Name — Salman Farooq

ID — 15276

Subject — Power Distribution

Date — 26.6.2020

Q:- (1) Page

Question Nos, 2

Given data:

Supply load is 150A, 200A

250A, 100A distance of 500m, 1300m

2300, 3000m

The Resistance of each Conductor is R

R = 0.02/1000m

Potential difference point

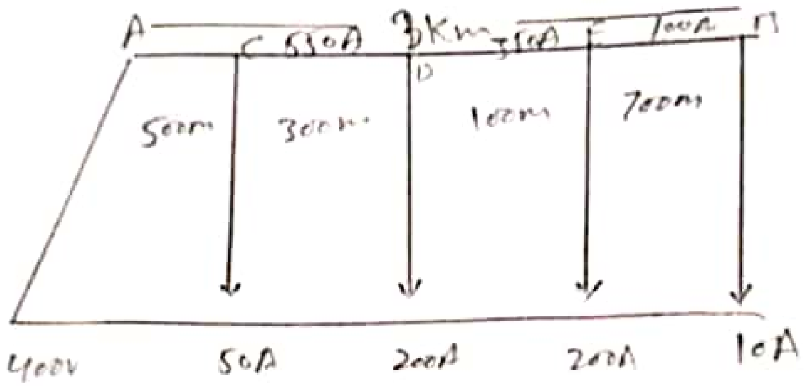
A = 400V

Required data:

Find potential difference of

each load = ?

Page ②



The above diagram is a single line diagram of the distributer with its tapped current.

Resistance per 1000m distributer is = 2X0.02 = 0.04Ω

Resistance of section Ac. RAc

$$Ac, R_{Ac} = 0.04 \times \frac{500}{1000}$$

$$= 0.04 \times 0.5$$

$$Ac, R_{Ac} = 0.02\,\Omega$$

Resistance of Section CD, R_{CD}

$$CD, R_{CD} = 0.04 \times \frac{800}{1000}$$

$$= 0.04 \times 0.8$$

$$CD, R_{CD} = 0.032\ \Omega$$

Rsistance of Section DE, R_{DE}

$$DE, R_{DE} = 0.04 \times 1000/1000$$

$$= 0.04 \times 1$$

$$DE, R_{DE} = 0.04\ \Omega$$

Resistance of Section

$$EB, R_{EB} = 0.04 \times 700/1000$$

$$= 0.04 \times 0.7$$

$$EB\ R_{EB} = 0.028\ \Omega$$

The Current in the various Section of distributor are

$I_{EB} = 100A$, $I_{DE} = \underline{100+250}$

$I_{DE} = 100+250 = 350A$

$I_{CD} = 350+200 = 550A$

$I_{AC} = 550+150 = 700A$

Potential difference at Point $C = ?$

V_C = voltage at A - Voltage drop in A.C

$= V_A - I_{AC} \cdot R_{AC}$

$= 400 - 700 \times 0.02$

$= 400 - 14$

$V_C = 386V$

Potential difference of point D = ?

$V_D = V_C - I_{CD} \cdot R_{CD}$

$= 386 - 550 \times 0.032$

$= 386 - 17.6$

$V_D = 368.4V$

Potential Difference at point D = ?

$V_E = V_D - I_{DE} \cdot R_{DE}$

$= 368.4 - 350 \times 0.04$

$= 368.4 - 14$

$= 354.4V$

$V_E = 354.4V$

Potential difference at load point B

$V_B = V_E - I_{EB} \cdot R_{EB}$

$= 354.4 - 100 \times 0.028$

$= 354.4 - 2.8 \Rightarrow V_B = 351.6V$

Question No 1

Resistance of 1m length of distributer

$$= 2 \times \frac{1.5 \times 10^{-5} \times 100}{1} = 3 \times 10^{-3}$$

Resistance of Section = AC, $R_{ac} = (3 \times 10^{-3})100 = 0.3\,\Omega$

Resistance of Section = CD, $R_{cd} = (3 \times 10^{-3})150 = 0.4\,\Omega$

Resistance of Section = DE, $R_{de} = (3 \times 10^{-3})100 = 0.3\,\Omega$

Resistance of Section = EF, $R_{ef} = (3 \times 10^{-3})100 = 0.3\,\Omega$

Resistance of Section = FB, $R_{fb} = (3 \times 10^{-3})100 = 0.3\,\Omega$

Voltage at y = voltage at X − drop over length Xy

$$V_y = [V_x - I_A R_{AC} + (I_A - 20) R_{CD} + (I_A - 60) R_{DE} + (I_A - 110) R_{EF} + (I_A - 140) R_{FB}]$$

$$230 = 230 - [0.3]_A + 0.4(I_A - 20) + 0.3(I_A - 60)$$
$$+ 0.3(I_A - 110) + 0.3(I_A - 140)$$
$$= 230 - (1.6I_A - 12.58)$$

Page (7)

or

$$1.6I_A = 12.58$$
$$I_A = 12.58/-1.6 = 7.862A$$

Knowing te value of IA Current in any Section can be determined, Thus Current in Section cd, $I_{CD} = I_A - 20$

$= 7.862 - 20 = -12.138A$ from C to D

$I_{DE} = I_A - 60 = 7.682 - 60 = -52.138A$ from D to E

Current in Section EF, $I_{EF} = I_A - 110$

$= 102.138A$ from E to F

Current in Section FB, $I_{FB} = I_A - 140$

$= 7.862 - 140 = 132.138A$ from F to B

The actual distribution of current in the various section of the distributors

It is clear that current are coming to the load point E from both side i.e from D.

Maximum consumer voltage.

$$V_E V_A - (I_{AC} R_{AC} + I_{CD} R_{cd} + I_{DE} R_{DE})$$

$$= 230 - (7.682 \times 0.3 + 7.862 \times 0.4 + 7.862 \times 0.3)$$

$$= 230 - 7.682$$

$$= - 222.318V$$

Question No 3

Sol

Current on +ve outer $I_1 = 260/7 = 37.14A$

Current on -ive outer $I_2 = 260/9 = 28.88A$

Current in neutral $= I_1 - I_2$

$= 37.14 - 28.88 = 8.26A$

Voltage between +ve outer and neutral at feeding end is

$V_1 = V_{EL} + I_1 R_{AE} + (I_1 - I_2) R_{NL}$

$= 260 + 37.14 \times 0.2 + 8.26 \times 0.2 \doteq 269.08V$

Voltage Between -ve outer and neutral at feeding end is

$V_2 = V_{LC} - (I_1 - I_2) R_{NL} + I_2 R_{BC}$

$= 260 - 8.26 \times 0.2 + 28.88 \times 0.2$

$= 267.42V$

Question NO:- 4

Ans:- A

(i) High diaelectric Strength to avoid electrical breakdown of the Cable.

(ii) High insulation resistance to avoid Leakage Current.

(iii) High mechanical Strength to with stand the mechanical handling of underground cable.

(iv) Non- inflammable

(v) Low Cost so as to make the underground system a viable Proposition.

Ans B

Rubber may be obtained from the milky sap of tropical trees or it may be produced from all oil product. It has valative permitivity verying between 2 and 3, diaelectric strength is about 30kv/mm and Resistivity of insulation is 1017 Ω cm.

Pure Rubber has reasonable high insulating properties, it suffer from some major drawback viz, readily absorbs maisture, the maximum safe temprature is low (about 38°c) soft and liable to damage due to rough handling and ages.

Ans A:-

(i) A trench of about 1.5 meters deep and 45cm wide is drug.

(ii) Then the trench is covered with a 10cm thick layer of fine sand.

(iii) The cable is laid over the sand bed. The sand bed protects the cable from the moisture from the ground.

(iv) Then the laid cable is again coverd with a layer of sand of about 10cm thick.

(v) when multiple cables are to be laid in the same trench, horizontal or vertical spacing of about 30 cm is provided to reduce the effect of mutual heating. Spacing between the Cables also ensures a fault occurring on one Cable does not damage the adjacent cable.

Ans B

The Solid system of Cable Laying in mainly performed where the Cable is Laid in the wood, Cast iron, or another nonsoil Surface, Normally cable is Laid in the manner which Provides good mechanical Strength to Cable.

The System is expensive Compare to the direct Laid system and heat dissipation capacity is not much good Compere with other System.

But For toughing material woods are much Cheap so it is widely used by Considering economical impect.

Normally the Cable are Filled with bituminous meterials for ~~Pro~~ Providing Protection and avoid heat dissipation. Then another Asphalt Cover Layer around the Cable and bituminous material area For further Protection.

Page (14)

End