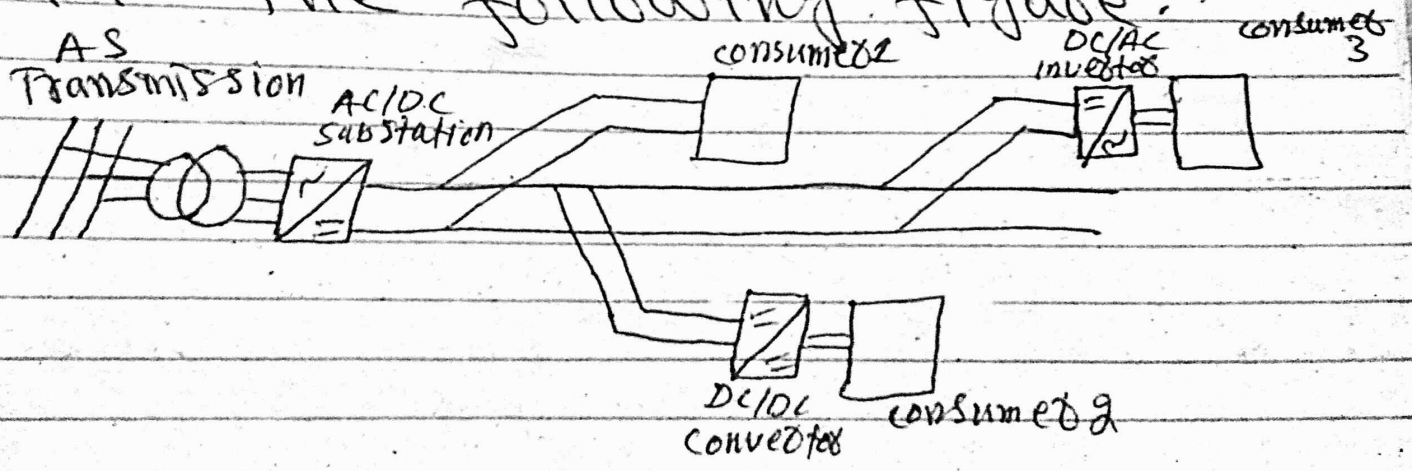
Q NO 5:-

(A) Explain 2-wire dc system.

Ans:

⇒ As the name suggests, 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 this system. A typical unipolar dc power distribution system is as shown in the following figure.



Q No 5 :-

(B) Booster :-

(1) A device for increasing electrical voltage or signal strength.

(2) The first stage of a rocket or spacecraft, used to give initial acceleration and then jettisoned.

End