Name: Sajid Ahmad
ID: 12671

Subject: PTD
Parogrome: BECE

①

Q#1 Explain two generator method of obtaining 3-wire D.C. system?

Ans#1 Two generator method:→ In this method, Two shunt wound d.c. generator G_1 and G_2 are connected in series and The neutral is obtained from the common point b/w generators as shown in fig. Each generators supplies the load on its own side. thus generators G_1 supplies a load current of I_1, whereas generators G_2 supplies a load current of I_2. The difference of load currents 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 seperate generators are required.

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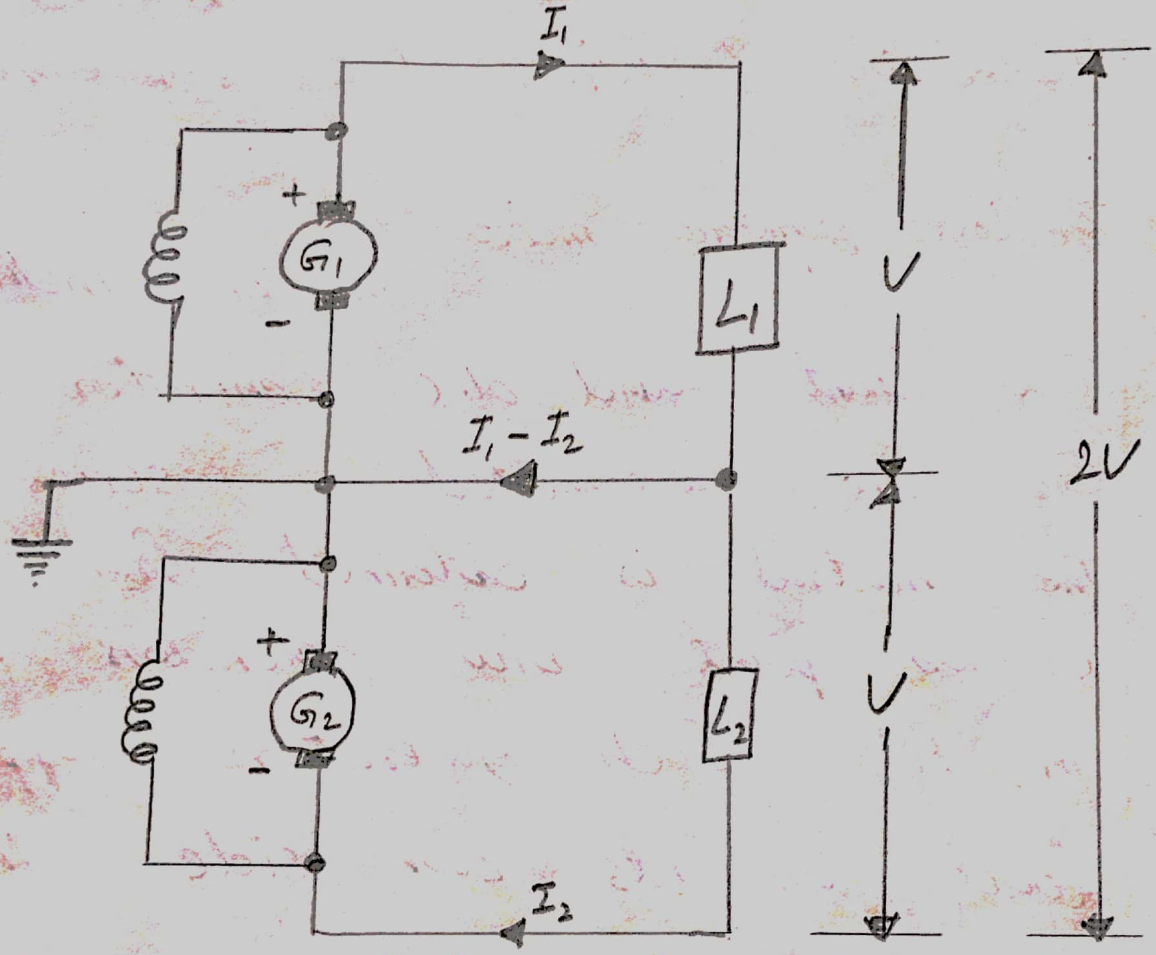
Program : BE(E)

②



Fig

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Q# 2 (A) Write down the types of D.C distributor. Also explain any one type.

Ans# 2 (A) Types of D.C distributors:-

The most general method of classifying d.c distributors is the way they are fed by the feeders. On the basis, d.c distributors are classified as:

(i) Distributor fed at one end
(ii) Distributor fed at both ends
(iii) Distributor fed at the centre
(iv) Ring distributor.

Ring Distributor:-

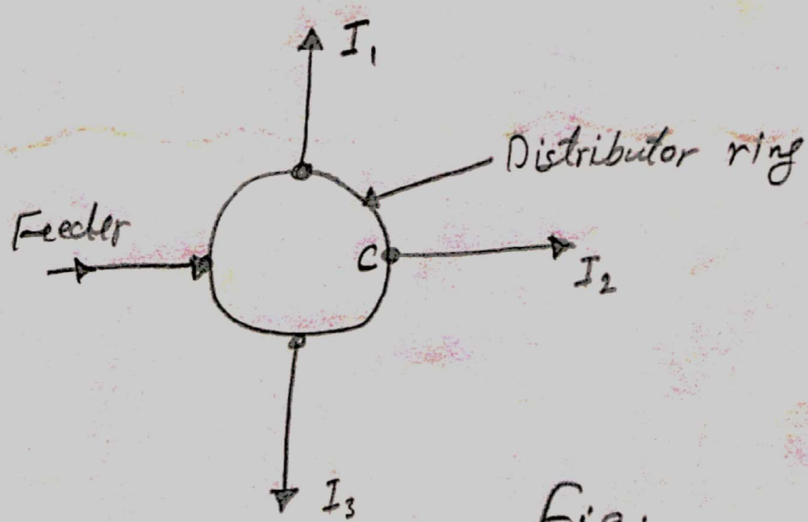

Fig:

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In this ~~th~~ type the distributor is in the form of a closed ring as shown as fig It is ~~equal~~ equivalent to a straight distributor fed at both ends with equal voltages the two ends being brought together to form a closed ring. the distributor ring may be fed at one ~~one~~ or more than one point.

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Q#2 (B) Explain Ground Detectors?

Ans:

Ground Detectors:-

Ground detectors are the devices that are used to detect/ Indicates the ground fault for ungrounded d.c. systems. when a ground fault occurs on such a system, immediate steps should be taken to clear it. if this is not done and a second ground fault happens, a short circuit occurs. lamps are generally used for the detection of ground faults. they are connected for ungrounded 2-wire system.

Each lamp should have a voltage rating equal to the line voltage. the two lamp in series, being

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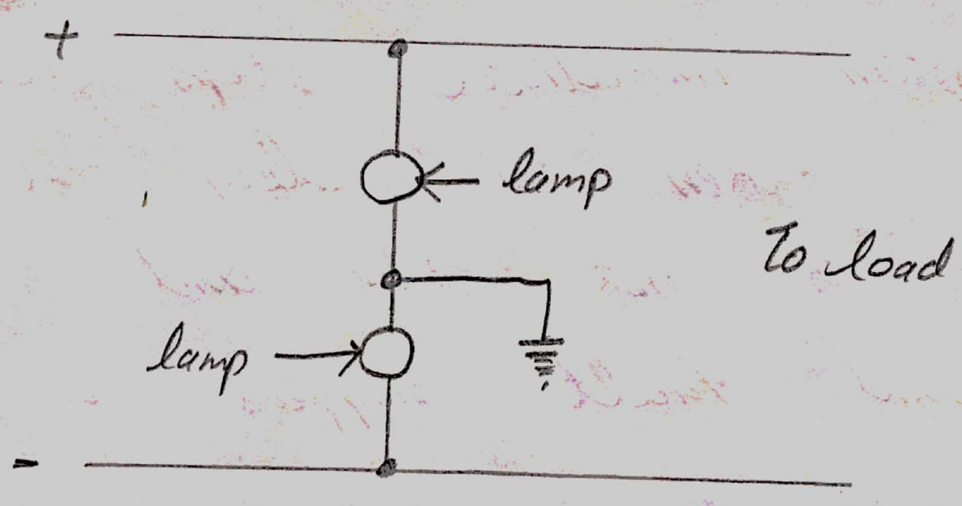
subjected to half their rated voltage will glow dimly. If a ground fault occurs on either wire, the lamp connected to the grounded wire will not glow while the other lamp will glow brightly.



Fig

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Q# 3 In a 3-phase 4-wire, 400/230 V system a lamp of 100V watts is connected to one phase and neutral and a lamp of 150 watts is connected to the second phase and ~~watts~~ neutral. If the neutral wire is disconnected accidentally what will be will be the voltage across each lamp?

Ans:- **Sol:->**

Fig shows the lamp connections. 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; $R_1 = \frac{(230)^2}{100}$

$$R_1 = 529\ \Omega$$

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

$$R_2 = 352.67\ \Omega$$

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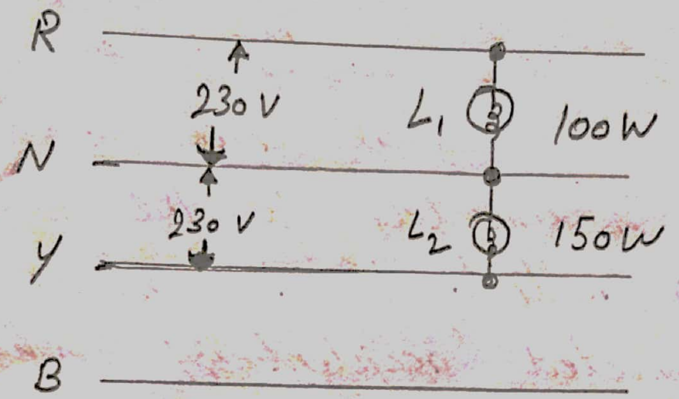
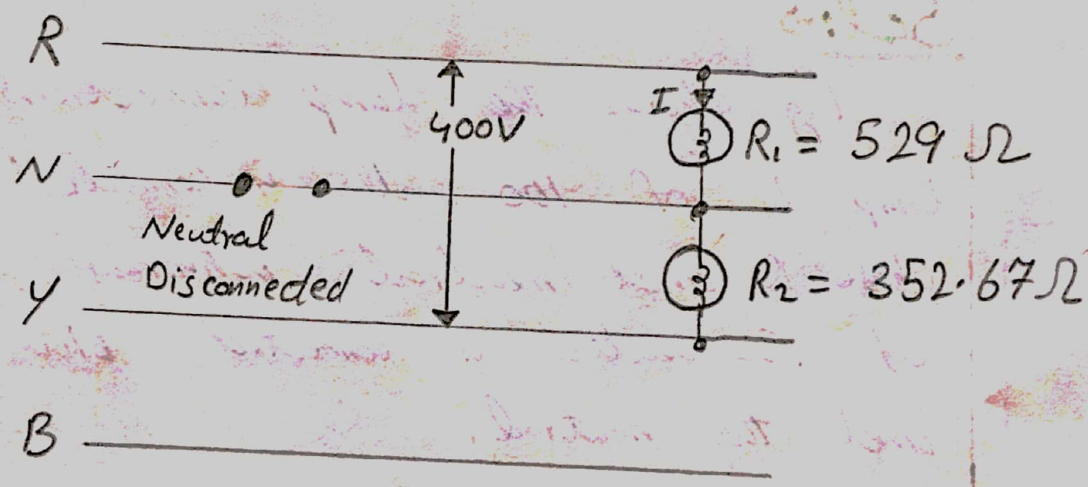


(i)



(ii)

When the neutral wire is disconnected as shown as fig the two lamps are connected in series and the potential difference across the combination becomes equal to line voltage E_L (=400V)

current through lamps $I = \dfrac{E_L}{R_1 + R_2}$

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$$= \frac{400}{529 + 352.67} = 0.454\ A$$

Voltage across lamp $L_1 = IR_1 = 0.454 \times 529$

$= 240\ V$

Voltage across lamp $L_2 = IR_1 = 0.454 \times 352.67$

$= 160\ V$

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

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Q# 4 A 2-wire d.c distributor ABCDE 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 sections (go and return) are: AB = 0.1 Ω; BC = 0.05 Ω, CD = 0.025 Ω and EA = 0.075 Ω. Determine:

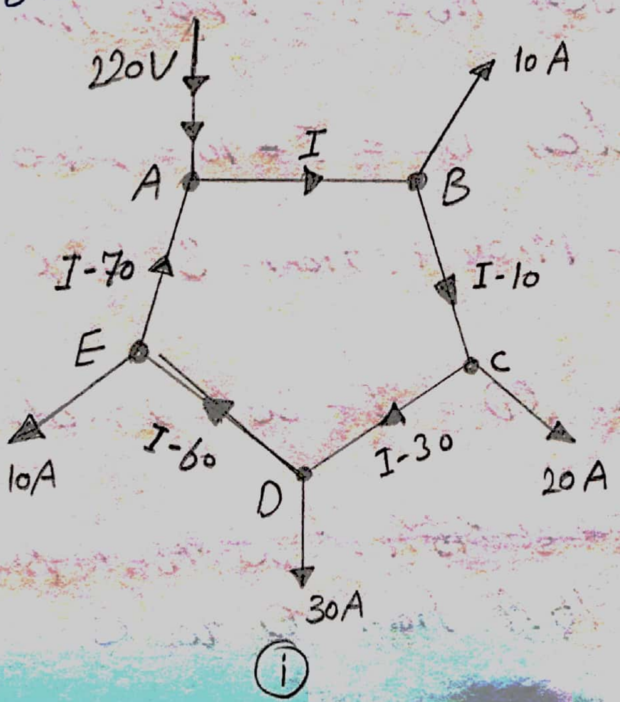
(i) The point of minimum potential

(ii) Current in each section of distributor.

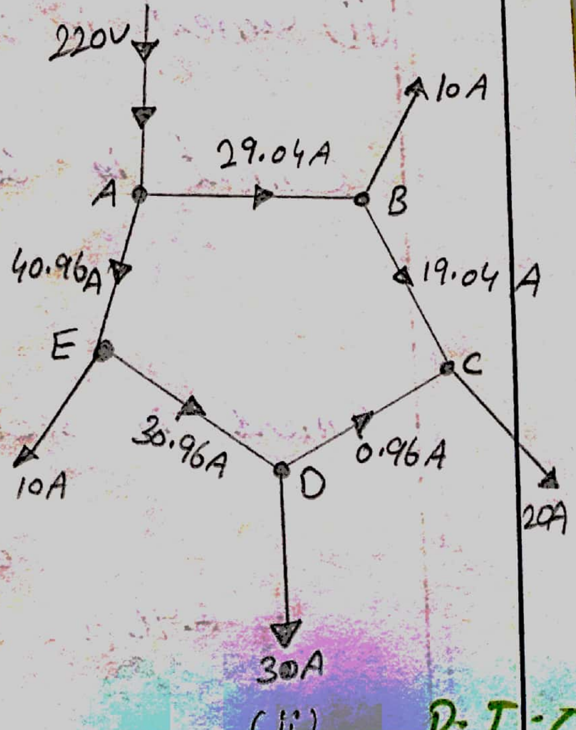
Ans# 4

Sol:→

Fig shows the ring main distributor. let us suppose the current I flows in section AB of the distributor. the currents in the various sections of the distributors are shown.



(i)



(ii)

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

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

or

$$0.1I + 0.05(I-10) + 0.01(I-30) + 0.025(I-60) + 0.075(I-70) = 0$$

or $0.26I = 7.55$

$\therefore$ $I = \dfrac{7.55}{0.26} = 29.04\ A$

$\therefore$ C is the point of minimum potential.

(ii) Current in section AB = I = 29.04 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 = 29.04 - 30

~~= -30.96A = 30.96A from E to D~~

= -0.96 A = 0.96 A from D to C

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Current in Section DE = I − 60 = 29.04 − 60 = −30.96 A from E to D

Current in Section EA = I − 70 = 29.04 − 70 = −40.96 A = 40.96 A from A to E

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Q# 5 Explain 2-wire D.C system.

(A)

Ans:- Two-wire d.c-system:-
If Vm denotes the maximum potential difference b/w the conductors it will also be the working voltage in this case

Load current, $I_1 = P/V_m$

line losses, $W = 2I_1^2 R_1 = 2\left(\frac{P}{V_m}\right)^2 \frac{\rho l}{a_1}$

$\therefore W = \frac{2P^2 \rho l}{a_1 V_m^2}$

$\therefore$ Area of x-section $a_1 = \frac{2P^2 \rho l}{W V_m^2}$

$\therefore$ Volume of Conductor meterial required

$$= 2a_1 l = 2\left(\frac{2P^2 \rho l}{W V_m^2}\right) l = \frac{4P^2 \rho l^2}{W V_m^2} = k \text{ (say)}$$

this volume will be taken as the basic quantity and comparison shall be made for other systems

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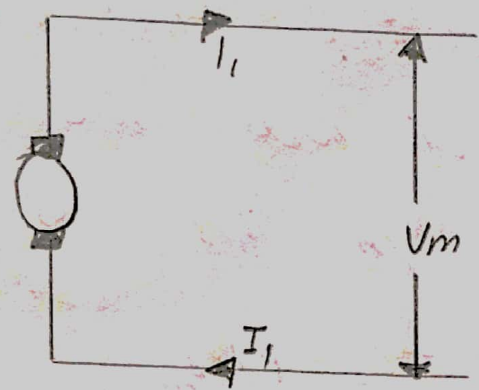
i.e;

$$\frac{4P^2\rho l^2}{W V_m^2} = k$$



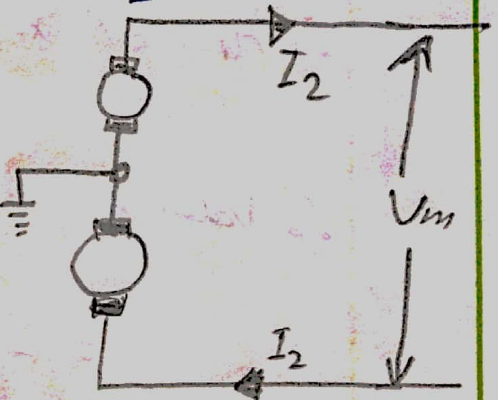
Fig

Two-wire d.c system with mid point earthed:-

load current, $I_2 = P/V_m$

line losses, $W = 2I_2^2 R_2 = 2\left(\frac{P}{V_m}\right)^2 \rho \frac{l}{a_2}$

$\therefore W = \frac{2P^2\rho l}{V_m^2 a_2}$



$\therefore$ Area of x-section, $a_2 = \frac{2P^2\rho l}{WV_m^2}$

Volume of conductor material required

$$= 2a_2 l = 2\left(\frac{2P^2\rho l}{WV_m^2}\right)l = \frac{4P^2\rho l^2}{WV_m^2} = k$$

Hence the volume of conductor material required in this system is the same as that for 2-wire d.c system.

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Q#5 (B) What do you know about boosters?

Ans. **Boosters:->**

A booster is a d.c generator whose function is to inject or add certain voltage into a circuit so as to compensate the IR drop in the feeders etc.

A booster is essentialy a series d.c generator of large current capacity and is connected in series with the feeder whose voltage drop is to to compensated as shown in fig. It is driven at constant speed by a shunt motor working from the bus-bars. As the booster is a series generator therefore, voltage generated by

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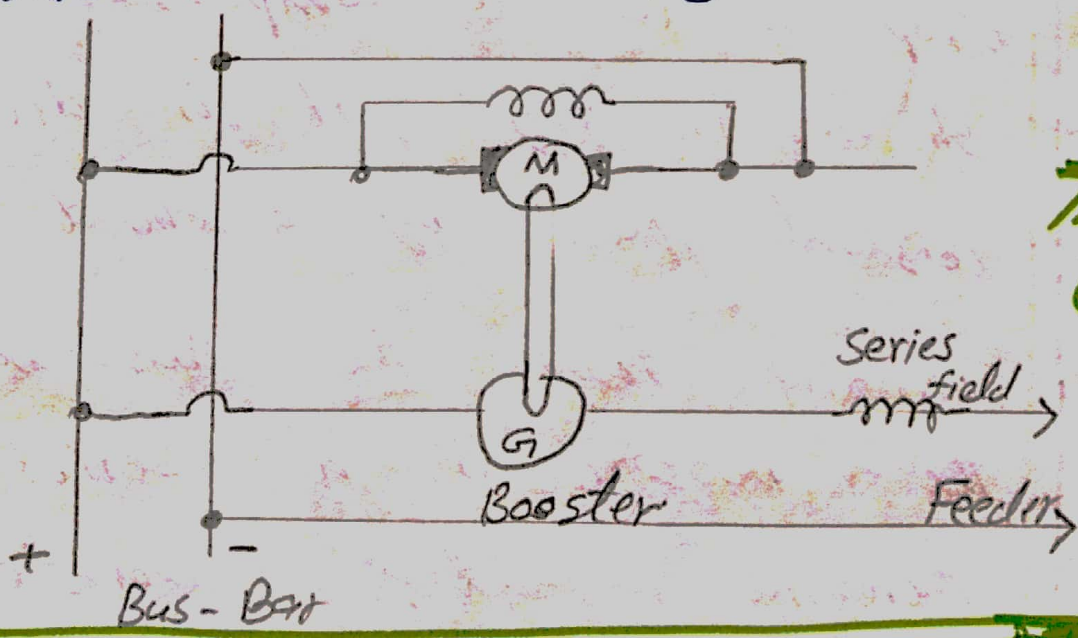
it is directly proportional to the field current which is here the feeders current. when the feeder current increases, the voltage drop in the feeder also increases. But Increased feeder current results, in greater field excitation of booster which injects higher voltage into the feeder to compensate the voltage drop.

The advantage of using a booster is that each feeder can be regulated independently - a great advantage if the feeders are different lengths.



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