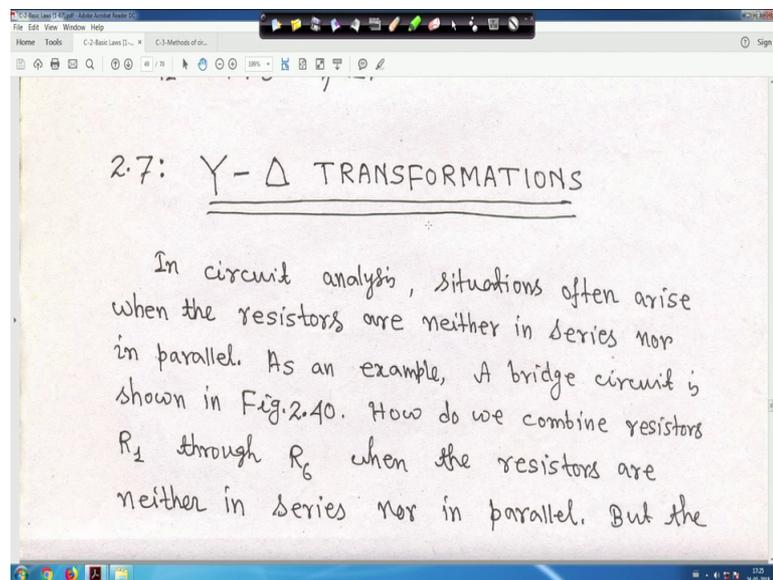


Fundamentals of Electrical Engineering
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Lecture – 10
Basic Laws (Contd.)

Welcome back, just now it is told about star delta transformation not delta transformation right.

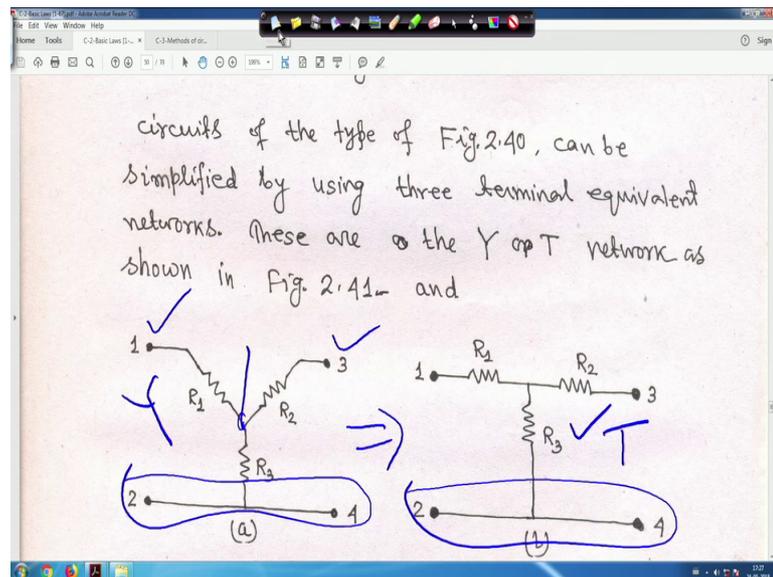
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So, how we will combine this here we will little bit little bit you just see how things are right. So, if you look at the circuit suppose for example, a bridge circuit is given in a your figure 40. So, how do we will combine resistor R_1 through R_6 ? Now say simple bridge circuit is there and here you have resistance R_1 , R_2 , R_3 , R_4 , R_5 , R_6 . So, how can we combine this R_1 through R_6 right? So, in that case you will find a difficult to get series parabola combination, because the way their connections R right.

So, you have to simplify by using a 3 terminal equivalent network right generally we will consider 3 terminals equivalent network for example, your this thing just hold on for this one. So, 3 terminal means basically these 2 terminals.

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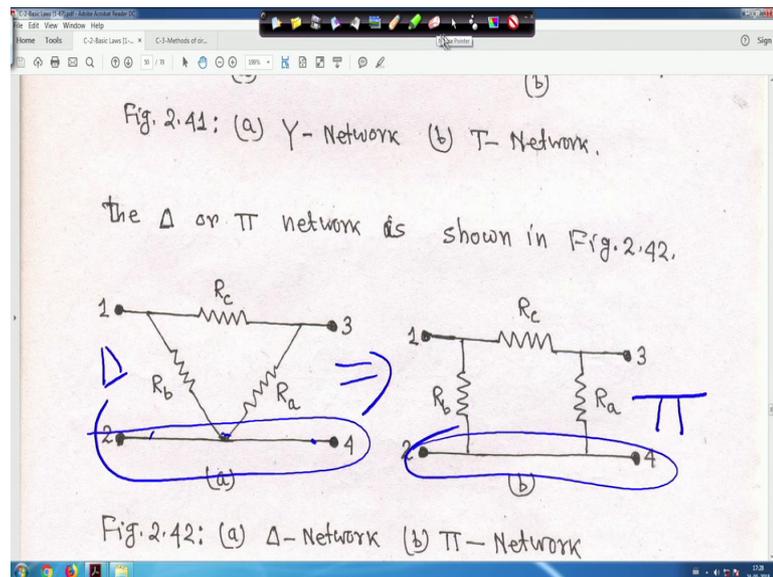


Look into that these 2 terminals actually is common, basically this is one terminal and this is another terminal and 2 and 4 because basically it is a common terminal. So, it is not 4 terminal; it is a 3 terminal right and resistances are given say R_1 R_2 R_3 if you if you draw like this, we call star connected right.

Same circuit if you stretch it of and make it like this same circuit both are same it is sometimes we call it T network here also R_1 R_2 and R_3 . Just this point this point you stretch it of right and just make it draw like this R_1 R_2 this is sometimes we call t network, and this is we call or stand both are same both are same right.

So, this is basically a 3 terminal, because this is common terminal 2 and 4 is a common terminal. So, let me clean it right. So, steps y it is star network we call sometimes they call y network also and this is T network right. So, another thing is the delta or pi network right. So, this is actually this is sometimes we call delta network here also 2 and 4 are common terminal here also this 2 and 4 this is a common terminal.

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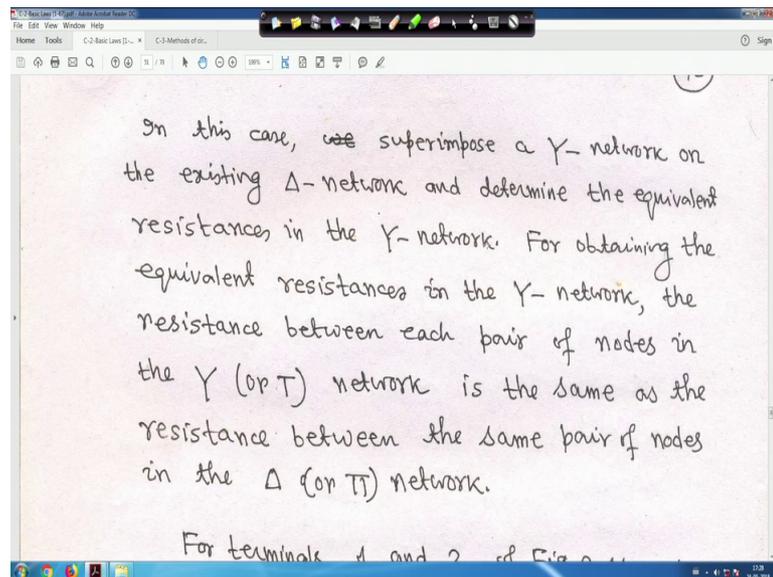


So, it is basically 3 terminal and one this is actually this your this is 2 3 4 this will mark, but this is basically a 3 terminal and if you just if you just bring this point to somewhere here and bring this point to somewhere here, this look like a your pi network.

So, because this is a common this is a common point right this is a common point. So, this is looks like a pi network both are same, both are same sometimes we call this is a delta network and this is we call sometimes pi network, but both are same both are same right. So, that is why it is written delta network and this pi network. So, how to because basically you have to either star to delta and delta to star conversion; so, how we do this? Just hold on right.

So, now delta to star conversion right you have to in this case what we will do?

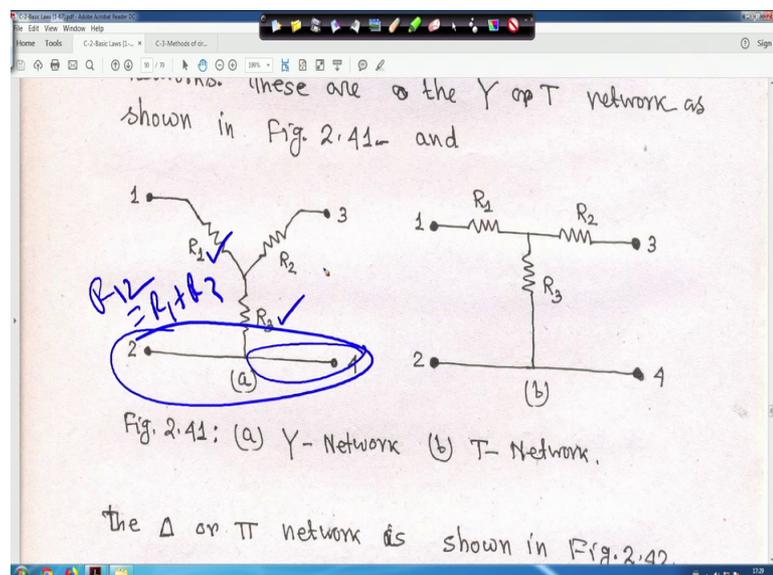
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You have to superimpose a star network on the existing delta network and equivalent and you have to find out equivalent resistances in the star network, so you go for delta to star conversion right. So, for obtaining the equivalent resistances in the star network, the resistance between each pair of nodes in the star or T network is the same as the resistance between the same pair of nodes in the delta or pi you know how it looks like?

Now, let us let us these first try to find out right; for example, for example, for terminals 1 and 2 for terminals 1 and 2 if you go for star network, for terminals 1 and 2.

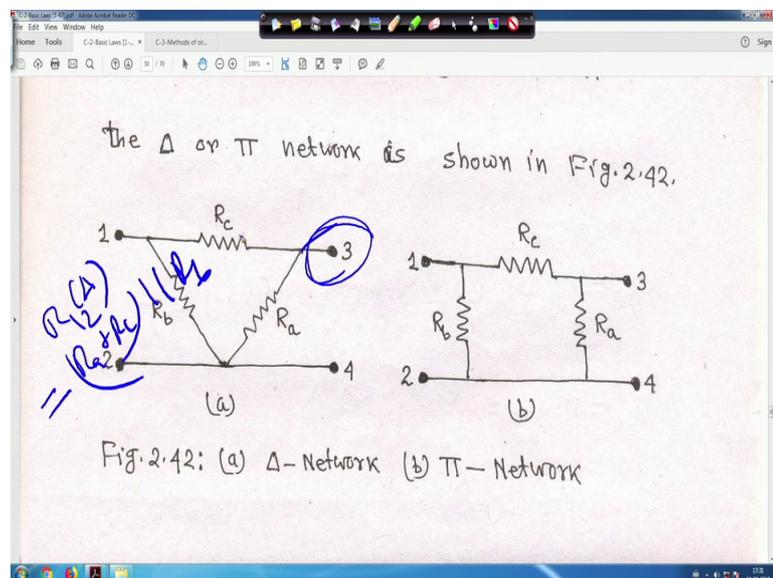
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2 and 4 is common; so, I making it here that 2 and 4 is common right; that means, we make it as a say your what you call forget about this side forget about this side say take R_{12} ; that means, your R_{12} ; when this side is open this side is open. So, R_{12} will become actually R_1 plus R_3 because this is R_1 and this is R_3 right.

So, R_{12} will become R_1 plus R_3 ; so, just clean it let me go right. So, if you see this that R_{12} star is equal to R_1 plus R_3 right; this is your for star connection R_{12} star R_1 plus R_3 . Now if you look R_{12} delta right come here again. When you come to R_{12} delta here right; here when you come to forget about this thing that R_{12} delta this side nothing is connected right.

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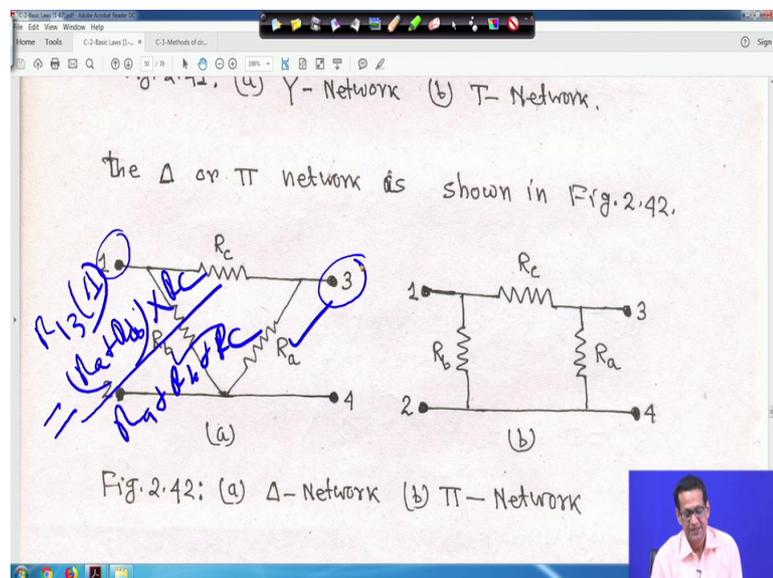
That means, if you look into here, you will find that if it is that if you try to find out here R_{12} this delta means for delta connection right; that means, R_c and R_a they are in series right; that means, R_a plus R_c in parallel with R_b ; that means, we can write this one is equal to hope you can this thing that R_a plus R_c ; these 2 are in series R_a plus R_c with that parallel to this one these are making it parallel is R_b that means R_{12} delta will be R_a plus R_c into R_b divided by R_a plus R_c plus R_b right.

So, because as soon as you are taking your what you call R_{12} , please do not consider anything here, it is simply R_a and R_c it is this R_c it is open. So, this side nothing is there right and so, R_a plus R_c they are in series along with that R_b in parallel. So, it will be R_b into R_a plus R_c divided by R_b plus R_a plus R_c ; so, cleaning it and going to that right.

So, if you come to that sorry that look R_{12} delta is equal to R_b parallel to $R_a + R_c$; that means, R_b into $R_a + R_c$ by $R_b + R_a + R_c$. Now both are actually same R_{12} star and R_{12} delta both are equal just we said that setting R_{12} star is equal to R_{12} delta because you have to find out equivalent hence they will be equal. Therefore, R_{12} will be $R_1 + R_3$ will be R_b into $R_a + R_c$ by $R_a + R_b + R_c$ this is equation 42. These all equation number 40 41 is given; so, a one equation you got $R_a R_1 + R_3$ is equal to these one.

Similarly when you get your R_{13} , you come to come to this circuit when you come to your R_{13} right.

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This one when you come that R_{13} ; that means, just hold on this is 1 and this is 3 try to find out R_{13} this is actually R_{13} then it is star right basically is nothing, but R_1 plus R_2 because other side is nothing is there open. So, it is R_1 plus R_2 right R_1 and R_2 this is your R_{13} ; and when you write, this is for star. Now when you come to delta let me clean it, when you come to delta here right here when you try to R_{13} ; let me mark it right this is your 1 and this is 3 when you your coming out to your R_{13} ; that means, in that time R_a and R_b are in series right.

Therefore, R_{13} delta right is equal to is equal to your R_a plus R_b this is in is your what you call this is are this 2 are in series with that with parallel with R_c ; that means, it is R_a plus your R_b right this one into I am writing on it does not matter into R_c divided by R_a

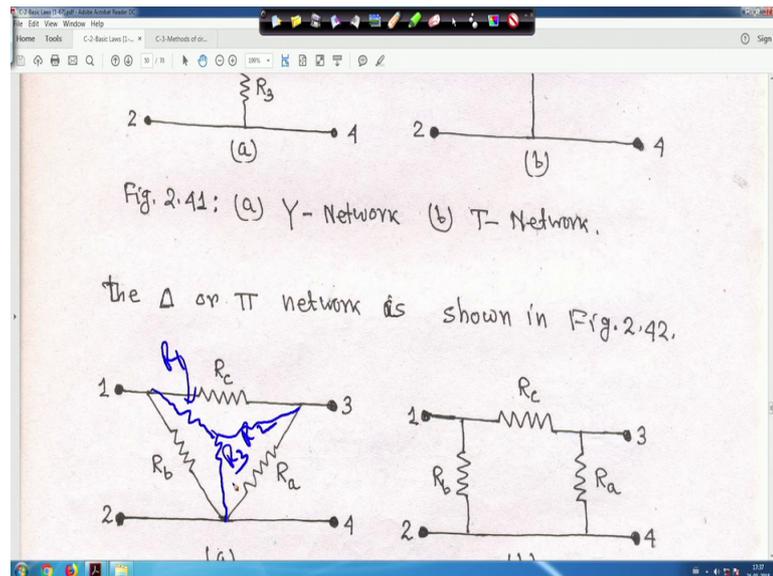
plus R_b plus R_c because when you take R_1 ; this R_b and R_c R_a there in series right. So, just cleaning it so; that means, your when to take R_1 R_a and R_b are in series and that is R_a plus R_b with that that R_a plus R_b is in parallel with R_c . So, it will be R_1 delta will be is equal to R_a plus R_b into R_c divided by R_a plus R_b plus R_c right.

So that is why you are writing this equation your R_1 is equal to R_1 plus your what you call R_2 into R_c , R_a plus R_b by R_a plus R_b this is equation 43. Similarly third one R_3 also you can find out I need not do repeated again now things are understandable to you right. Similarly, R_3 if you make it will become R_2 plus R_3 for star and for your delta you will see R_b plus R_c is in parallel with R_a . So, because R_b and R_c will be in series; so, R_b plus R_c into R_a divided by R_a plus R_b plus R_c .

So, if you look into that that equation 42, equation 43 and 44 that 3 unknown and 3 equations we have to solve it. So, I am writing the solution directly, but you can try to solve of your own if you want right, but no need actually some technique is there I told you, you can you can keep it in your memory right. So, solving 42, 43 and 44 for R_1 , R_2 R_3 you will get R_1 is equal to $R_b R_c$ upon R_a plus R_b plus R_c R_2 is $R_c R_a$ by R_a plus R_b plus R_c and R_3 is equal to $R_a R_b$ by R_a plus R_b plus R_c .

So, from your what you call; how to your remember this one right that delta to star right how to remember this one. So, go back to this thing right that delta to star transformation right go back to this. Now look into that that your what you call your 1 2 suppose R_1 , R_2 , R_3 and here it is your R_b , R_c , R_a right. So, if I superimpose this star if I superimpose this star on this delta, then how it looks like? Just see that when I making it hope it is matching with this your this thing just hold on let me have a look this one this one R_1 , R_2 , R_3 ok.

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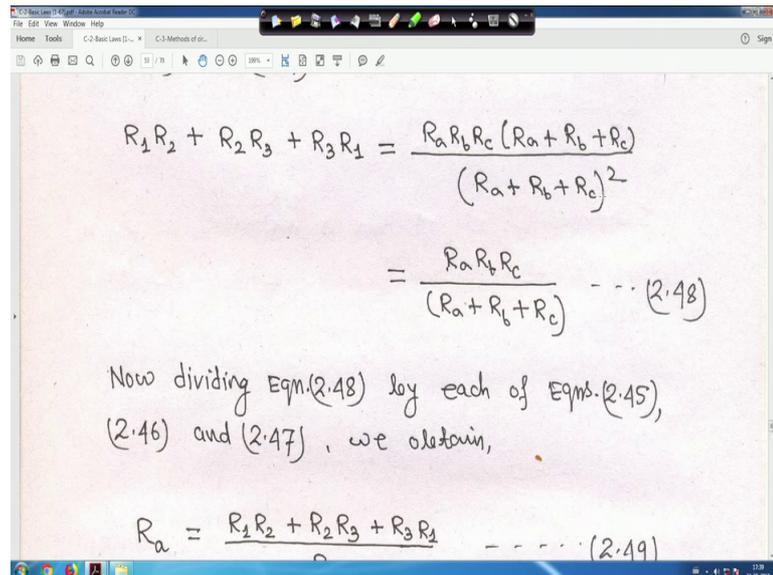
Now, just hold on this is actually if you try to find out this is R 1 this is actually this one actually your R 1, this is actually your R 2 and this is actually is R 3 right. So, R 1 will be you have look according to that R 1 will be this is your R 1 and this is delta. So, R 1 will be R_b, R_c divided by R_a plus R_b plus R_c ; that means, when you take the R 1; the product of this 2 resistance adjacent branch, divided by some of all R_a plus R_b plus R_c .

Similarly, R 2 is equal to product of the 2 resistor adjacent branch that is $R_a R_c$ divided by $R_b R_a$ plus R_b plus R_c . Similarly R 3 is equal to product of the adjacent branch that is $R_a R_b$ divided by your; what you call R_a plus R_b plus R_c right. So, this is your if you go to that the derivation that R 1 look R 1 is equal to R_b, R_c, R_a plus R_b plus R_c R 2 is equal to $R_c R_a$ plus R_b plus R_c ; R 3 is equal to $R_a R_b$ plus R_a plus R_b plus R_c ; that means, I told you the adjacent for adjacent branch product resistance given it by R_a plus R_b ; that means, all the time your R 1, R 2, R 3 case are division by R_a plus R_b plus R_c common and only adjacent branch that 2 resistance product you have to take that is your delta to star conversion right delta to star conversion. So, that is 45, 46 and 47 this is the equation number right.

Now, question is superposition of y and delta networks is shown in figure this thing here; here it is shown. Whatever I shown look R 1 is equal to when you take R 1 product of this adjacent branch $R_b R_c$ by R_a plus R_b plus R_c . Similarly your R 2 is equal to product of this adjacent branch $R_a R_c$ by R_a plus R_b plus R_c and R_c is equal to $R_b R_a$ plus R_a plus R_b plus R_c divided by R_a plus R_b plus R_c that is whatever it is written here in 45, 46 easy to remember.

And one additional node is neutral that we will see your n, that we will see later for the AC circuit not here we will not see those things here right. One another additional node is created here n right that we will see later right ah, but for our this thing AC circuit analysis, but your; what you call this is your delta to star transformation, this is actually delta to star transformation.

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$$R_1 R_2 + R_2 R_3 + R_3 R_1 = \frac{R_a R_b R_c (R_a + R_b + R_c)}{(R_a + R_b + R_c)^2}$$

$$= \frac{R_a R_b R_c}{(R_a + R_b + R_c)} \quad \dots (2.48)$$

Now dividing Eqm.(2.48) by each of Eqms.(2.45), (2.46) and (2.47), we obtain,

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1 + R_2 + R_3} \quad \dots (2.49)$$

Now, start to delta if we suppose R 1, R 2, R 3 is there and star, I have to make what is the expression of Ra, what is the expression of Rb, what is the expression of Rc right. So, that how we will do it that now star to delta transforming now we have I have a star network now what I have to do is, I have to conveyor to delta network right.

So, in that case what we do that from for your Y network, that equivalent delta network we made from equation 45, 46 and 47 loop. Here we have here we have R 1 R 2 R 3 all 3 expression what we do? You find out the sum R 1 R 2 plus R 2 R 3, plus R 3 R 1; R 1 R 2 you multiply R 2 R 3 you multiply and R 1 R 3 also multiply right. If we do so, if we do so, then R 1 R 2 plus R 2 R 3 plus R 3 R 1 if we do and simplify you will get Ra Rb Rc into Ra plus Rb plus Rc upon Ra plus Rb plus Rc whole square. So, Ra Rb Ra plus Rb plus Rc will cancel R 2 will be become Ra Rb Rc upon Ra plus Rb plus Rc; if you just make it now.

Now, dividing equation 48, 2 that is 48 that is by each of equation 2 45, 46 and 47 then we will obtain then what we will do.

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$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1} \quad \dots \dots (2.49)$$
$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2} \quad \dots \dots (2.50)$$
$$R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3} \quad \dots \dots (2.51)$$

From Eqms. (2.49), (2.50) and (2.51) and Fig. 2.43,

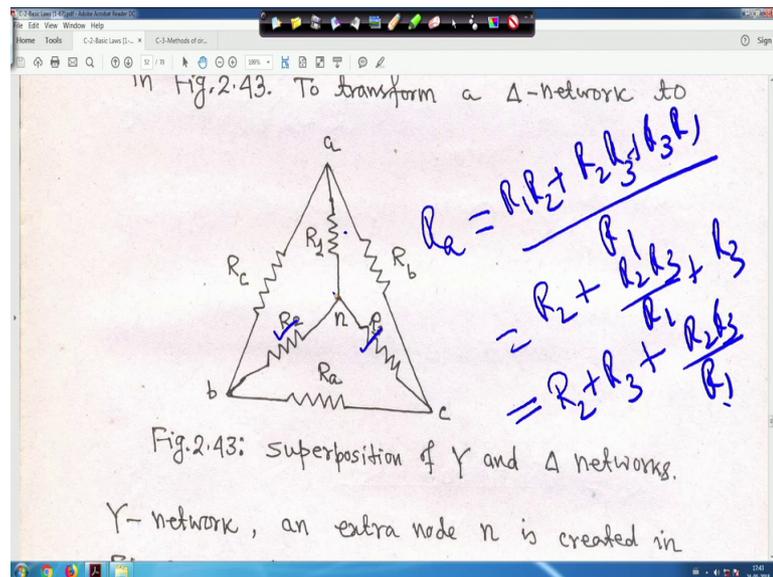
This equation 48 divide by each of 46 like this one, that your equation for your 45 46 and 47 just you divide right. These are simplest way of obtaining this right you got this one, now dividing equation 48 by each of equation 45 46 and 47

So, first you divide equation your 48 by your 45 first you divide, then what you will get? You will get this your R_a is equal to $R_1 R_2 + R_2 R_3 + R_3 R_1$ divided by R_1 right. So, what we will what we will get this one that R_a is equal to $R_1 R_2 + R_2 R_3 + R_3 R_1$ by R_1 and R_b is equal to $R_1 R_2 + R_2 R_3 + R_3 R_1$ and R_c we will get $R_1 R_2 + R_2 R_3 + R_3 R_1$ by R_3 .

But how to remember I will simplify it; this way if you just make it like this, the $R_1 R_2 + R_2 R_3 + R_3 R_1$; all the case numerator in this case is same. This $R_1 R_2 + R_2 R_3 + R_3 R_1$ all the case numerator is remain same only for R_a divided by R_1 for R_b divided by R_2 and for R_c divided by R_3 right.

So, if you look into the circuit, that your what you call your star to delta transformation right.

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So, this is if you look into this that what will be your what you call that your R_a R_b and R_c ; if you look into that your R_a , then R_a is equal to actually it is coming that numerator is same R_1, R_2, R_3, R_3 and your $R_1 R_2$ then $R_2 R_3 R_c R_1$ divided by R_1 . So, how to remember this?

So, question is that your for example, this one look for a first I am taking R_a ; R_a right what we are doing in that is your $R_1 R_2$ this numerator is common $R_1 R_2$ plus your $R_2 R_3$ plus $R_3 R_1$ common divided by this is R_a right. So, and this is the opposite term here it is R_1 you divided by you divide it by R_1 right. Now for further simplification how will do? Divide this one by R_1 .

So, it will become R_2 right and plus this is your $R_2 R_3$ by R_1 and divide this by R_1 this is R_3 ; that means, R_i is equal to I can write like this R_2 plus R_3 plus $R_2 R_3$ by R_1 right; that means, for remembering this that R_i is equal to what you can do is, one is that very simple is that your $R_1 R_2 R_2 R_3$ plus $R_3 R_1$ divided by the opposite is R_1 just opposite to this R_1 right.

Another way is R_a is equal to this R adjacent branch this sum that adjacent branch R_2 plus R_3 , plus $R_2 R_3$; $R_2 R_3$ divided by this opposite branch R_1 . So, R_2 plus R_3 plus R_2 upon R_3 upon R_1 this way also you can remember this; I mean this is the simplest way that R_1 at $2 R_2 R_3 R_3$ is common, numerator is common. So, when you

take $R_1 R_2$ once R_a , R_a should be get this $R_1 R_2 R_2 R_3 R_3 R_1$ this is common divided by R_1 .

Similarly, if you try to find out your what you call R_b , similarly numerator is common the actually whatever it will come divided by your R_2 . Similarly when you take R_c that numerator is common right divided by only R_3 very simple. Otherwise R_a is equal to your what you call R_2 plus R_3 plus see after simplification this R_2 into R_3 by R_1 ; the way you want similarly your R_b and R_c you can easily make it right.

So, it is very easy the way you want, but I always feel this is the simplest one because product $R_1 R_2 R_2 R_3 R_3 R_1$ product; you take and this is common for all this is common for all the your what you call for all $R_a R_b R_c$ numerator is common. So just when it is R_a just; opposite branch is R_1 divided by R_1 for your R_b whatever it is coming numerator divided by R_2 numerator is same.

Similarly, for your what you call R_c , R_c whatever numerator is common divided by R_3 just simplest one; I hope you have understood this right. So, just you have to solve it that is all. So, just clean it right hope things you have understood that how to make this thing right. So, this is your start to delta conversion right.

So, each resistor in the delta network I made something underline, that is a sum of all possible products of star resistance take into 2 at a time divided by the opposite your Y resistance that opposite Y that that is all right. So, this is easy for you right.

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$R_a = R_b = R_c = R_\Delta \dots (2.53)$

Under this condition, conversion formulas become,

$$R_Y = \frac{R_\Delta}{3} \text{ OR } R_\Delta = 3R_Y \dots (2.54)$$

The Y or Δ networks occur by themselves or as part of a larger network. They in three-phase networks, matching net

And if in this case if a suppose delta and star networks are said to be balanced and when $R_1 = R_2 = R_3 = R_{\Delta}$, and when all are equal it is said is a balance network right and $R_a, R_b, R_c = R_{\Delta}$ right. So, that is equation 53. So, under this condition if you make all R same right and R_{Δ} and R_{star} all R same, then easily you can find out is conversion say R_{star} will be $R_{\Delta} / 3$ right when you say and when you making for your what you call then one you can make it delta to star another you can make star to delta right. So, in that case R_{star} will be $R_{\Delta} / 3$ or $R_{\Delta} = 3R_{\text{star}}$ right.

So, from this equation only it comes opposite to the that; $R_{\Delta} = 3R_{\text{star}}$ right. So, this is the that is fine it is all $R_1 = R_2 = R_3; R_a = R_b = R_c$ all are equal, then in that case this is the condition if you substitute and weight that is all right. So, star or delta networks occur by themselves or is a part of the larger network, there use in the your 3 phase network, matching networks and electrical filters that will your what you call that when you will learn 3 phase circuit at the 10 of course, we will see the star delta right.

So, let taken example; so, in the circuit shown in figure your 44 ah. So, find the equivalent resistance R_{ab} right and the power delivered ah by the same right.

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EX-2.20: In the circuit shown in Fig.2.44, find the equivalent resistance R_{ab} and the power delivered by the source.

Fig.2.44: Circuit for EX-2.20

Handwritten calculations on the slide:

$$(10 + 6) = 16\Omega$$
$$\frac{16 \times 48}{(16 + 48)} \Omega$$

So, in that case that you have to find out you have to find this is actually a terminal this is actually b terminal and voltage source is given. And you have to find out first what is R_{ab} equivalent resistance of this circuit first you have to find out right. So, how we will do it?

Now 10 and 6 ohm actually there in series; so, it will be 10 plus 16. So, 10 and plus 6 these to R in series is. So, it will be 16 volt right and with that 48 is in parallel right. So, 16 is in parallel is 48; so, equivalent will be 16 into 48 divided by 16 plus 48 ohm right whatever it comes. So, same thing is there next; so, let me clean it.

So, if you look so 10, 6 these thing and 48, now if you if you look into I told you that 10 and 6 are in the series; so, 16 and 48 are in parallel right.

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Equivalent circuit is shown in Fig. 2.45(b)

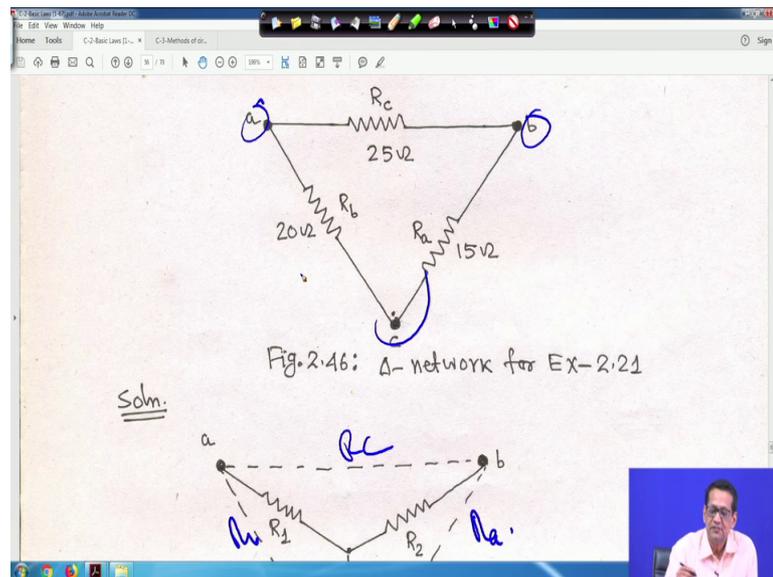
Fig. 2.45(b)

$$R_{ab} = \frac{15 \times 30}{15 + 30} = 10 \Omega$$
$$P = V^2 / R = (20)^2 / 10 = 40 \text{ W}$$

So, this 48 and 16 will be parallel equivalent is becoming 12 ohm right so; that means, the circuit is coming like this is your 12 ohm and then again 12 ohm is in series with 18 ohm because 18 ohm resistance is here.

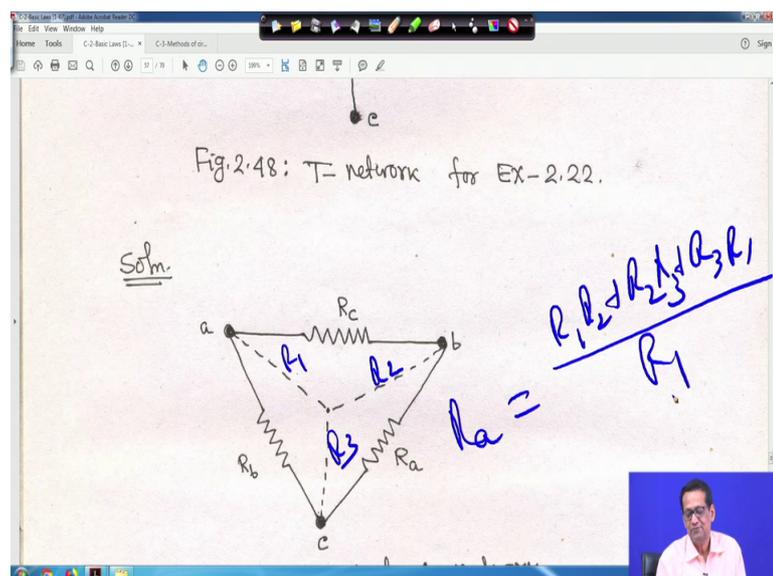
So, here it is 12 and 18; so 30 30 ohm total that is in parallel with 15 ohm right. So, 15 into 30 by 15 plus 30; so equivalent to 10 ohm and power delivered is you know V^2 upon R_{ab} because equivalent this is actually R_{ab} equivalent resistance, because this terminal is a this terminal is b. So, this is equivalent your what you call this equivalent is your this is actually a this terminal is b. So, this equivalent is R_{ab} right; so, R_{ab} is equal to your 10 ohm because 12 by 18; 18 to 12 by an 18; 30, 30 into 15 by 15 plus your 30; so 10 ohm right; so, cleaning it. So, it is actually 40 watt; so power delivered by this only is 40 watt right.

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Now, next stage your another thing that convert delta network to an equivalent star network. That it is R_a is given 15 ohm, R_b 20 ohm and R_c you have to convert star to delta. So, this is actually drawn R_1 R_2 R_3 ; so, just for your this thing just hold down this is R_c you know. So, it is a b c or a b c all are marked; so, a to be actually here it is R_c right and here it is your this branch is R_a for delta and this branch is R_b for this thing right. So, it is fifth 25 ohm 15 ohm and 20 ohm right; so, this is I am cleaning it.

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So, if you now if you use equation 45 46 and 47; so, R_1 will be $R_b R_c$ by R_a plus R_b plus R_c ; $R_a R_b R_c$ all are given right just you by adjacent then product divided by R_a plus R_b plus R_c that is all right. So, it is R_a is R_b plus R_c sorry R_b into R_c by R_a plus R_b plus R_c whatever it come 20 into 25 by 15 plus 20 plus; so, 60. So, denominator is 60; so, it will be 25 by 3 ohm.

Similarly, R_2 is equal to $R_c R_a$ and denominator is fixed. So, 25 into 15 upon 60; so, 25 by 4 ohm sorry and R_3 is equal to R_a by R_b and denominator is fixed. So, it is total 60; so 15 into 20 by 6; so that is equal to 5 ohm that is delta to star conversion.

So, taking $R_1 R_2 R_3$ star try to convert to delta, same value will get $R_a R_b R_c$ right. Now another thing is the transform the T network T means it is a it is a star network right. So, T network in figure 48 to your what you call to your delta network. So, it is a star right; so making it delta. So, this is your a just hold down this is a b and c right this is T network the star network R_1, R_2 and your R_3 all are given 10, 20 and 30 ohm right.

Now, delta when you are trying to make it delta right. So, this is actually your this is actually your R_1 this is actually your if it is R_1 I think this is R_2 and this is R_3 yeah this is R_3 ; so, right. So, cleaning it; so, you are making this your what you call this to you have to convert it your what you call to delta. So, R_a is equal to (Refer Time: 26:25) you will take that your what you call? All the product R_1, R_2 plus $R_2 R_3$ plus your $R_3 R_1$ divided by the opposite R of the star that we have seen. So, in this case also in this case also right just just 1 minute; let me take I should not make any error right. So, this is R_1 this is R_2 this is R_3 now it is ok.

So, now this is your this is R_1 this is your R_1 , this is R_2 and this is R_3 right. So, we have to your what you call the star is given. So, you have to make it delta; so, we know R_a is equal to your R_1, R_2 numerator is same here $R_2 R_3$, plus $R_3 R_1$ right divided by that opposite term R_1 , similarly $R_b R_c$ we will be get all the values have $R_1 R_2 R_3$ is given. So, you can easily compute. So, let me clean it right.

So, look into that equation 49 50 and 51 R_a is equal to $R_1 R_2$ plus $R_2 R_3$ plus $R_3 R_1$ by R_1 . So, just 10 into 20 plus 20 into 30 plus 30 into 10 divided by 10. So, its come 110 ohm similarly R_b is equal to numerator will be remain same divided by R_2 20. So, 55

ohm and this one your ah your what you call numerator will remain same divided by R 3 30 it will be 110 by 3 ohm right.

So, these another circuit that further network in figure 50 find Rab and I just one thing here one here one small error is there.

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$$∴ R_c = \frac{110}{3} \Omega$$

Ex-2.23: For the network in Fig.2-50, find R_{ab} and i . (55)

The circuit diagram shows a 50V DC voltage source on the left. A 13Ω resistor is connected in series between terminals 'a' and 'c'. A current i is indicated flowing from terminal 'a' through the 13Ω resistor. The circuit then branches into two parallel paths. The first path contains a 24Ω resistor in series with a 30Ω resistor. The second path contains a 20Ω resistor in series with a 10Ω resistor, which is in parallel with a 50Ω resistor. The circuit returns to terminal 'b'.

So, this actually you have to find Rab means these Rab here this you will be know this one you will know. So, I cut this is not there. So, I cut Rab means, this Rab right. So, in the diagram this you will know by mistake I have made it here also, but for you have to find out this Rab. So, how to find it out right?

So,. So, and the I current voltage source is given 50. So, 24 ohm 20 ohm and 10 ohm register are delta connected and for simplicity.

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Fig.2.50: circuit for EX-2.23.

Soln.
 24Ω , 20Ω and 10Ω resistors are Δ -connected and for simplicity, convert Δ -network portion to Y-network.
 Equivalent circuits of Fig.2.50 are shown in Fig.2.51(a) and 2.51(b)

Convert delta network portion to star may be 20 ohm 24 20 and 10. So, 24 20 and 10 this is basically your delta because c and b if you just make like this it is a delta connection.

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R_{ab} and i .

Fig.2.50: circuit for EX-2.23.

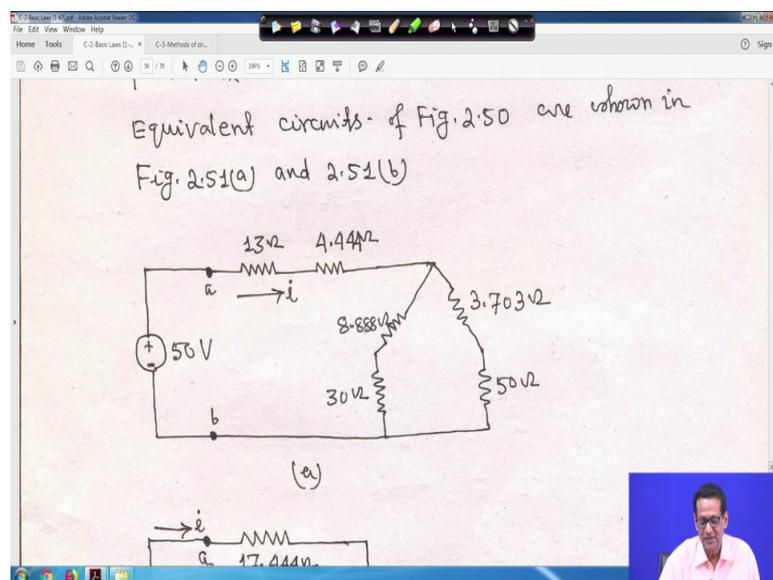
Soln.
 24Ω , 20Ω and 10Ω resistors are Δ

It is made it like a square, but this is a delta connection because here you here you can make this connection like this right suppose only I have driving this portion. This is c this is your c right and this is your some terminal this is your some terminal, I actually I should it made a dash b dash then there is no problem right.

So, here it is a dash right, here it is b dash and this is 10 ohm and this is your 10 ohm and here also that 30 ohm is connected and here also some 50 ohm is connected something it. So, this actually it is in delta right. So, 10 24 20; so, you have to convert it to star right. So, you can now you know how to convert it to star, I will now will directly I give the values right. So, such that that time will be time will be said you can easily do it.

So, I am just another cleaning it right. So, in that case if you make all this conversion and make your series your after making this all this some series combination will come.

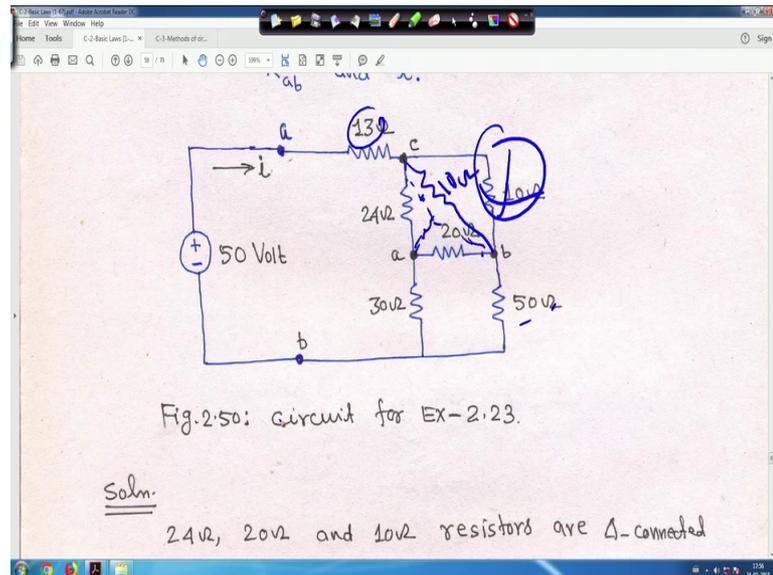
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So, if you make it will come your 8.888 this side right because as soon as we will make it, that your you will see the 24 20 trade or in your what you call in your what you call that your ah delta to star. So, it will become 13 and with that your this is your 13 ohm and this branch because as we know as soon as you make this star as soon as you make this one what we call, star connection with the 13 something will find will be in series right. And other thing other 2 will be that 8.88 will come. So, 4.44 will come. So, it is your R 1 say it will come like this. So, this is your after delta 2 star conversion, and this is the other 2 part 8.88 and 3.703.

So, this 4.444 ohm will series 13 and this will be series is 30 and this will be in series in 50. Please do it of your own right please do it of your own actually when will make this one as a delta just hold down if you this thing this is this is delta know.

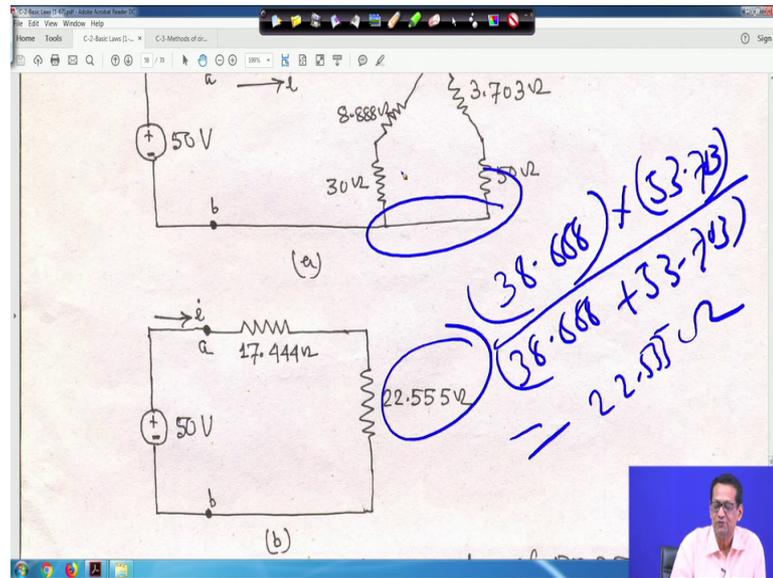
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So, forget about this thing this 10, I am if I make it like this is my 10 10 ohm forget about this thing for example, 10 ohm then this is your star this is star this is star suppose this is your R 1. So, whatever will come here with the 13 it will be in series whatever will come here it will be in series is 30 and whatever will come here it will be in series in 40 that is whatever you have got 4 point 4 four 8.88 another I have to see how much it is right. So, that is the thing; so, anyway cleaning this right.

So, this way it is coming now this at this 2 at this 2 and this 2 are in parallel because there in parallel. So, if you that is 38.888 and 53.703 these 2 are in parallel, make there equivalent and this is 13 plus 4.4 17.444 and there equivalent will be 22.555 ohm it is something like this right it is be it is your 38.

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There in series into 888 right into 50 plus 3.703. So, 53.703 right this one divided by 38.888 plus 53.703 it will it will come actually 22.555 ohm that whatever it is made here right.

So, this because there in parallel, because this is a this is your common node this node is a common node so, they are in parallel right; so let me clean it right. So, now, you add this 2 17.44 so, you will find it is 40 ohm. So, if you add this it will be actually 40 ohm right. So, an i is equal to then 50 by 40 volt, 50 volt is a source. So, current is 1.25 ampere right so.

Thank you very much we will be back again.