Fundamentals of Electrical Engineering
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Lecture – 07
Basic Laws (Contd.)

So, whatever we have discussed here, same thing has been made for you, right? So, I am not further explaining this, just I have told you.

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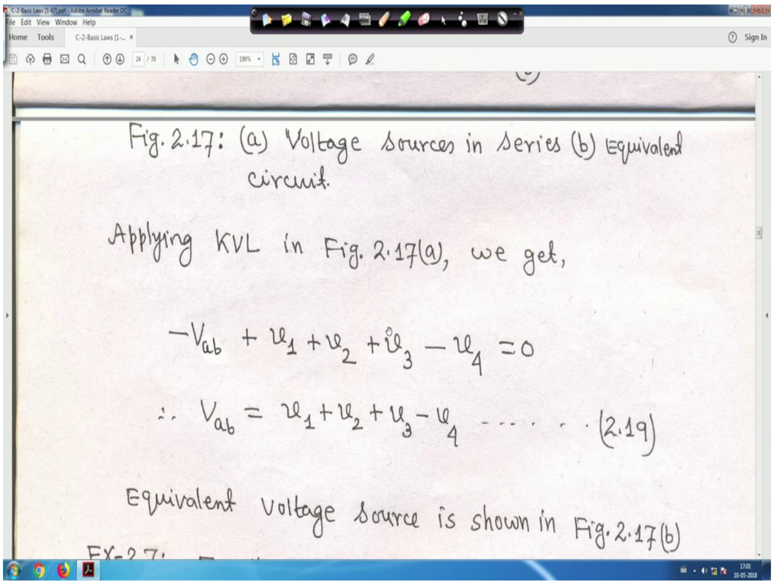

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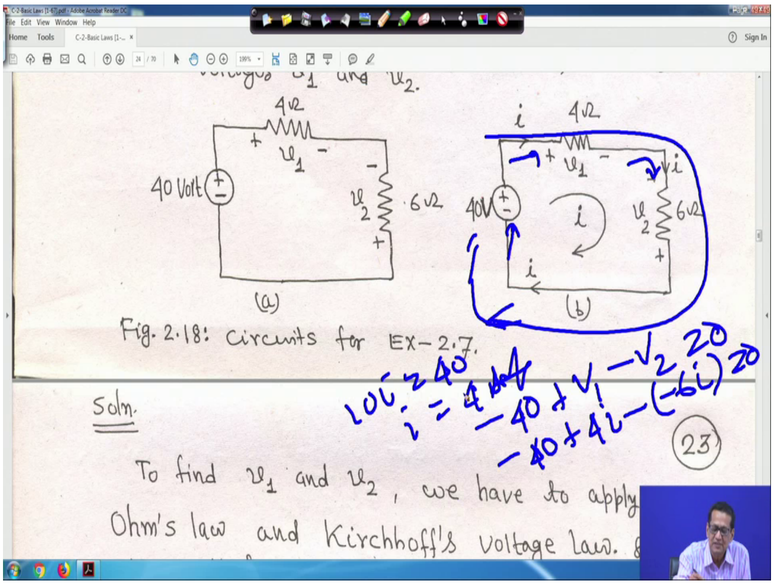

Now, for now consider this example 7. So, further circuit of figure this one 2.18 a, we have to find out voltages v 1 and v 2. So, this is actually the circuit is given, this is the 40-volt source 4-ohm resistor and this is 6-ohm resistor these are the polarity is given. Now, what we are doing is, look we have that a that your just hold on, what we are doing it that this from this circuit we are make a say this is your this is the circuit, right. So, question is that here we have to be current is simple series circuit, because 4 ohm, then 6 ohm, then 40 volt all are in series.

So, same current will flow through the circuit. So, we have taken a current flowing like this is a clock wise; that means, the this i is flowing like this flowing like this or you can into the source again this i, this is this i, but for your understanding here it. So, the i moving in the line here also and here also returning, right. So, question is that resistor actually will see here it is mark plus minus there 4 ohm here it is minus plus, and then ohms' law and KVL your what you call will apply, right.

So, KCL here KVL will apply ohms' law along with KVL. So now, let me first clean this one, right. So, if you now if you from ohms' law, if you come here this one, b 1 is equal to 4 into i, that is your this is 4, 4 into i, but in this that is current entering into the positive terminal 4 into i.

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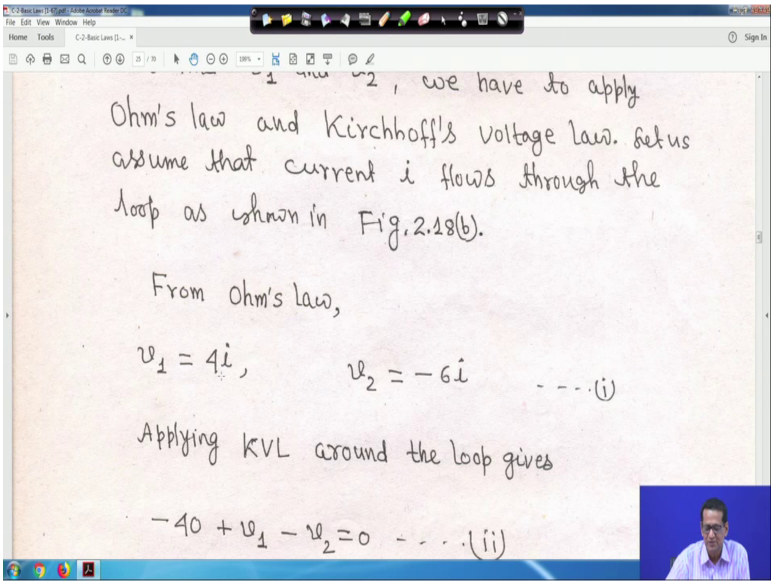

So, but here the wave we have taken the polarity, that current entering into the minus terminal later we will see, that both are resistor actually observe power, right. Is it passively means always observer power, but as the terminal we have polarity we have taken this is minus and this is plus, current entering into the minus terminal. So, v 2 will be minus 6 into I. So, v 2 will be minus 6 into i, right.

So, when it is entering plus terminal earlier we have discuss, v 1 will be 4 into i and here entering the minus terminal. So, v 2 will be minus 6 into i, right. So, applying KVL around the loop, now you apply KVL in this in this in this loop. So, you when you moving it, look I moving clock wise direct clock wise. So, again for your understanding initially I am showing everything, suppose I am moving clockwise; that means, I am moving like this moving like this, moving like this, clock wise, right?

So, plus terminal if this thing your, what you call if you move clock wise. So, first it is encountering minus terminal the 40-volt source; that means, it will be around writing here later will come to that it will be minus 40, right then this when your moving clock wise it is encountering plus terminal first. So, it will be plus v 1 then when your moving like this it is coming here. So, it is encountering minus terminal plus. So, minus v 2 is equal to 0, right. So, minus 40 plus v 1 minus v 2 is equal to 0.

Now, v 1 is equal to 4 I we have seen earlier. So, that will show you later. So, 40 plus v 1 is equal to 4 I because v 1. And this v 2 is equal to because entering into the minus terminal we have seen. So, it is minus v 2 is equal to minus 6 i is equal to 0, right; that means, if you solve the circuit actually 4 i minus minus plus 10 i actually 10 i is equal to 40; that means, i is equal to 4 ampere, right. So, let me clean it, this I have done it later, but for your understanding I showed this one. So, let me clean it, right? So, this is actually i is equal to 4 ampere, that is minus 40 plus v 1 minus v 2 whatever just now I wrote for you.

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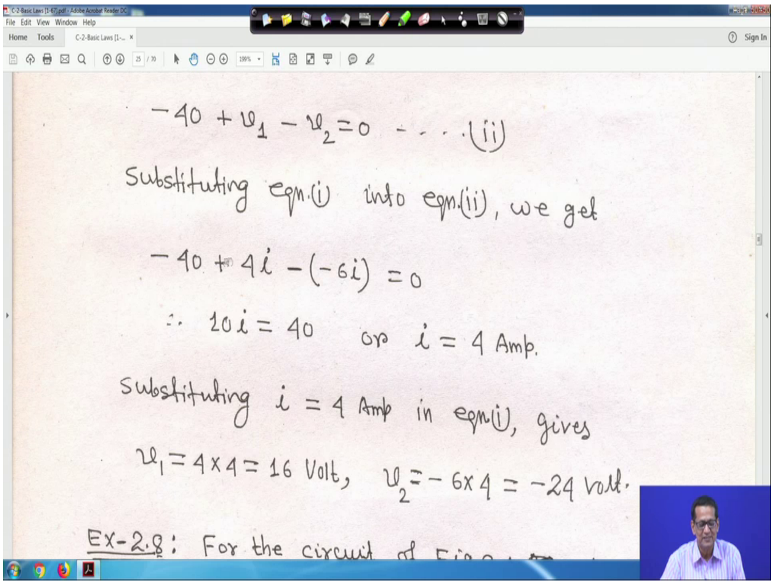

So, in discuss v 1 is equal to you put 4 i and v 2 is equal to minus 6 i. Equation numbers are all given 1 2, right. So, if you put it will be 10 i is equal to 40 your i is equal to 4 ampere; that means, if you put i is equal to in equation 1, it will be v 1 is equal to 16 volt, because v 1 is equal to plus if your 4 i.

So, 4 into i i is equal to 4 ampere and v 2 is equal to minus 6 into i is equal to 4 that is v 2 is equal to minus 24 volt, because v 2 is equal to minus 6 i, right; v 2 is equal to minus 24 volt means, here polarity is v 2 minus plus, it is minus 24 means, actually minus with reverse it will be actually it is actually plus and then it will become minus understandability, right?

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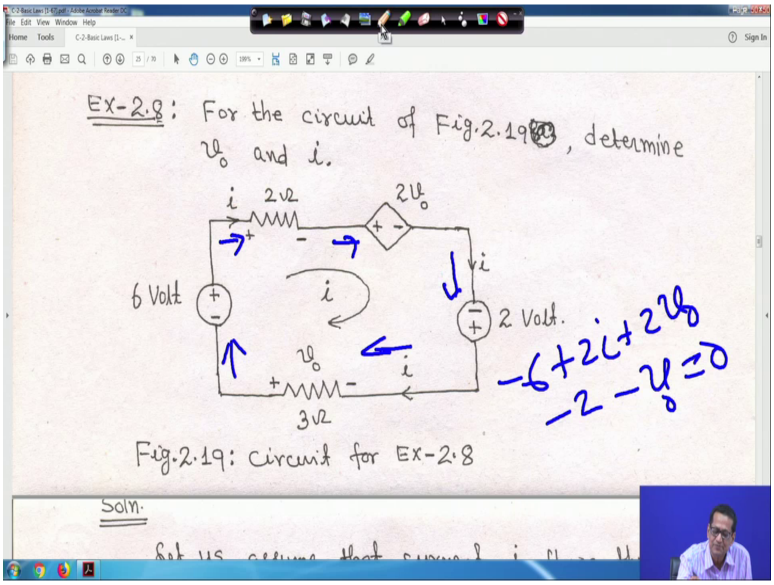

So, next one we will take a dependent source slowly and slowly, we will enter into the little bit now you have improved circuit problem; that means, your what you call degree of softness slowly and slowly will decrease, right. And hardness will slowly, and slowly will increase. So, for the circuit of figure this thing is determine you have to determine v 0 and your i 0. Now this is a circuit we have taking clock wise direction I told you anti clock wise also you can take absolutely no problem, right.

So, question is that these a this there is a your 6-volt source here also 1 2 voltes that polarity is are mark and this is a 2-ohm resistance. And this is a dependent voltages 2 v 0 and this v 0 is here, right. This v 0 actually across 3-ohm your resistor so, and my and current is entering into the minus terminal loop this I we have taken clock wise direction. So, current entering plus terminal, here also entering the plus terminal, here current entering the minus terminal, and here current entering into the minus terminal so, right. So, we have to find out v 0 and i; that means, this v 0 and the current i.

So now, you have to first apply the KVL. If you apply KVL, look we are moving we are moving clock wise, right. Gain for u I am making it, after 2 3 problem I will not make it again and again, now when by that time your this concept will be clear to you. So, I am moving this thing clock wise. So, this one this clock wise I am moving, clock wise I am moving clock wise I am moving, and clock wise I moving. So, as soon as I move clock wise that minus 6 will come fast, right because it is encountering negative terminal. So, it will be minus 6, then here it is your what you call plus your voltage I am not mark. So, it is plus terminal it is entering, right it will be actually volt is drop will be after to ohms' law, that is your iR. So, it will be 2 into i. So, it will plus terminal it is encountering it is 2 i, right. Then again it is encountering plus terminal so, 2 v 0. So, it will be plus 2 v 0, right.

Then here it is encountering minus terminal so, minus 2 and here it is entering minus your what you call terminal. So, it is minus v 0 is equal to 0, right? So, this is your KVL so, that is minus 6 plus 2 into i because v is equal to iR, R is equal to 2 encountering plus terminal; So, 2 i here also plus terminal so, 2 v 0 here encountering minus terminal. So, minus 2 because is a voltage source here also minus terminal voltage across this theory is given v 0. So, it will be minus v 0 and v 0 will be minus 3 into i that will see later, right. So, this is equation is equal to 0. So, let me clean it, right so, just hold on.

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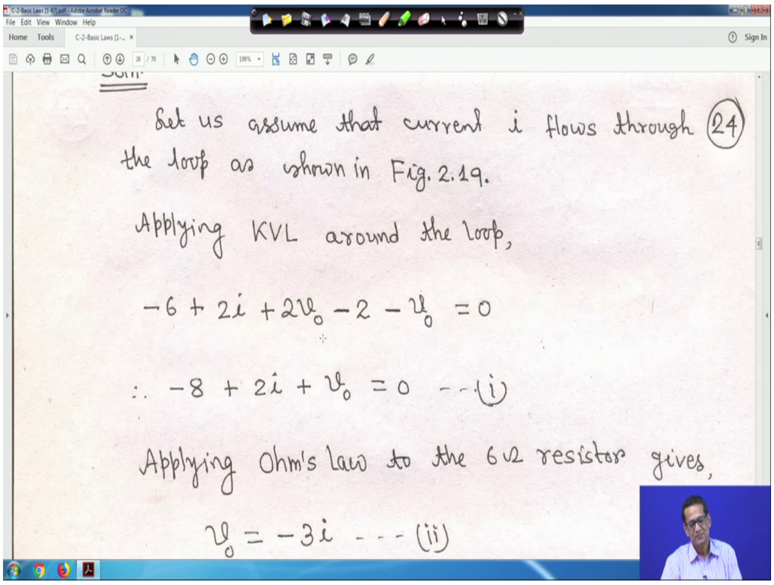

So, if you write this equation, whatever I have written here minus 6 plus 2 i plus 2 v 0 minus 2 minus v 0 is equal to 0 or your you have minus 6 and minus 2 so, minus 8 plus 2 i plus v 0 2 v 0 minus v 0 is equal to 0, right this is equation 1. So, now applying ohms' law to the 6-ohm resistor, because it is I just told you it will be v 0 is equal to minus 3 into i. Because it is this current entering here it is the minus terminal. So, v 0 is equal to minus 3 into i. So, it is v 0 is equal to minus 3 into i. So, this v 0 is equal to minus 3 into i, you substitute equation 2, you substitute here, you substitute in equation one you substitute here, right?

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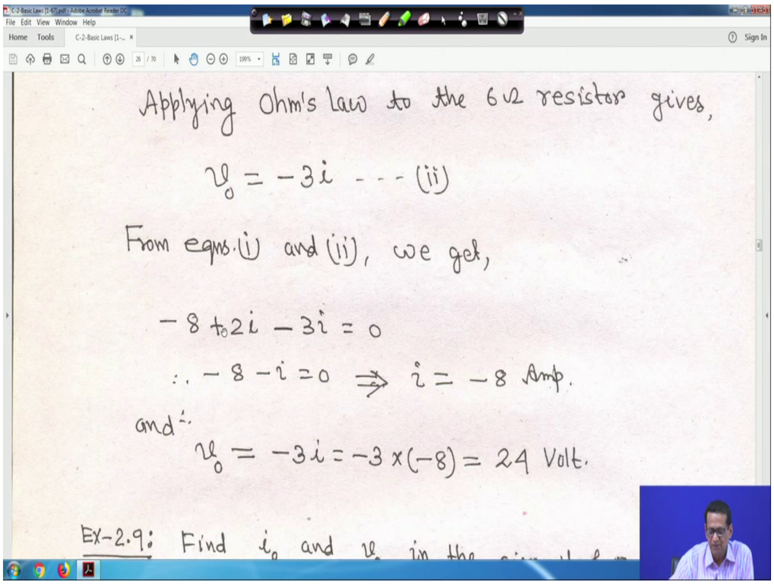

If you do so it will be minus 8 plus 2 i, minus 3 i is equal to 0; that means, minus 8 minus i is equal to i is equal to minus 8 ampere. So, when i is equal to minus 8 ampere means, actually current actually we have taken clock wise direction actually current at flowing in a other way.

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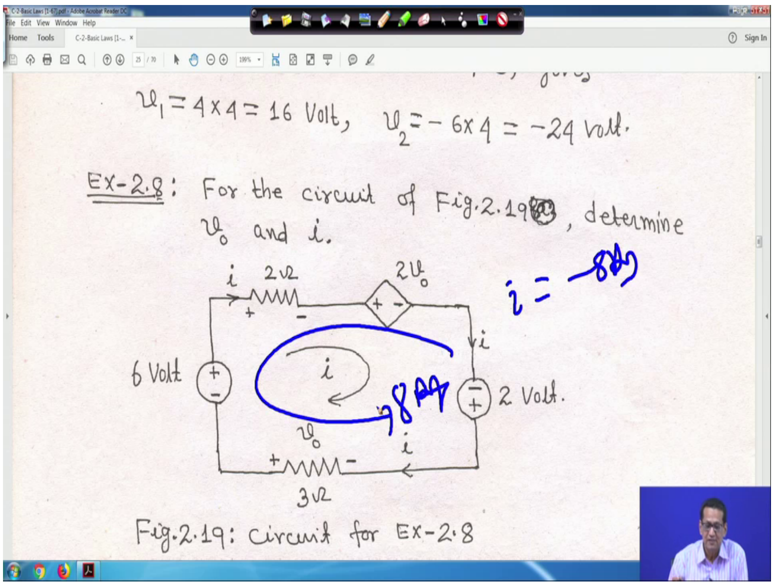

So that means, when it is i is equal to it is coming minus 8 ampere. If it is minus 8 means that; that means, current actually is flowing like this it is flowing like this, if this 8 ampere the current is flowing like this, right. Because direction will be reverse, because it was become minus, right? So, I should I should clean it first so, it is understandable to you.

So, here we got i is equal to minus and v 0 is equal to minus 3 into i, because we we said that current getting to the minus terminal so, v 0 is equal to minus 3 i. So, v 0 is equal to minus 3 into i is equal to minus 8, so, v 0 is equal to your 24 volt, right. So, an if you look into that if you look into that v 0 is equal to 24 volt that is plus; that means, if you look into that once again that current actually flowing in this direction. Just now I showed, because it is minus means that current is flowing in the your anti clock wise direction.

So, and v 0 is equal to your v got 24 volt, right. So, if you look into that that passive element know resistors are passive element, these also resistor passive element so, current enter is observer power. So, will find current enters into the positive terminal, right or negative terminal, right. So, whatever it is now if you for this circuit if you knowing if you now try to make it the power balance equation that which source is observing power and which source is supplying power you can get the power balance also.

So, anyway then let me clean it right. So, that is up to you. So, this is now this is so, what I suggest? For this problem that power balance equation you will obtain and see that your what you call that your power supplied is equal to power observed, right? So, this is your what you call another problem. In this case, and in this case what will happen that your that one more thing let me tell you, in this case that your v 0 one more thing I should tell you then it will be very easy for you, one more thing I should mention it because your beginners I assume most of your beginners.

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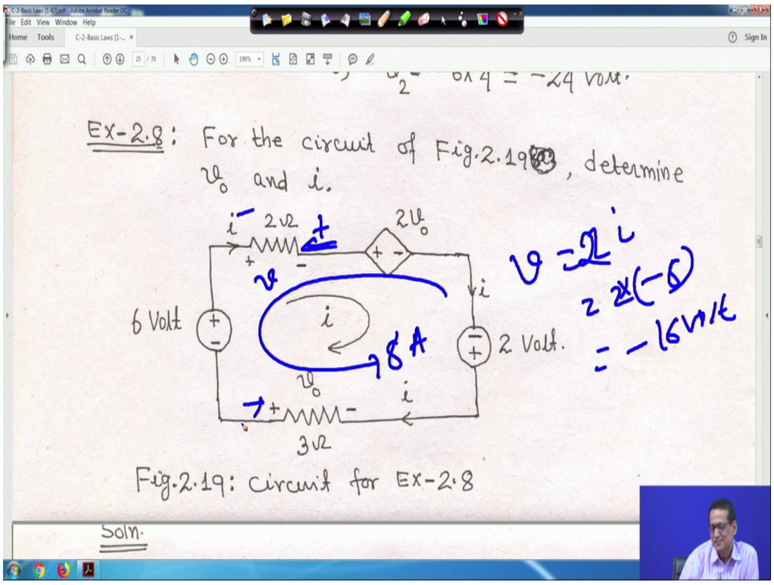

So, v this voltage here that v this voltage so, across this is voltage is say v v volt. So, v is equal to actually 2 i v is equal to 2 i; that means, actually original i I got minus 8 that is 2 into minus 8, that is minus 16 volt, right minus 16 volt. As soon as you get v is equal to minus 16 volt means current is flowing in this direction.

So, automatically as that assume minus this terminal will I am not marking here, or marking for you this terminal will be plus this terminal will be minus and current is 8 ampere current is flowing like this. So, actually if you take v is equal to your 2 i i is equal to minus 8. So, minus 16 volt the polarity will be reverse. So, actual polarity this is plus this is minus, right. And look this current entering it is a resistor know it will observe power. So, current entering into the positive terminal and here also you mean that current entering the positive terminal, right.

So, concept has to be clear. I mean, right from the beginning you should make your our you should make our concept clear; such that absolutely there will be no problems, same philosophy will follow for ac circuit instantaneous polarity. So, if you understand the dc circuit one then will find ac circuit is as simple as anything right. So, let me clean it, right. So, power I have told everything. So, you find out power observe or power supply it from the point of view of your assignment of this course. Now another course another one this time we have taken.

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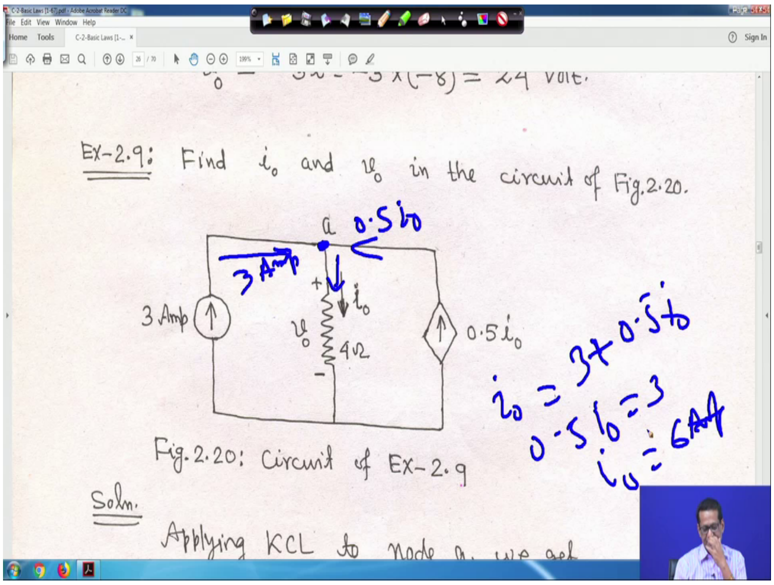

You have to find out i 0 and v 0 in the circuit of figure 2 these are series parallel these a a 3 3 elements are in parallel, right all 3 elements are in parallel. So, one current source is that is a dependent current source such these the current i 0 and this is your voltage v 0 and this is the 3 ampere current source you have to find out i 0 and v 0. So, what you do this, this one node, right at this node you apply your what you call KCL.

So, if you apply KCL look how you will do it? I am making it for you, right. So, this is 3 ampere current so, 3 ampere current actually entering into this node, this is 3 ampere current entering into the node. And this current this is this is your this is your node a. And this is 0.5 i 0 so, this current entering also 0.5 i 0.

And i 0 this current is leaving the node i 0 current is leaving the node. Therefore, if you apply KCL at your, what you call at node a, then your i 0 that is the outgoing current i 0 is out going current is equal to 2 currents are incoming. So, outgoing current actually in general that some of the incoming current is equal to some of the outgoing current, here only one out going current i 0.

So, i 0 is equal to actually it is 3 plus these 0.5 i 0, right. So, because from that you can find out your, what you call i 0; that means, 0.5 i 0 is equal to 3, because i 0 minus point 5 i 0. So, point that means, i 0 is equal to your 6 ampere, got it? I think you have got it, right. So, let me clean it, right so, that I have done it here for you, sorry right.

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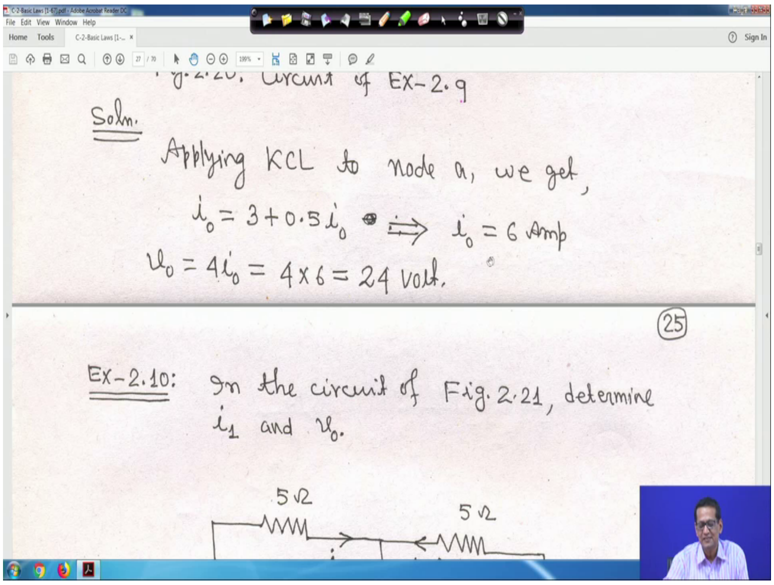

So, if you see that i is equal to 3. So, i 0 is equal to 6 ampere now v 0 is equal to 4 into i 0. So, this is this current is entering because positive terminal. So, ohms law will say that v 0 is equal to 4 into i 0. So i 0 you have got 6 ampere so, v 0 will be 4 into 6. So, 24 volt so, v 0 is equal to 24 volt. Here also you find out power observe or power supply. This is not done all this things if I do it will it will run the it is an exercise for you for every case, you find out for observe or power supplied by the your you have you have electric electrical elements, right.

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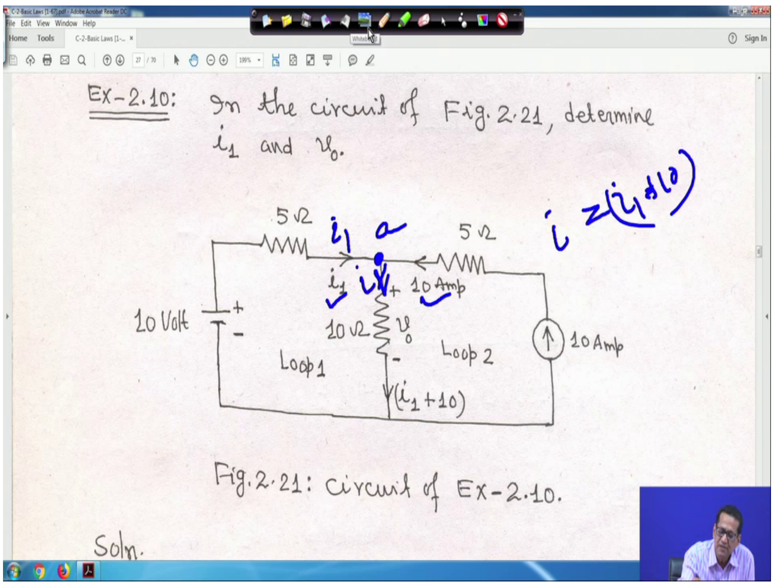

So, next one now, next one you see now this is series parallel circuit, this circuit is a circuit is given, right. You have to find out i 1 and v 0 i 1 is this current, i 1 is this current and v 0 is this voltage all the things are given this is 10 ampere current source, a 10 ampere here we have a 10 volt, 10 volt voltage source here we have a 10 ampere current source, you have a 5 ohm resistor here 5 ohm resistor here, and this voltage this is a 10 ohm resistor across is voltage is v 0, this is loop one, right.

Now, question is that your this current is i 1, this branch current let me mark it for you. So, these branch current is this is your i 1, this is marked here, right? This i 1 and this 10 ampere current is a current source; so, this 10 ampere current also entering here. So, this 10 ampere is also mark this 10 ampere and outgoing current if I take here. I am writing i 1 plus 10, suppose if outgoing current will that that is from this is a node, this is a node, right. Suppose it is suppose it is if it is a node a. So, if you apply than this current say it is i, this current is i, right then it is out going current i is equal to incoming current; that is, your i 1 i 1 plus your plus 10, right so, i is equal to that, instead of writing I directly we are writing this current i 1 plus 10 flowing through this branch, right.

So, let me let me clean it, right. So, hope this thing you have understood, right. So, here also now you have to apply KVL in loop one. So, this loop one will apply and we will move clock wise, we move clock wise. So, if you move clock wise hold on again, right so, if you move clock wise; that means, will we move like this we will move, like this will we move, like this, we will move like this clock wise, right. It will move clock wise, then accordingly first word that minus 10 volt your encountering in this, right minus 10 volt.

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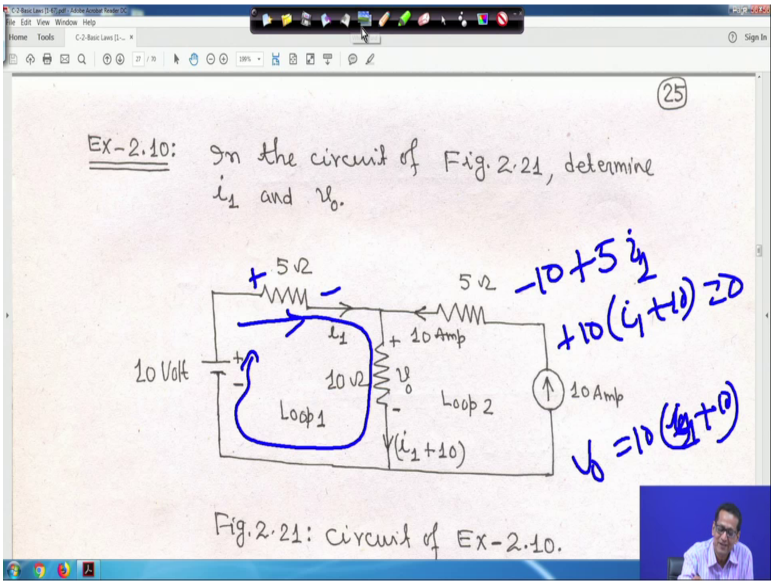

So, we will write minus 10 then second thing is that we have not marked here plus minus. So, if I mark this is my plus, and this is my this even if it is not given you have to mark it, right. You have to mark it, and if you take clock wise direction suppose in this case resister is a passive element and it observe power so, current entering into the positive terminal. So, here current entering the positive terminal and this current flowing through this branch is i 1; that means, according to ohms law it will be 5 into i 1. So, minus 10 plus 5 into i 1, now you are moving to this. So, it will be actually 10 ohm, plus this 10-ohm resistance into your into i 1 plus 10, right?

Or this equation also can be written I mean if you want that it will be your minus 10 plus your 5 i 1 plus v 0, and v 0 is equal to actually and v 0 actually it is current entering into this i 1 plus 10 entering the positive terminal. So, it will be 10 into i 1 plus 10, this is your i 1 this is i 1 plus 10, right?

So, directly I am writing and this is equal and this is equal to 0, right ah? So, when I am writing many times equation by chance right hand side, if I by chance means 0 so, you forgetting me so, hopefully I am not miss till now, right there is a few possibility right. So, this is a this is your. So, I am let me clear it, right? So, hope this thing is under this thing is your clear to you, right sorry clear to you.

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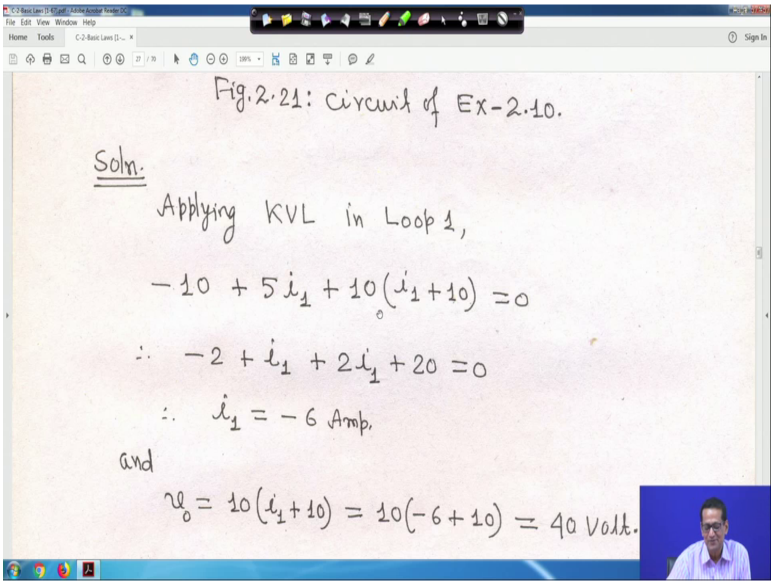

So, that is I am writing minus 10 plus 5 i 1 plus 10 into i 1 plus 10, now you simplify is equal to 0, now you simplify. So, minus so, what you do? Both side actually divided by 5. So, it is minus 2 plus i 1 plus 2 i 1 plus 20 I mean this equation both side divided by your 5. Therefore, i 1 we get minus 6 ampere if we will get i 1 is equal to minus 6 ampere means the current actually in this branch flowing in other direction.

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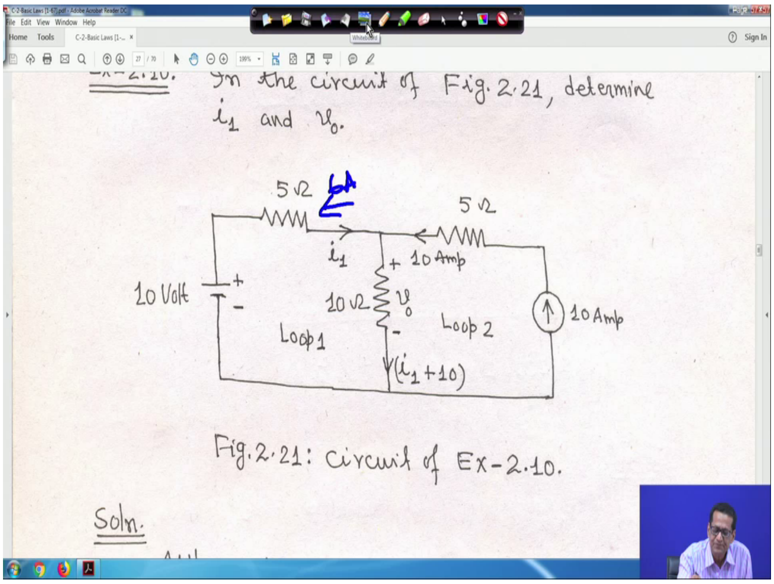

So, whenever we are taking that i 1 is equal to minus 6 means, the current actually 6 ampere current actually flowing in this direction, right? Does not matter from as far as your loser concern put accordingly we will get all the result. So, let me clean it, right. So, now v 0 is equal to just I showed you previously the 10 into i 1 plus 10. So, 10 into i 1 is minus 6 so, it is 10 minus 6 that is your 40 volt.

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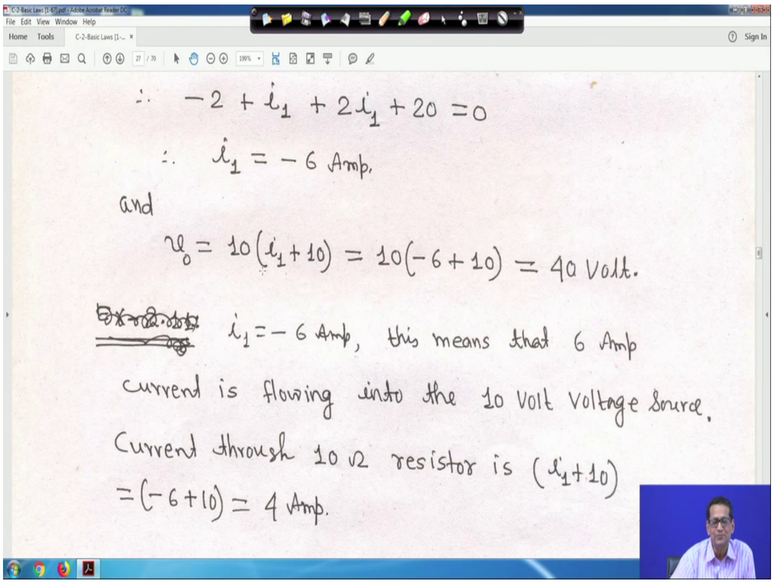

So, v 0 is equal to 40 volt, now i 1 is equal to minus 6 ampere this means that 6 ampere current is flowing into the 10 volt 10 volt the source. I told you that as i 1 is minus 6 means it is your what you call it is flowing to your in this direction, that entering in it is minus 6 means it is these direction right; that means, it is these direction current is current is flowing this direction then we entering into the voltage I mean plus terminal; that means, this 10 voltage source actually is observing power, because when it is leaving the plus terminal it is supplied when is entering the plus terminal it is your power observed. So, let me clean it, right?

So now so, current through 10-ohm resistor is this is also given 4 ampere. So, current through 10-ohm resistor, this is also told you. So, this at this is I told you voltage source is observing power. So, here also we will find out power observer or power supply by that each electrical element, right. Resistor you we observer power so, this is also observing power, then which is supplying power. So, accordingly you have to you have to just 5 need out, right. What I am see that power value sequence is matching.

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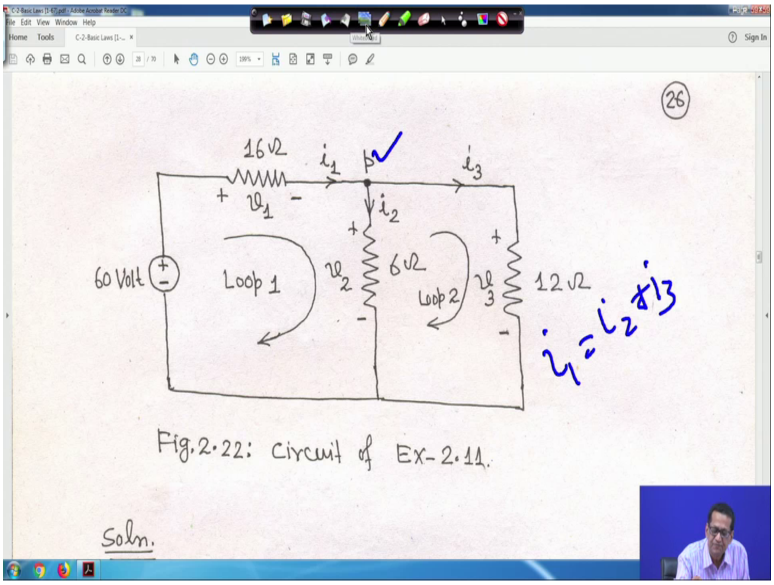

Now another one so, this is find the current and voltages in the circuit shown in figure 2 here, we have find the current and voltage. So, one current is i 1 is there, this is i 2 is there in this branch, right and I i 3 is there right. So, this voltage is marked here all polarity is are marked here this is v 1, this is v 2 and this is v 3 v 1 is voltage across 16-ohm resistance, v 2 is across say 6 ohm, and v 3 is across 12-ohm resister, right? And there are 2 loops I have taken clock wise, you can take there are 2 loop one loop is here, one loop is here, right? And you have to find out your what you call voltages current and voltages in this circuit the weight is marked, then you have to find out i 1 i 2 i 3, and then v 1 v 2 v 3 only one voltage source is there.

So now we have to we have to apply KCL at point that is at node p, right. This is your node this is your node p, right? This is your node p, just hold on, this is your node p. So, here if you apply that outgoing this i 1 is entering at point p and i 2 and i 3 leaving point p, right; that means, i 1 is equal to your i 2 plus i 3, right? That is KCL so, let me clean it, right. So, now that is your i 1 is equal to i.

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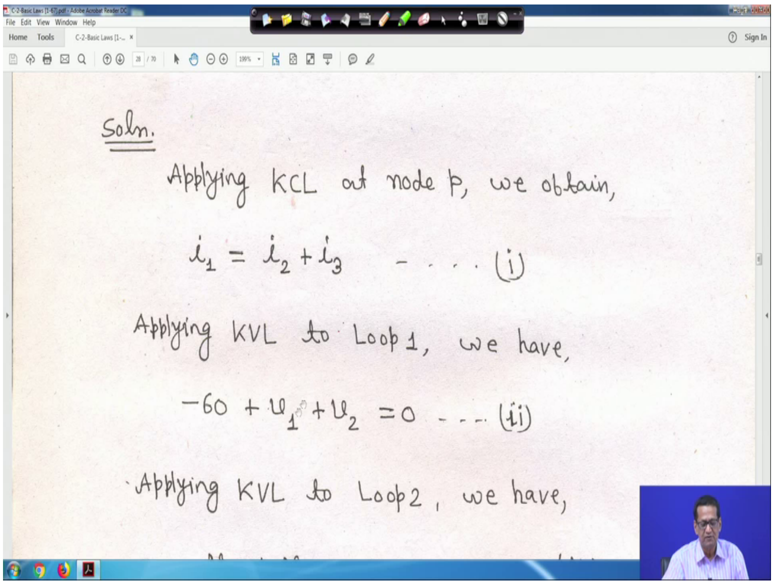

Now, applying KVL to loop one, if you apply KVL to loop one, several things we have told. So, if you move like this it is encountering minus terminal plus, because clock wise we are moving. So, it is minus 60, then it is plus v 1, it is encountering moving clock wise. So, encountering plus terminal plus, I am not showing again and again by your blue ink. So, it is understand able now so, it is able move clock wise, it is encountering plus terminal now. So, that is why it is plus v 1, and here also when we move in this loop, it is your what you call plus terminal it is encountering. So, plus v 2 is equal to 0, right is equal to 0.

This is your loop 1 and, and if you apply your KVL in loop 2 your moving in the your what you call in the clock wise direction. So, encountering plus terminal past so, it is your plus v 3, then it is when your moving like this clock wise encountering minus terminal first so, minus v 2 is equal to 0.

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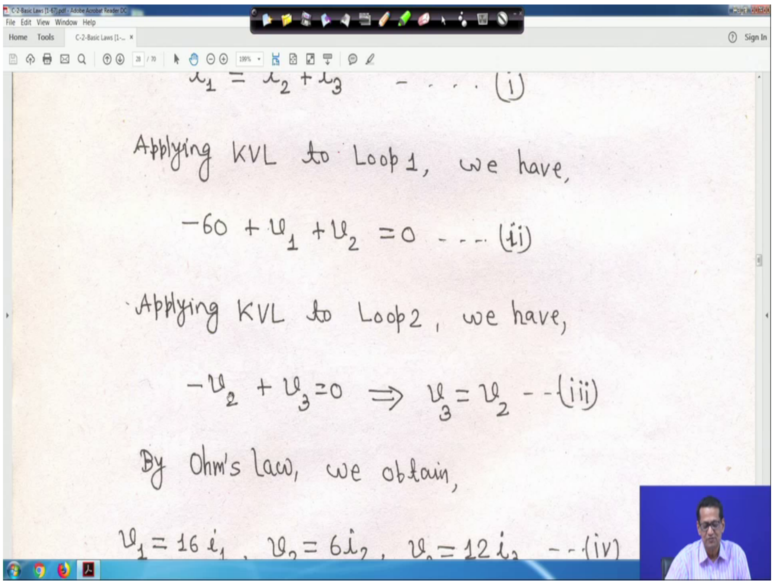

So, minus v 2 plus v 3 is equal to 0; that means, if you move clock wise, first I am writing it is encountering minus terminal minus v 2 and then encountering plus terminal plus v 3. So, minus v 2 plus v 3 same thing is 0 so, v 3 is equal to v 2, right. And by ohms' law, by ohms law this current is a your clock wise we are taking this current actually i 1, it is entering into the positive terminal. So, v 1 is equal to 16 i, 1 because is current flowing through this branch, then is a entering into the positive terminal. So, v 1 will be is equal to your 16 into i i 1.

Similarly, if you take v 2, the i 2 actually entering in to the positive terminal so, v 2 will be 6 i 2. So, your v 2 will be 6 i 2 here it is v 2 is equal to 6 i 2. And here i 3 actually entering into the positive terminal so, v 3 will be 12 i 3. So, v 3 actually is equal to 12 i 3. So, v 1 v 2 v 3 all you have got in terms of it is i 1 it is i 2 i 3, now from equation 3; that means, from equation 3 v 3 is equal to v 2; that means, v 3 is equal to 12 i 3 and v 2 is equal to 6 i 2 that means, we have got an relation i 2 is equal to 2 i 3.

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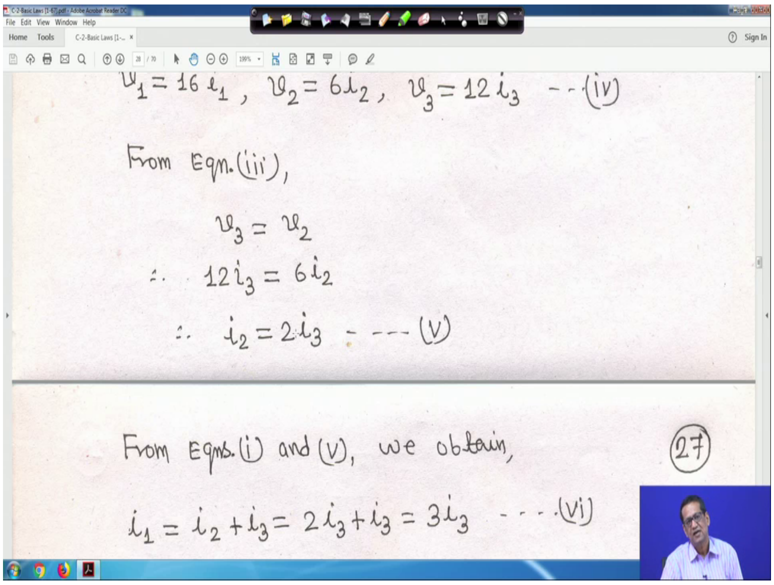

I mean the way you solve linear equation these we have to make it. So, from equation 1 and 4 we obtain equation 1 and 5 equation 1 and 5. So, come to equation one this is equation one equation 5 is i 2 is equal to 2 i 3. So, put here i 2 is equal to 2 i 3. So, if you do so you will get i 1 is equal to i 2 plus i 3 i 2 is equal to 2 i 3 so, i 1 is equal to 3 i 3, right?

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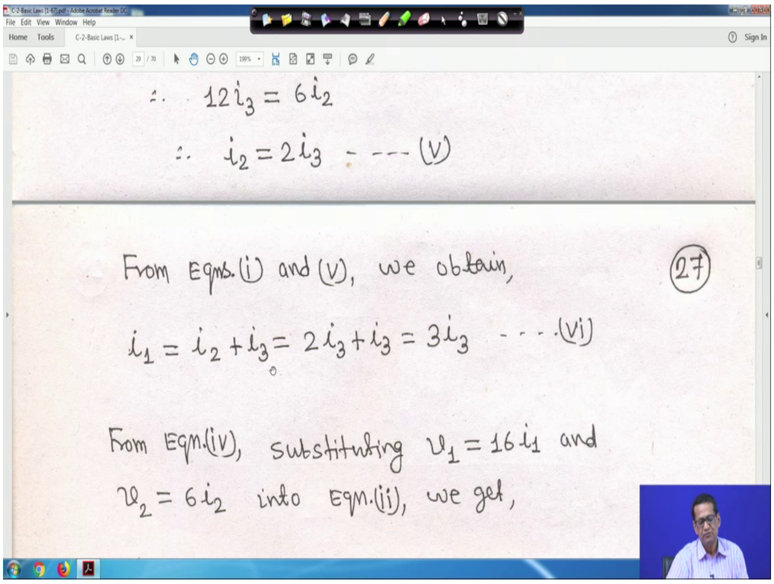

So, from equation 4; that means, from these equation from equation 4, right. Substitute in v 1 is equal to 16 i 1, and v 2 is equal to 6 i 2 into equation 2 we will get the substitute.

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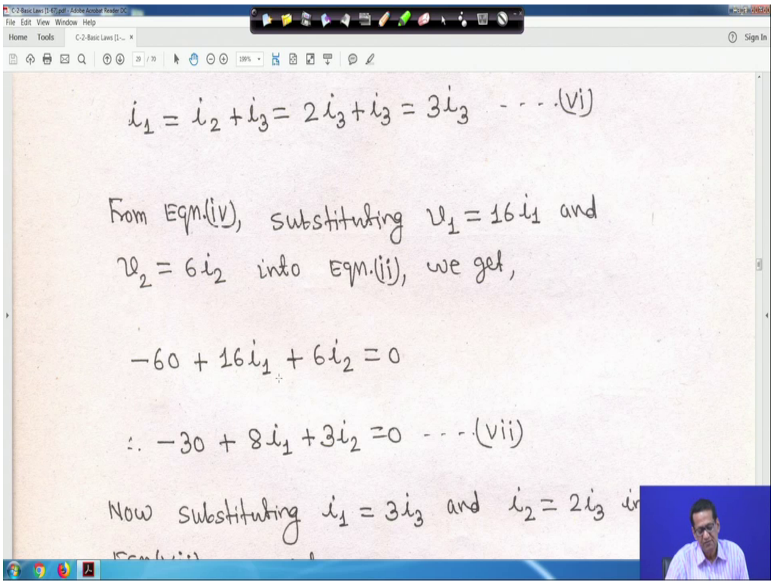

You will get minus 60 plus 16 i 1 plus 6 i 2 is equal to 0, or divided by 2 both side. So, sorry minus 30 plus 8 i 1 plus 3 i 2 is equal to 0, now you substituting i 1 is equal to 3 i 3 and i 2 is equal to 2 i 3 into equation 7.

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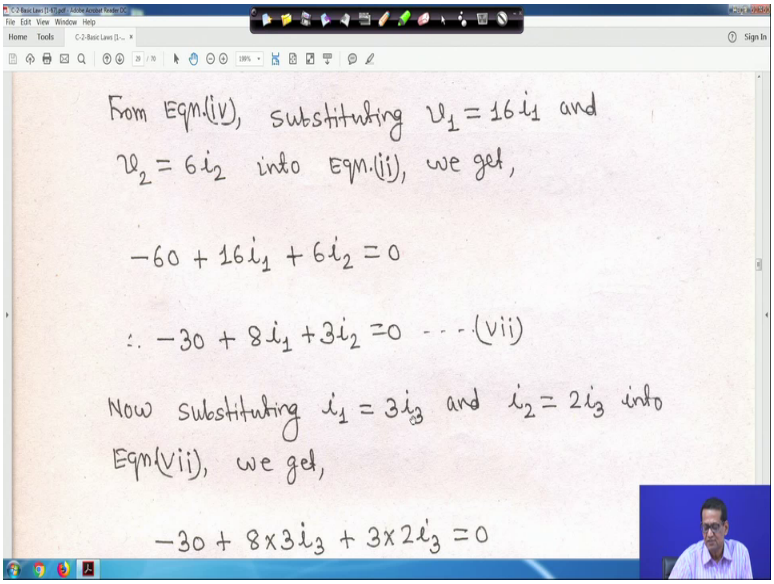

All this i 1 3 is equal to 3 i 3 i 2 2 i 3 all you have got just you have to manipulate mathematically, and you have to put one after another if you put. So, not showing it you it is understandable, right it is understandable.

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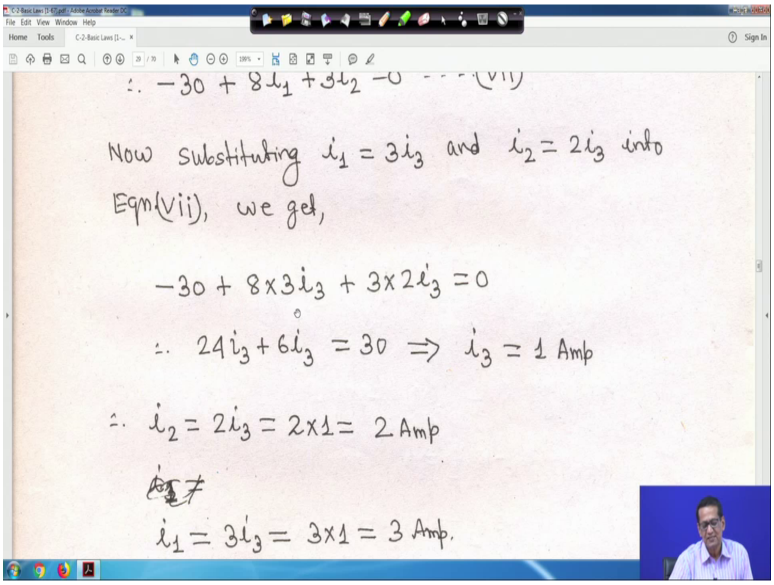

If you do so, it will be minus 30 plus 8 into 3 i 3 plus 3 into 2 i 3 is equal to 0. Or 24 i 3 plus 6 i 3 is equal to 30 or i 3 is equal to 1 ampere. And we have seen we have got this direction i 2 is equal to 2 i 3 so, i 2 is equal to 2 ampere. And i 1 is equal to 3 i 3, i 3 is equal to 1 ampere so, i 1 is equal to 3 ampere.

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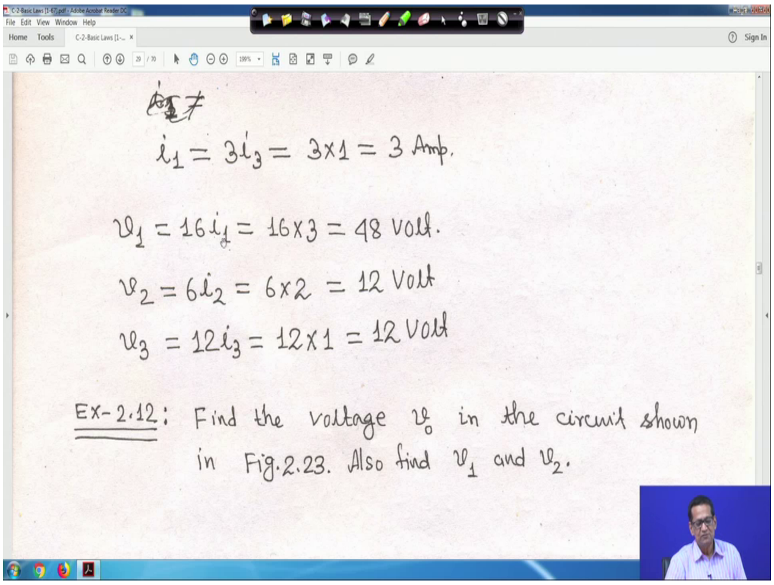

Now, v 1 is equal to 16 into i 1 so, 16 into 3. So, 48 volt v 2 is equal to 6 i 2; so, 6 into i 2 so, 6 into 2 because i 2 is equal to 2 ampere so, 12 volt. And v 3 is equal to 12 i 3 is equal to 12 into 1 is equal to 12 volt, right?

So, these we have easily we can solve it, only you have to (Refer Time: 28:07) that how quickly you can solve it, right; Putting equation one to another, right.

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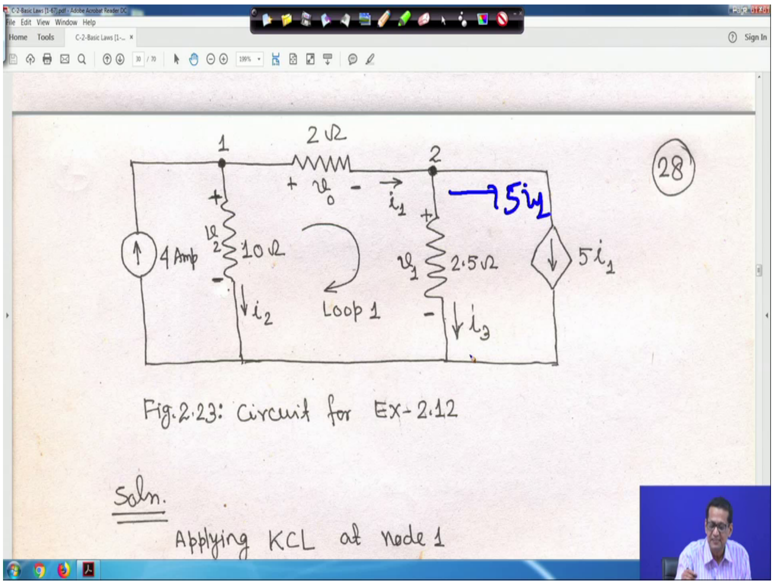

And here you that find the voltage v 0 in the circuit shown in figure 2.23 also find v 1 and v 2. So, this is the circuit, this is your 4 ampere current source, this is your one t ohm resistor is there, this is one voltage source sorry one resistor is that 2 ohm. Across is voltage is v 0 here across voltage is v 2. And then here voltage is your v 1 and raise 2.5, this is the current source, 5 i 1 dependent current source, it is 5 i 1 and I was flowing here.

So, this is 4 ampere current source, through this branch current is flowing i 2 this is i 1 current flowing through i 3 right. So, you what you do this thing you have to find out voltage v 0 in the circuit shown in figure also find v 1 and v 2; that means, you have to find out v 0 as well as v 1 as well as v 2, right.

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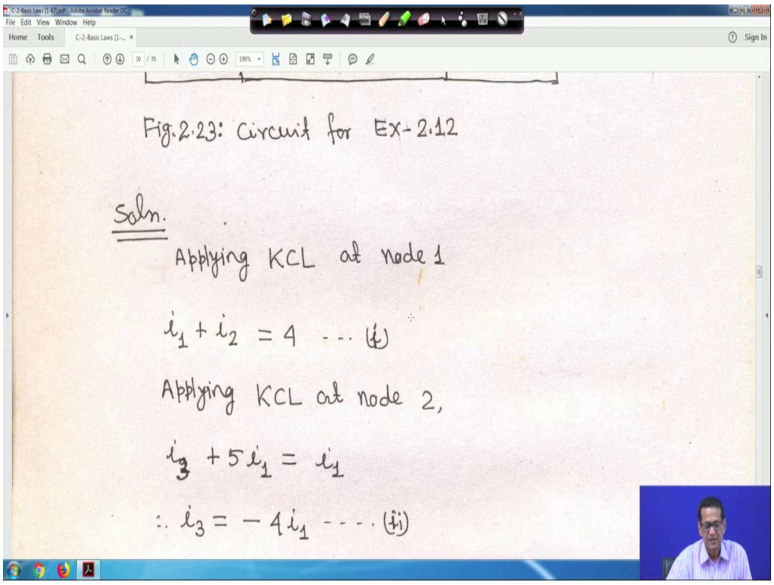

So, if you apply KCL at node one this is node one is mark node 2 is mark you can see that diagram node one you apply KCL here. If you apply KCL i 1 plus i 2 is equal to 4, right because? This is 4 ampere and current source so, this current 4 ampere is entering here, right. And this is i 2 is leaving i 1 is also leaving.

So, incoming current i 1 4 is equal to i 1 plus i 2 so, i 1 plus i 2 is equal to 4. So, let me clean this one sorry, clean this one, right. So, so, this is your applying KCL at node 2, you applying KCL here also, current i 1 is entering and node 2, i 3 is leaving and 5 i 1 also this is dependent current source it is also leaving, right. So, this is actually just we need this is actually your, this 5 i 1, right this is 5 i 1 right. So, this so, i 1 is equal to 5 i 1 plus i 3, right?

So, let me clean it first, right so, your i 3 plus 5 i 1 is equal to your i 1. So, this is i 3 plus 5 i 1, both are out going current i 2 is equal to i 1. So, i 1 is equal to your i 3 plus 5 i 1 or i 3 is equal to minus 4 i 1; this equation to now applying KVL in loop one, if you apply KVL in loop 1, this loop.

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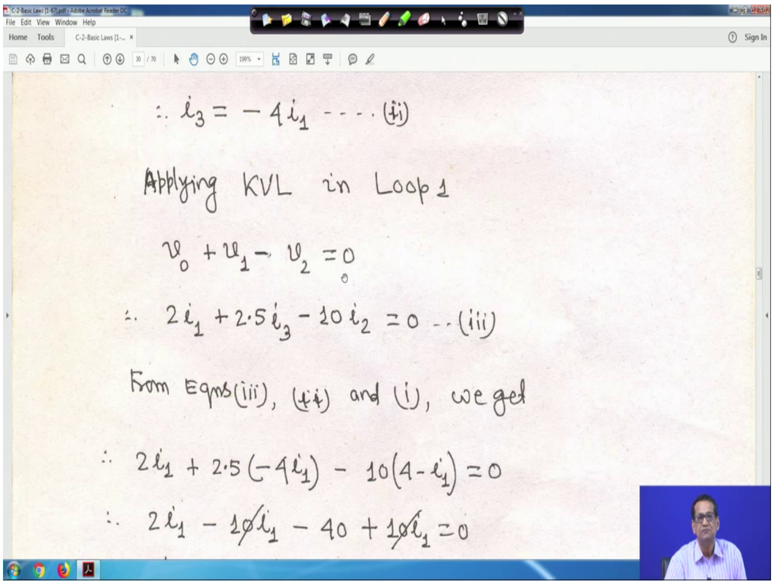

So, it is encountering your the way I am writing here, right. So, I am writing from v 0. So, encountering plus terminus plus plus v 0, plus again encountering clock wise plus terminus plus v 1, and here it is encountering minus, this minus sine clock wise your are moving so, minus v 2 is equal to 0.

So, it is v 0 plus v 1 minus v 2 is equal to 0. So, put v 0 is equal to 2 into i 1, because this is my v 0 and this is your plus this current i 1 is entering the positive terminal ohms law so, v 0 is equal to 2 into i 1. So, here it is v 0 is equal to 2 i 2 into i 1, now v 1 v 1 is here, the current your i 3 actually entering to the positive terminal. So, v 1 will be 2 plus 2.5 i 3 so, here v 1 is 2.5 i 3 in a minus v 2 is equal to your 10 i 2. This is your v 2 and this i 2 current entering into the positive terminal ohms law. So, v 2 is equal to it will be plus 10, i 2 that is why it is 10 i 2. So, minus 10 i 2 is equal to 0.

Now, from equation 3, and one you will get just manipulate, right equation one it is given equation your 3 it is there. So, from equation 3 and one just substitute that is all, if you substitute and simplify you will get i 1 is equal to 20 ampere, right.

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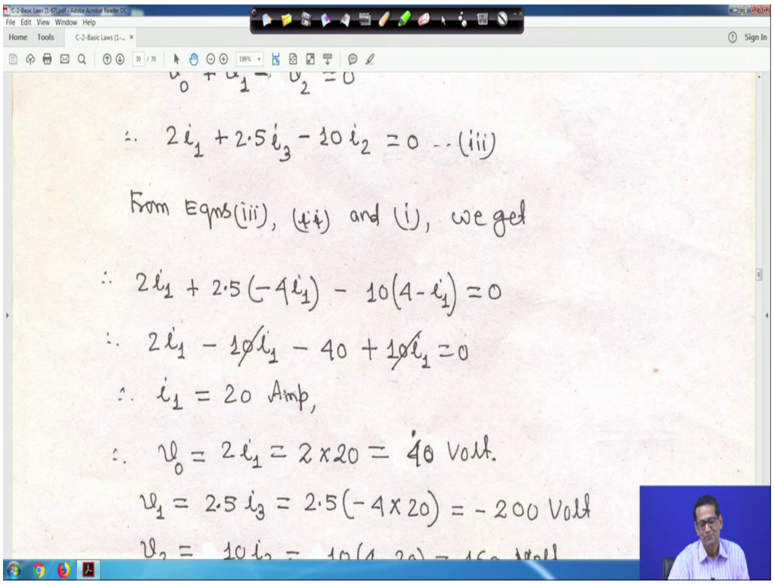

So, this is now understandable to you, now nothing there absolutely there will be that should not be any problem now, right. Just equation your from equation 3 2 and 1, we get from 1 and 2 whatever is there from one this relationship from 2 this relationship, right. And in you substitute in 3, right all this things you put here. So, you will get after solving, you will get i 1 is equal to 20 ampere.

So, v 0 is equal to 2 into i 1 because this is your v 0 is equal to 2 into i 1 plus 2 i 1. So, v 0 is equal to your 2 into 20 40 volt, now v 1 is equal to 2.5 i 3. So, 2.5 and i 3 is equal to your, what you call minus 4 this thing i 3 is equal to minus 4 i 1 and i 1 is equal to 20. So, that means, that means your 2.5 minus 4 into 20. So, it is minus 200 volt, right?

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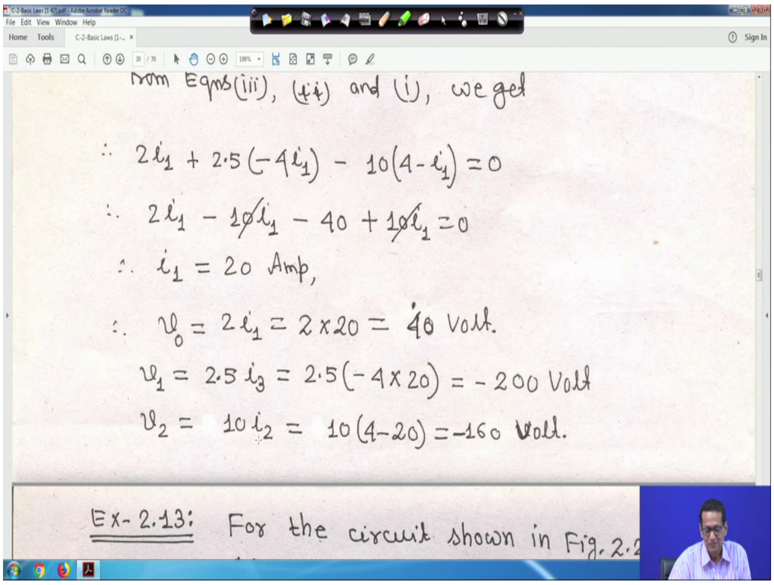

And v 2 is equal to 10 i 2 so, 10 into your i 2 is equal to if you see, this is your what you call i 2, i 2 is equal to 4 minus i 1, right?

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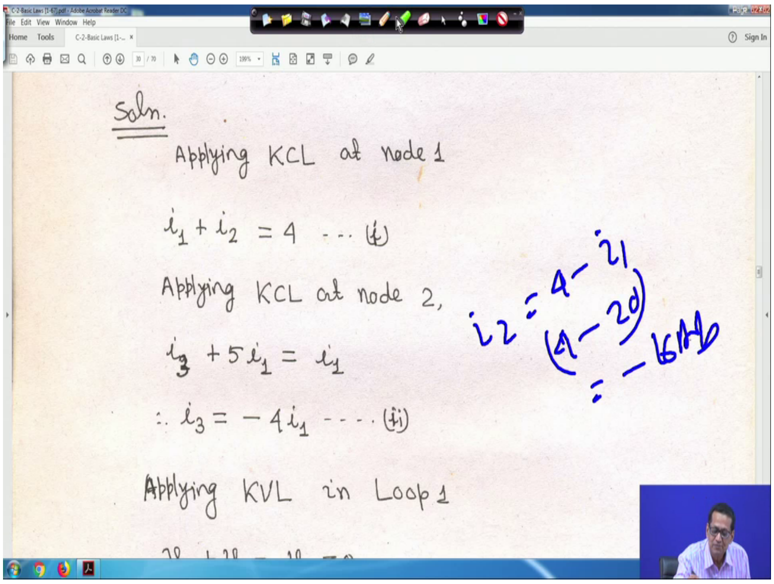

Just writing one thing for you here i 2 is equal to your 4 minus i 1 and i 1, you got 20 so, it is minus 20 is equal to minus 16 ampere, right? So, i 2 is equal to 4 minus 1 so, if just me let me clean it, right? So, little bit you do it have this is simple thing. So, here if you see the 10 into 4 minus 20 so, minus 16 into 10 minus 160 vat, sorry volt, sorry, sorry it is volt. So, v 2 is equal to minus 160 volt.

So, with these whatever little bit you have studied, Kirchhoff's first law and second law, and all this say numericals your we can without considering the, your dependent voltage and current source. And the all the up and your what you call that your polarity convention, and how to apply KCL and KVL, and the plus minus how will take voltage drop or voltage rise; all this things, and you know along with that ohms law and your KCL and KVL, and we will be back again.

Thank you.