Fundamentals of Electrical Engineering
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Lecture - 28
Capacitors & Inductors (Contd.)

So, we will take another example, then we will move to the inductors right.

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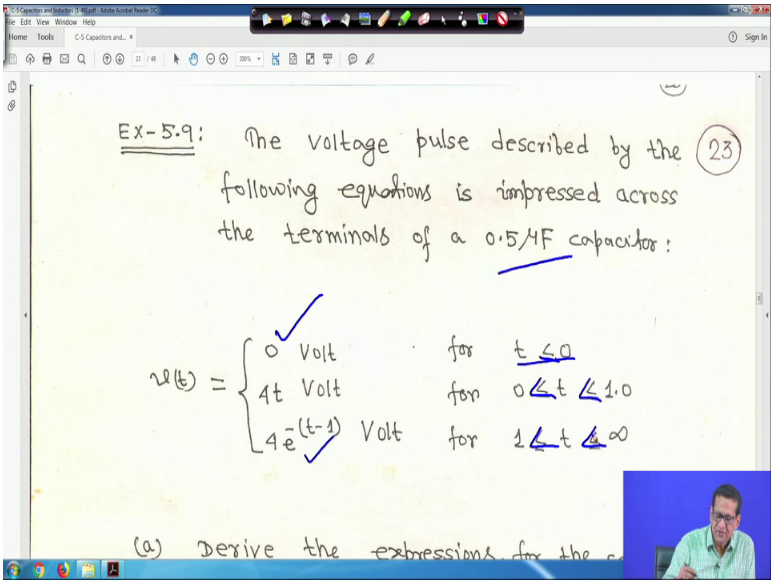

So, this is another example of voltage pulse distributed by the following equation is impressed across the terminals of a 0.5 micro farad right; so and it is given v t is equal to 0 volt for t less than equal to 0, it is you make less than 0 less than less than right. So it is 4 t volt for in t in between 0 and 1 second and your 4 into e to the power minus t minus 1 volt when you when t is greater than 1, but I mean in between 1 and infinity right. So, let me clear it so you have to find out few things.

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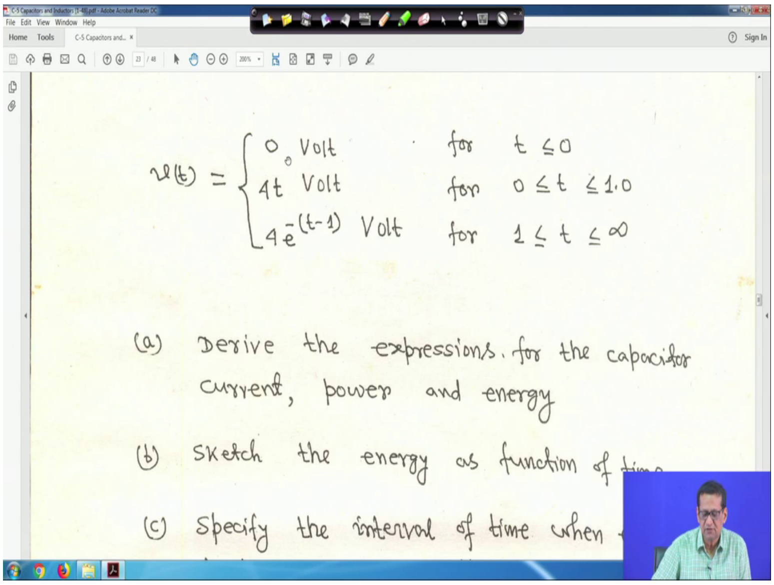

You have to first is v t is 0 volt for some time till less than I have told till less than 0 and 4 t volt 20 greater than 0 less than 1 and 4 e to the power minus t minus 1 for t greater than 1 less than infinity.

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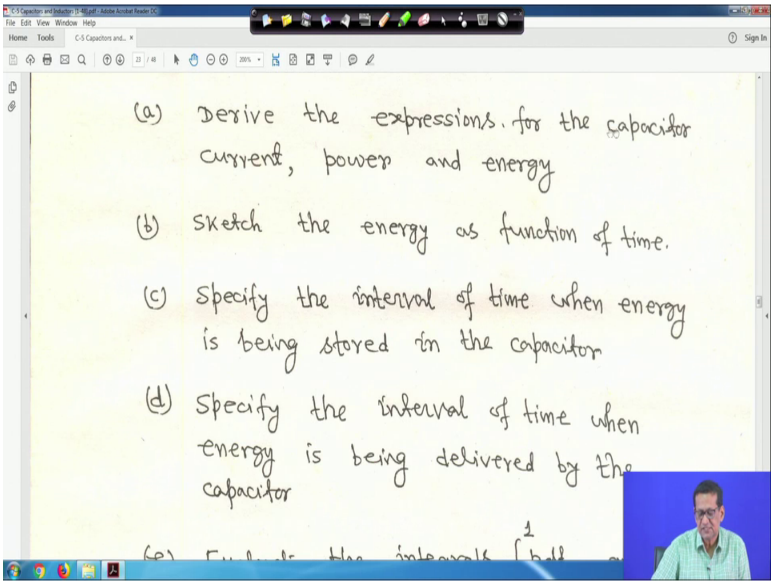

So, you have to find out derive the expression for the capacitor current power and energy this is the first thing. Sketch the energy as function of time, then specify the interval of time when energy is being stored in the capacitor and specify the integral of time when the energy is delivered by the capacitor.

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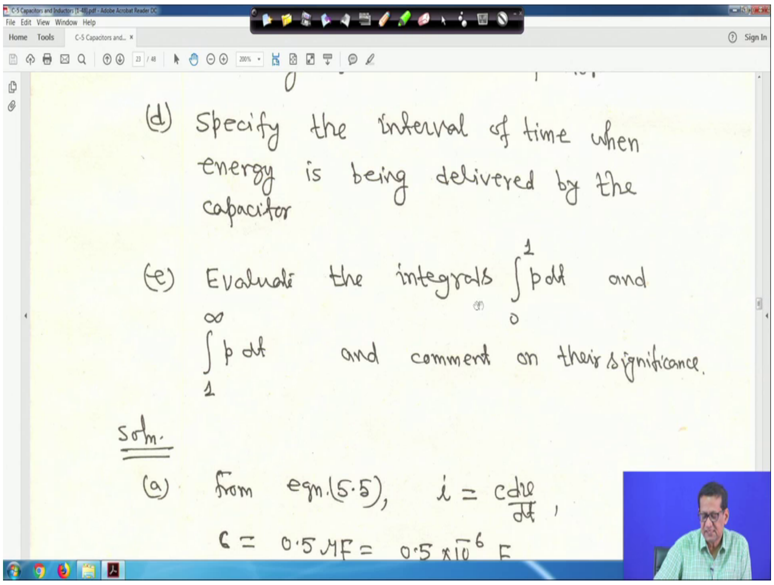

And evaluate the integrals 0 to 1 p dt p is power and 1 to infinity p dt and comment on their your significance right. So, we know again very simple.

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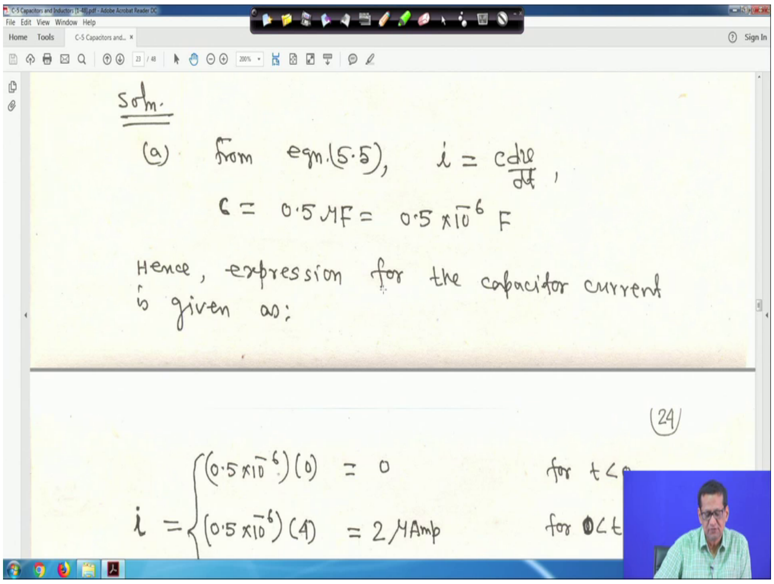

It is look we know from equation 5 that i is equal to C into dv by dt C is given 0.5 micro farad that is 0.5 into 10 to the power minus 6 farad, you can say expression for the capacitor current is given as I mean just for each integral you apply C into dv by dt right. So, first case voltage was 0 so C into your dv by dt 0. So, it is 0 for t less than 0 and then in second case between 0 and 1 v t is equal to 4 t. So, if you take the derivative with respect to it will we 4 and multiplied by C.

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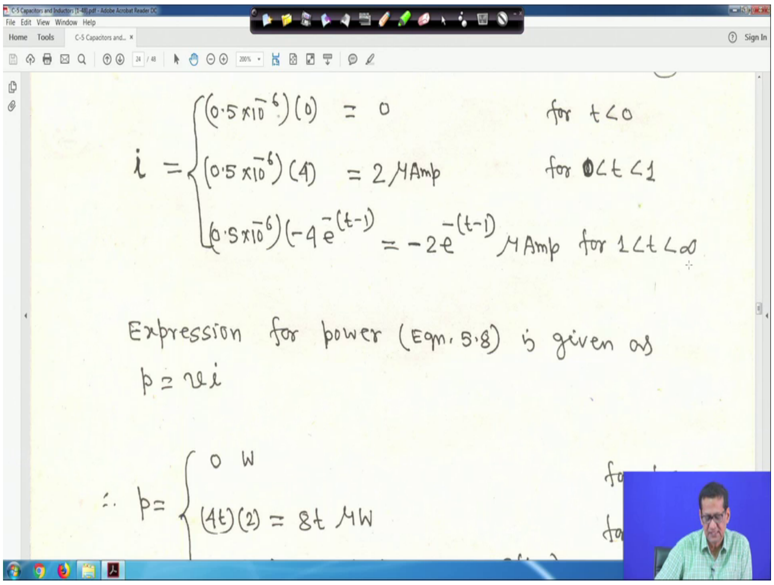

So, it will be 2 micro ampere because 10 to the power minus 6 is here that is t greater than 0 less than 1 and third one it has given 4 here it is it was given 4 in e to the power minus t minus 1, you take the derivative of it C into dv by dt. And if you do so it will 0.5 that is into 10 to the power minus C that is C value in farad into minus 4 e to the power minus t minus 1. So, it is minus 2 e to the power minus t minus 1 that is micro ampere for t greater than 1 less than infinity.

So, expression of power from equation you know that power is equal to v into i right, so this is your v into I am not marking it is understandable v into i. So, v is 0 4 t less than 0, so it should be 0 watt and then v is equal to 4 t right and i is equal to 2 micro ampere by what you call 2 micro ampere here it is written for t greater than 0 less than 1. So, multiplied by 2 it will be 8 t micro watt right, it is in micro watt and there are another one similarly.

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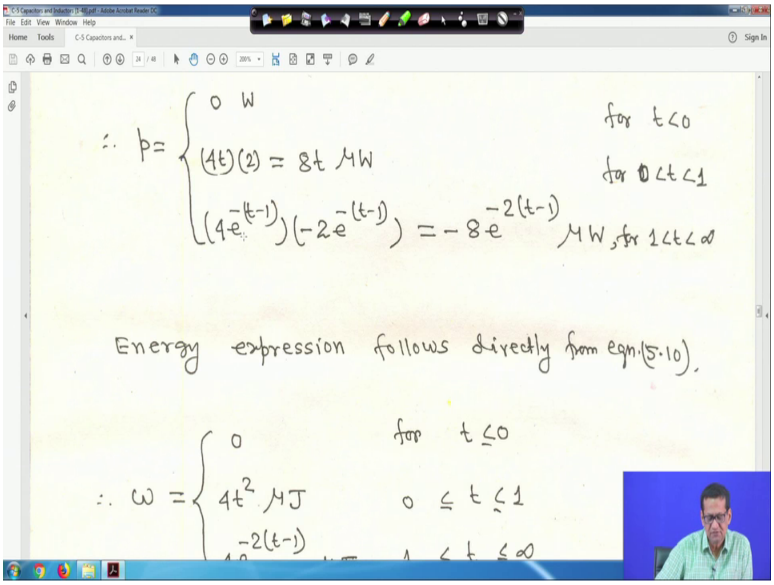

The last one will be 4 into e to the power t minus 1 into that is your v t right into current minus 2 into e to the power 2 sorry minus t minus 1 is if you just multiply, it will be minus 8 into e to the power minus 2 t minus 1 right. So, this is micro watt for t greater than 1 less than infinity this is the power, the energy expression as follows that directly we get from your what you call equation 10 right. So, you know half series square energy is equal to, so first one is v h 0 so it is 0, second case your v was given your 4 t right.

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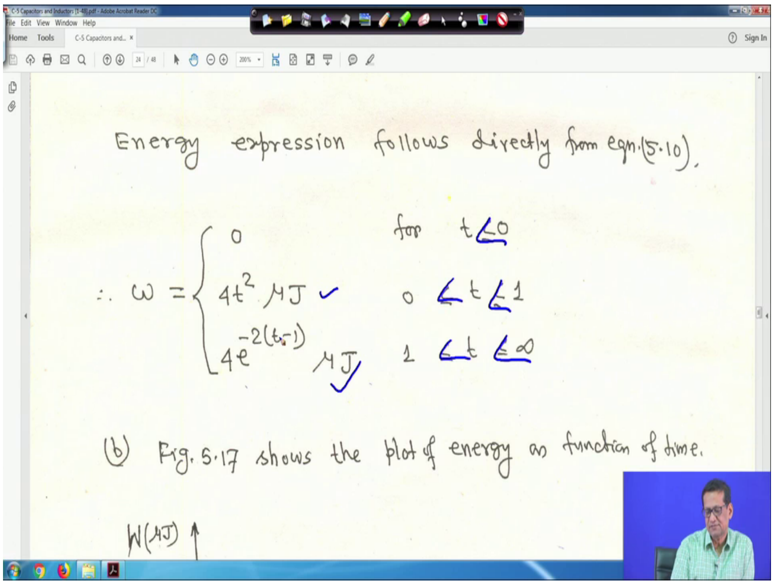

So, just simplify C is equal to 0.5 into 10 to the power minus 6 farad, so half C v square simplify you will get 4 t square micro joule your this is your it will be less your less than less than less than some where equal to it has gone right. I am correcting it so and third case half C v square it will become 4 into e to the power minus 2 sorry minus 2 into t minus 1 micro joule these are all micro just you do it please do it I have done it for a simple thing right.

So, this is your what you call energy expression, now just let me clear it. So, figure 7 shows the plot of energy function right. So, 1 is 4 t square micro joule so it looks first part will be up to 0 to 1, so it looks like in parabola right and then 4 into e to the power minus 2 into t minus 1 micro joule, so it is exponentially decay.

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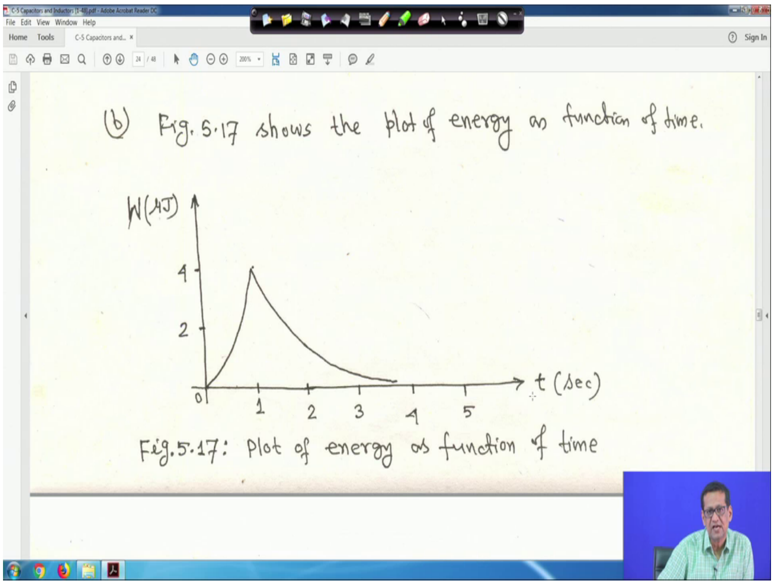

So, this side is W in terms of micro joule and this time you are this time is your x axis is your time second, if you plot it is 4 t square up to this and then that your what you call that your other part in between t greater than 1 less than infinity. So, this is your 4 e to the power this part 4 e to the power minus 2 into t minus 1 this part is 4 t square and this part is 4 into e to the power minus 2 into your t minus 1 right. So, this is your energy plot function plot.

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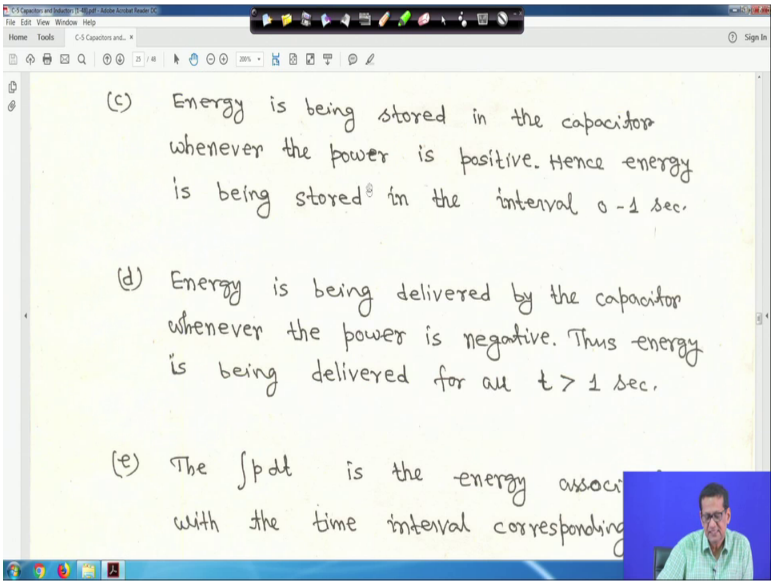

Now energy second thing is that energy is being stored in the capacitor whenever the power is positive; that means, when power is positive that energy is being stored. So, if you come to the power expression p that 8 t micro watt, so it is positive that means, energy is being stored and when power is negative when t greater than 1 less than infinity it is negative, that means power is being delivered.

So, here that your energy is being stored in the capacitor whenever the power is positive, hence energy is being stored in the interval 0 to 1 second right and energy is being delivered by the capacitor whenever the power is negative. Thus, energy is being delivered for all t greater than 1 right second.

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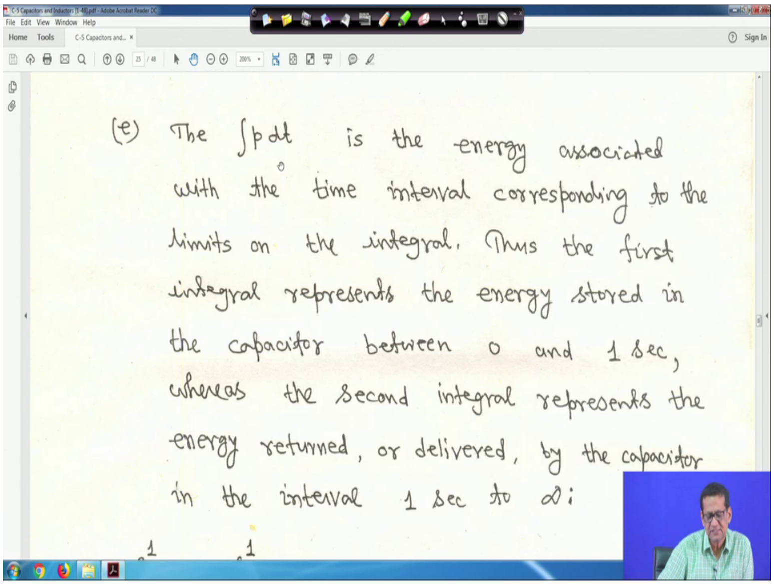

So, now next is the integration of p dt so the it is it if the energy associated with the time interval corresponding to the limits on the integral right. So, thus the first integral represents energy stored in the capacitor because, if you look into that it is given 0 to 1 p dt that is in between that p is positive right.

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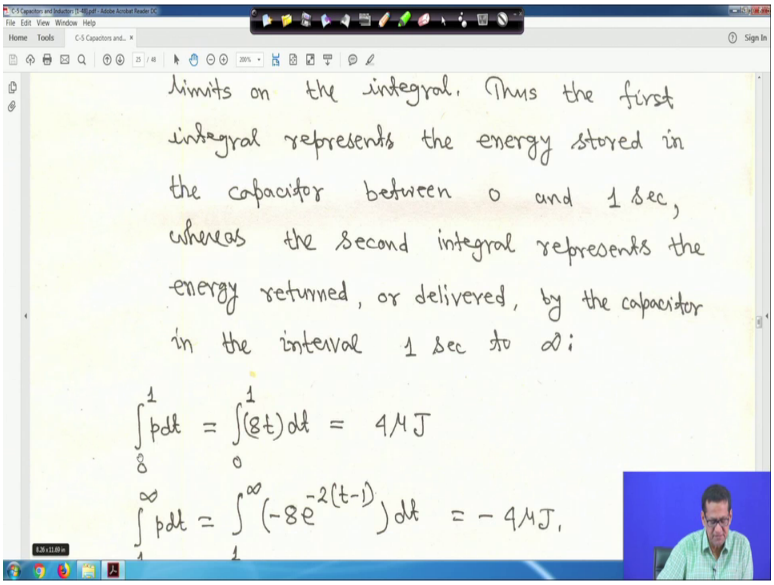

So, if it is given p dt your p dt and p is equal to v into i right your earlier, we have given that p is equal to v into i, so it is 8 t your micro watt. So, here if you see that it is energy being stored right. So, so whenever in the second integral represent the energy returned or delivered by the capacitor in the interval 1 second to infinity.

So, when 0 to 1 p dt it is 0 to 1 8 t dt so you integrate right it is in the definite integral you will get 4 micro joule and 1 to infinity when you make it is 1 to infinity and in that case minus 8 e to the power minus 2 into t minus, so integrate and simplify you will get minus 4 micro joule. So, energy stored is equal to energy delivered so it is there matching right.

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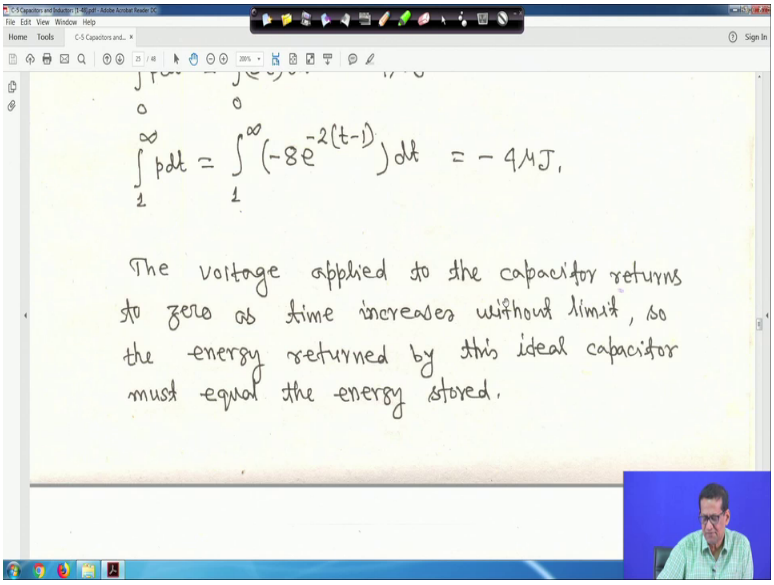

So, the voltage applied to the capacitor returns to 0 as time increases without your limit, so the energy returned by this ideal capacitor must equal the energy stored right. So, this is what we take this example for our understanding right. So, next we will take the inductors right.

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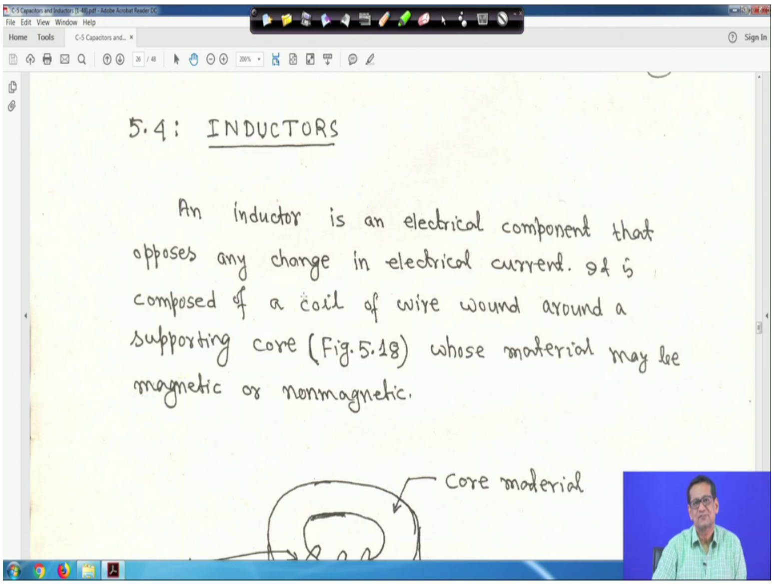

So, after that we will move to your first order circuit. So, inductors so an inductor just look into that.

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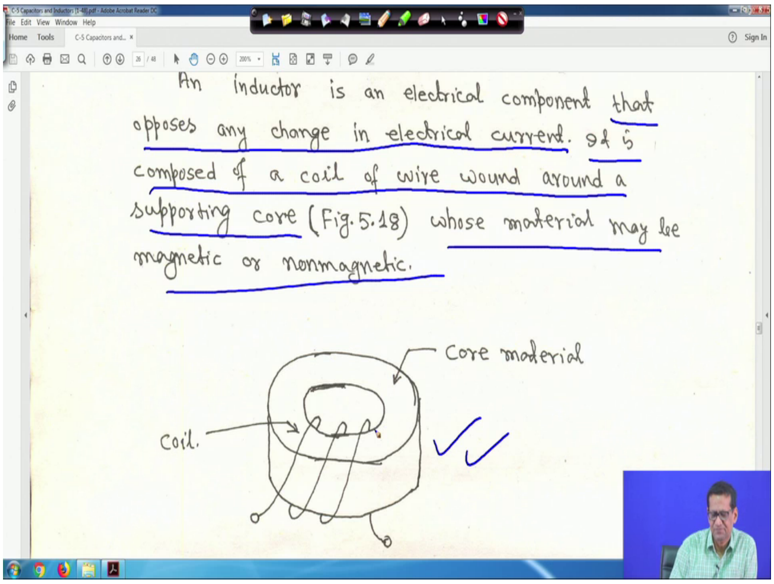

An inductor is an electrical your electrical component right that that opposes any change in electrical current little bit you know about from your (Refer Time: 08:25) physics. So, it is composed of a coil of wire wound around it your supporting core that is this figure this is figure 18 right; whose material may be magnetic or non-magnetic, so this is coil wound and this is the core material. So, let me clear it so this is your figure right.

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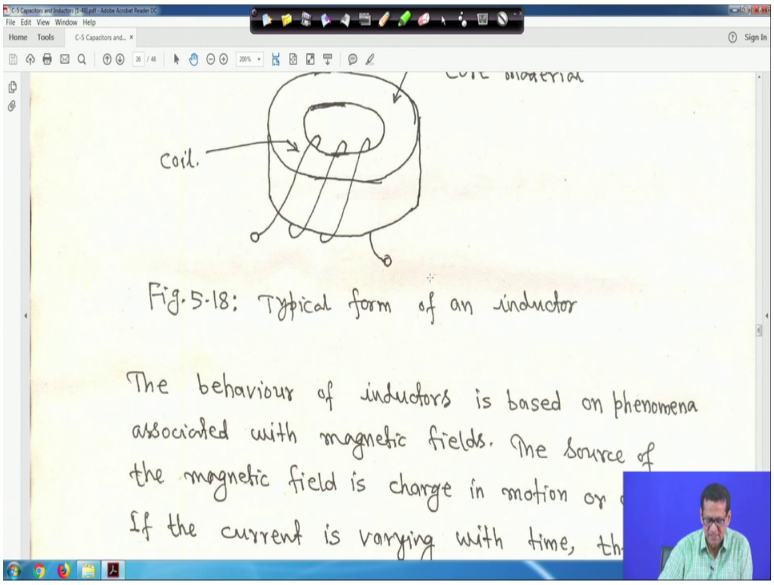

The behavior of inductor is based on phenomenon associated with magnetic fields.

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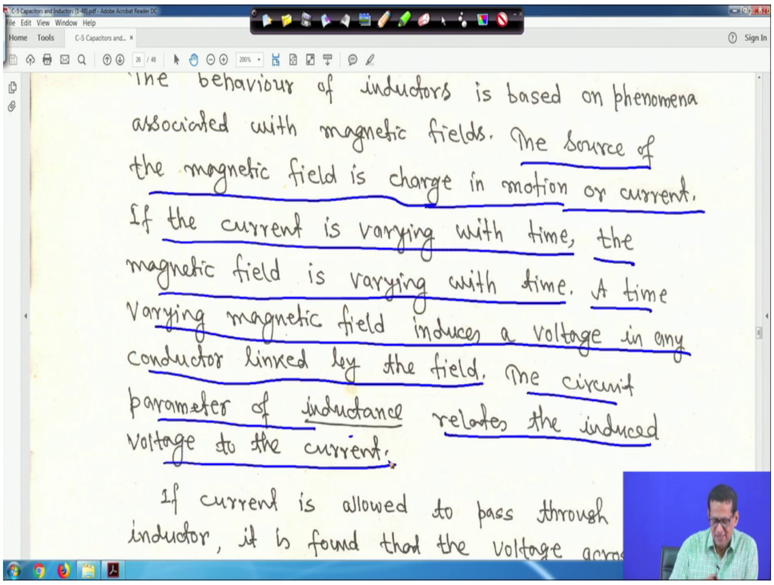

So, the source of the magnetic field is here what you call charge in motion that is current dq by dt or current charge in motion that is i is equal to dq by dt your current right. If the current is varying with time that you know then the magnetic field is varying with time right, so a time varying magnetic field induces a voltage in any conductor linked by the field this you know.

The circuit parameter of the circuit parameter of inductance your relates the induced voltage to the current, this you know in general you know v is equal to L into dy by dt will come to that right. So, let me clear it.

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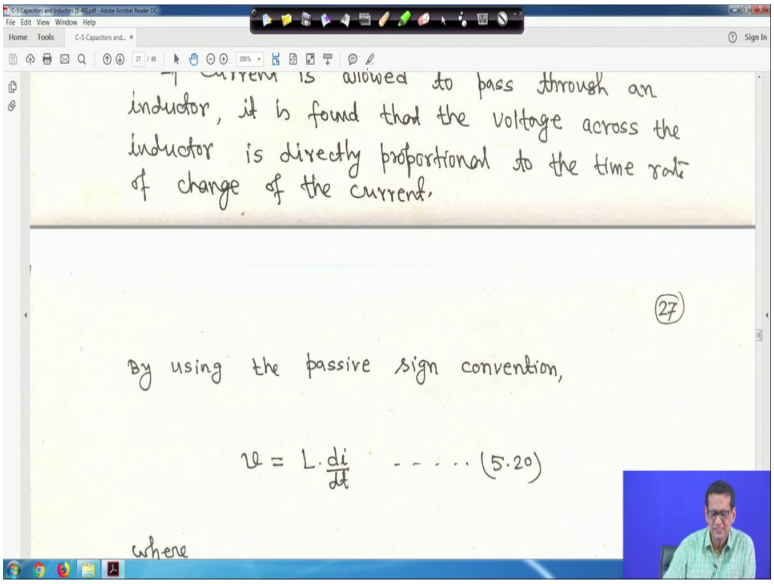

So if the current is allowed to pass through an inductor it is found that the voltage across the inductor is directly proportional to the time rate of change of current. So, by using the passive sign convention right v is equal to L into di by dt.

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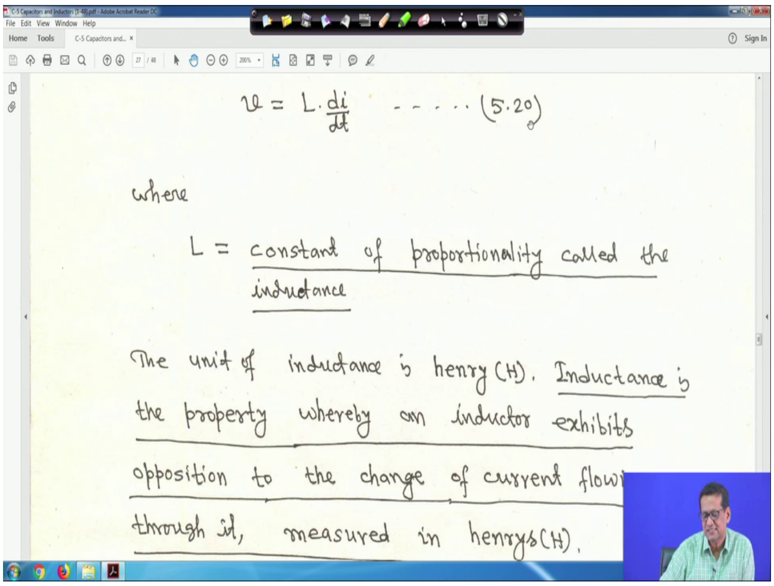

Say this is equation 20 where L is constant of proportionality called inductance this you know right. The unit of inductance is Henry and inductance is the property right.

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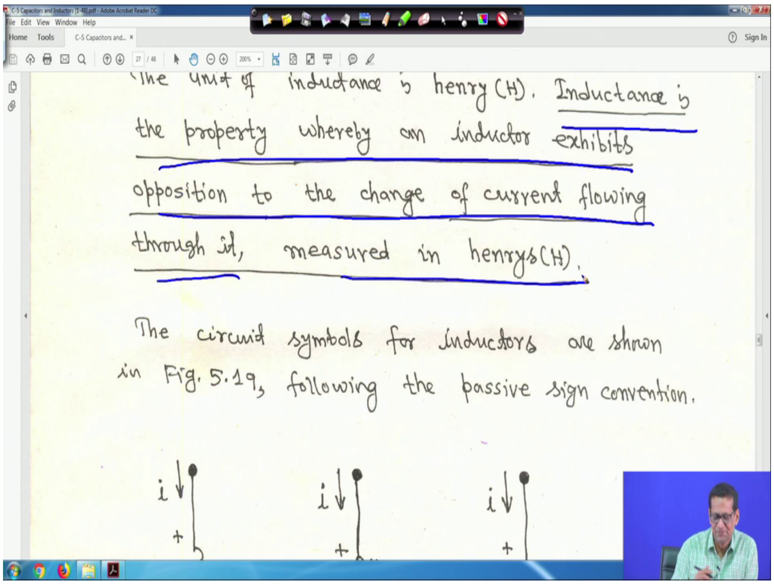

So, that you inductance actually is the property whereby an inductor exhibits opposition to the change of current flowing through it measured in henrys right. So, this is actually your what you call little bit of your many things you know this is simple thing. But just to just to start this introduction so little bit I wrote for you right. So, let me clear it so the circuit symbols for inductors are shown in figure 9 have following passive sign convention.

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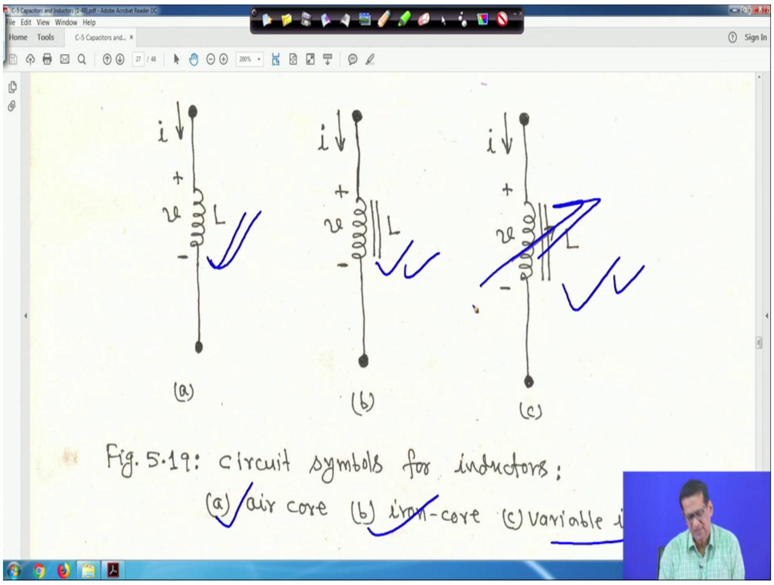

This one your this one your e this is the sign of inductor when it is air core it is here it is written figure a air core. When this symbol is there it is iron core here it is written it is iron core when this variable sign is there that arrow is there this is variable iron core. So, this is your symbols of the your what you call the inductor your inductors right, so it is it is when you write like this it is air core. When you make 2 bar then it is iron core and if it is a variable iron core then 2 bar and then make arrow right, so this is the symbol of the inductor so let me clear it.

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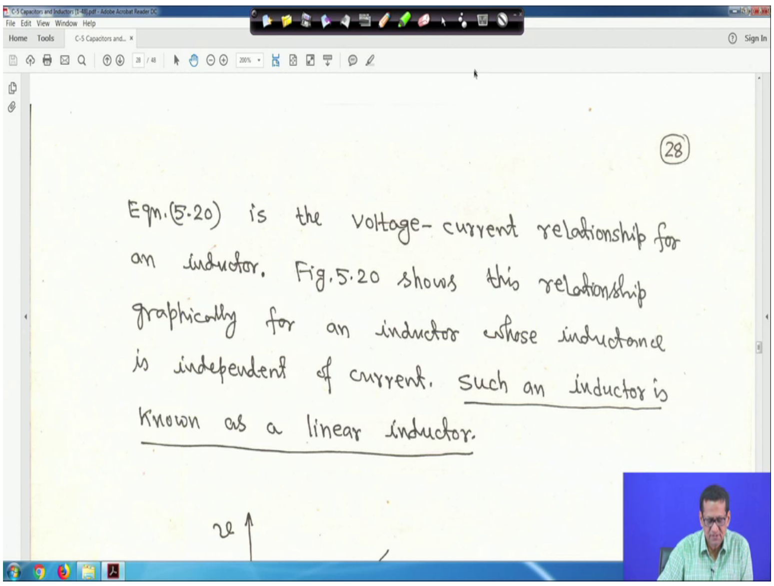

So, equation 20 that is v is equal to L into di by dt right that the voltage for a relationship for an inductor. So, this figure 20 shows the relationship graphically for an inductor whose inductance is independent of the current.

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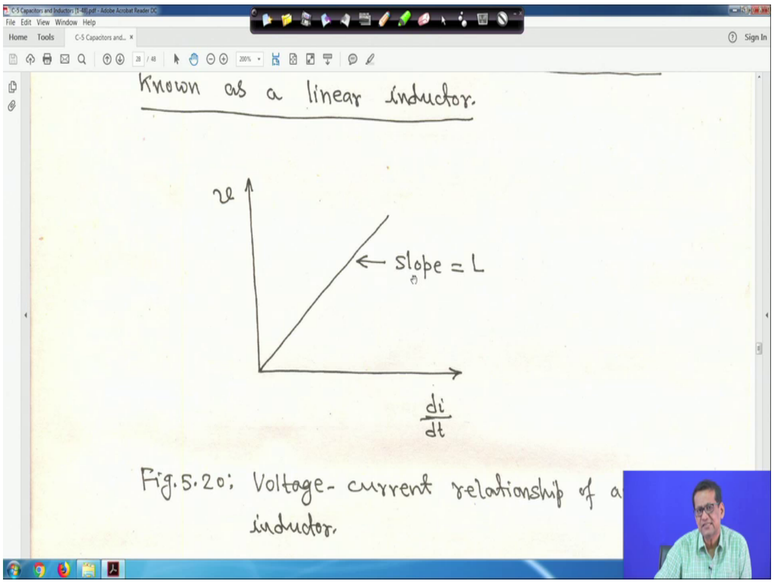

Like capacitor also how we saw R is equal to C into dv by dt such an inductor is known as linear inductor right, when inductor is independent the L is independent of the current then this side is v y axis x axis is di by dt and simple straight line passing through the origin and this is the slope that L slope is actually in this case inductor. So, L is not a function of I current right so it is an need then it is linear inductor right, so this the voltage current relationship simple it is.

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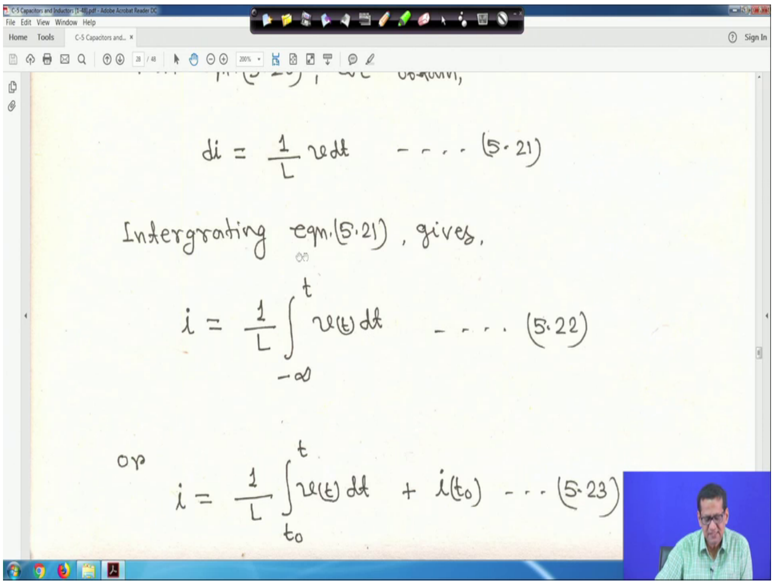

Now, if v is equal to L into di by dt that means we can write di is equal to 1 upon L v dt this is equation 21; now if we integrate then I should be is equal to 1 upon L then minus infinity to t v dt v t dt right v t is function of t this is equation 22. So, if you integrate same like capacitors same philosophy and it will be 1 upon L t 0 to t v t dt plus i t 0 that is equation 20 3 where i t 0.

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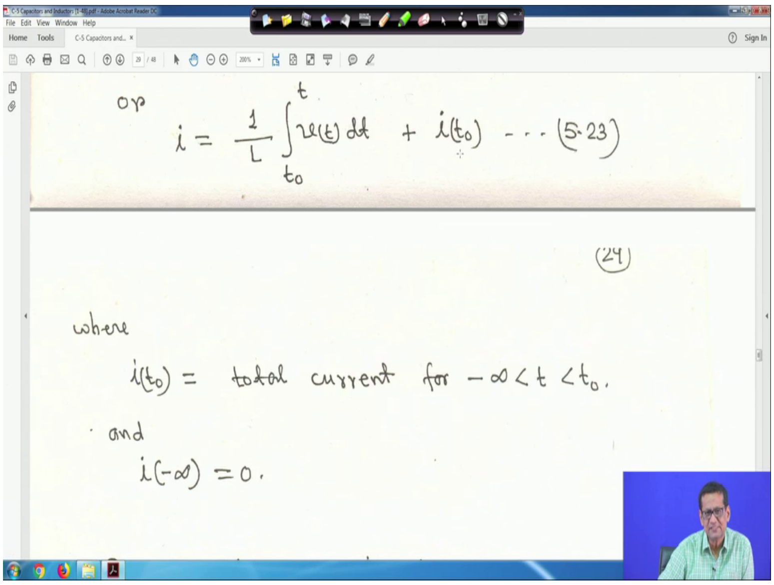

Like capacitor also we explain something same philosophy the total current for in between minus infinity t greater than minus infinity less than t 0 and i minus infinity is always take 0 right.

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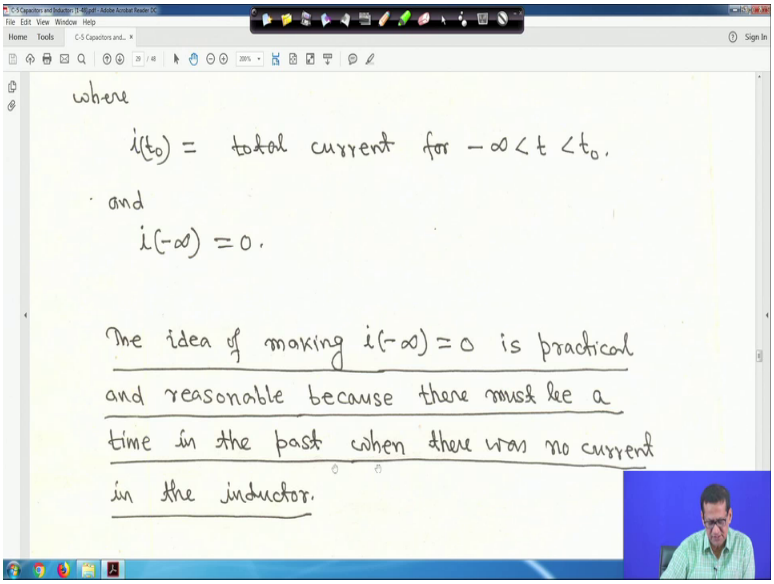

So, the idea of making i minus infinity 0 is the practical and reasonable, because they are must be a time in the past when there was no current in the inductor. So, it is my it is past only past history so in some time there was no current in the inductor right. So, it is very practical of this kind of assumption, so i minus infinity we take it as a 0 right and the power delivered to the inductor will be p is equal to v into I right.

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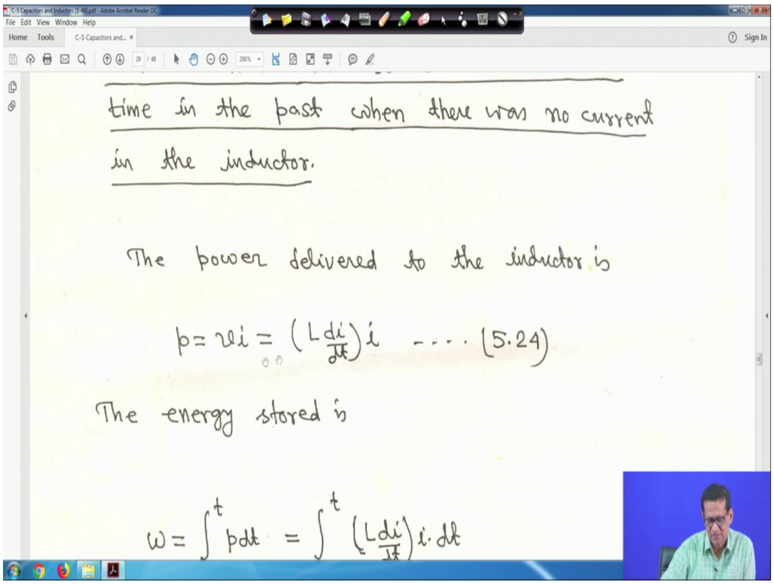

So, v is equal to L into di by dt into i so this is equation 24.

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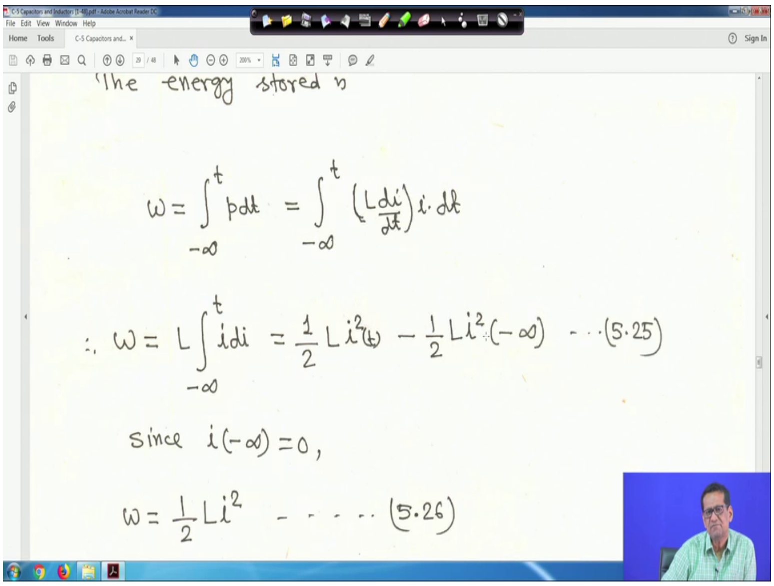

The energy stored is that w is equal to minus infinity to t p dt, that is minus infinity to t L into di by dt into i right and if you integrate this 1 then it will be it basically it will be L minus infinity to t i vi. So, that is half Li square t minus half Li square minus infinity that is i your i minus infinity square right this is equation 25. But just we have seen that i minus infinity is equal to 0 right since it is 0 i minus infinity; therefore, energy stored is equal to half Li square this is equation 26 simple thing right.

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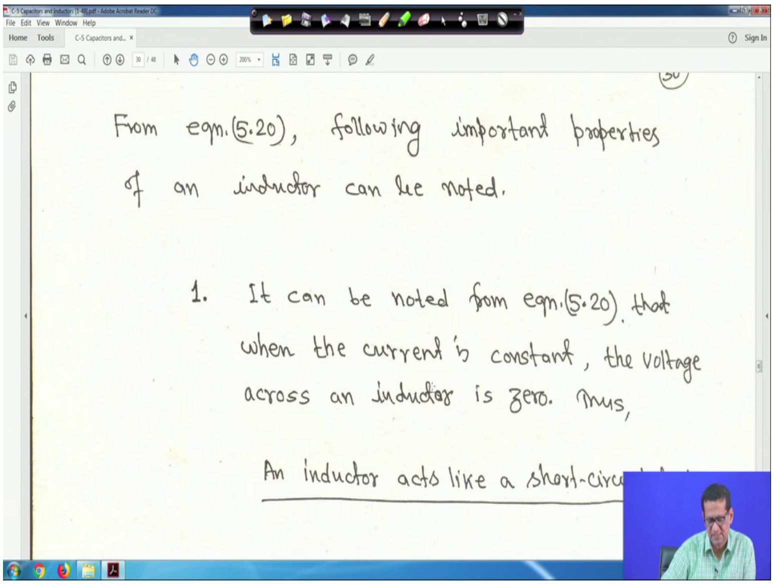

So, equation 20 that means, this equation 20 as well you are following important properties of an inductor can be noted like capacitor also we solve some property. So, it is same way will see pure inductor that is v is equal to equation 20 v is equal to L into di by dt. So, it can be noted from equation 20 that when the current is constant because, v is equal to L into di by dt, if i is constant then di by dt is equal to 0 right. Therefore, the voltage across an inductor is 0 thus an inductor acts like a short circuit to dc right. So, when will solve numerical study state condition we have to assume that inductor acts like a short circuit to dc.

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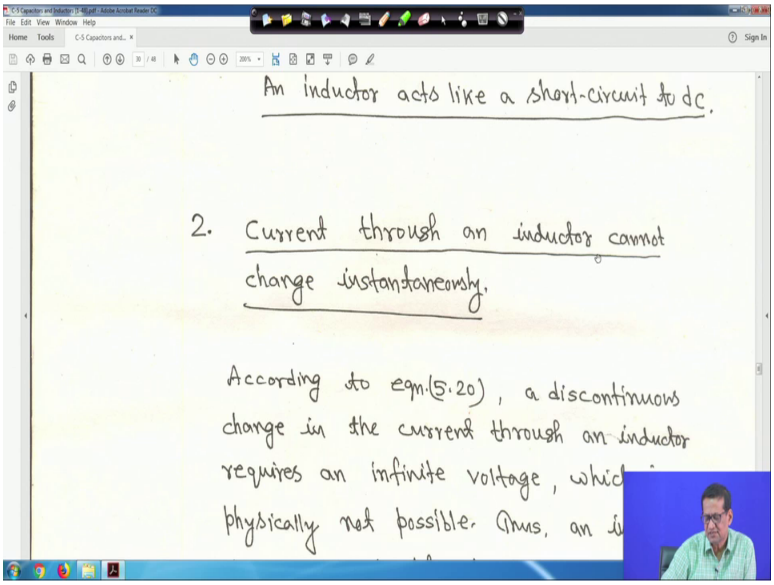

Second one is the current to inductor cannot change instantaneously.

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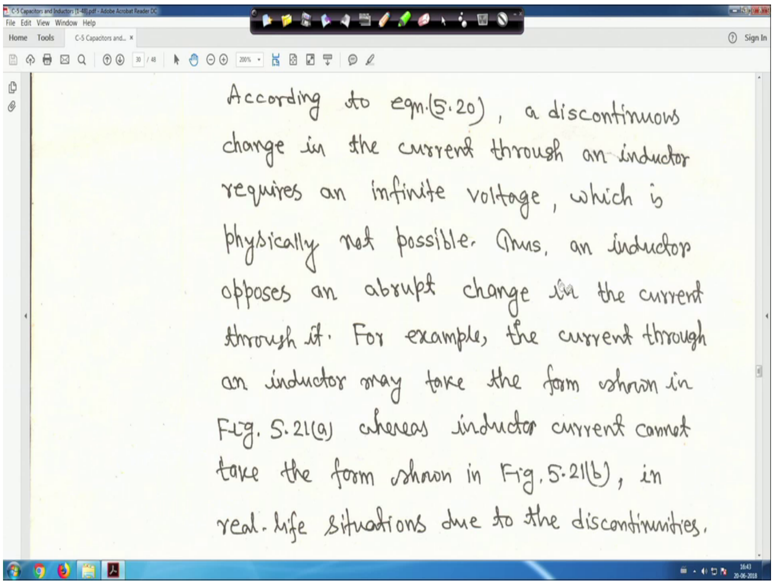

So, your in this case according to equation 20 that is v is equal to L into di by dt a discontinuous change in the current to an inductor requires an infinite voltage which is physically not possible. Thus, an inductor opposes an abrupt change in the current through it; for example, the current through an inductor may take the form shown in figure 21a. I will come to that whereas, inductor current cannot take the form shown in figure 21 b I real life situation in real life situation due to your discontinuities.

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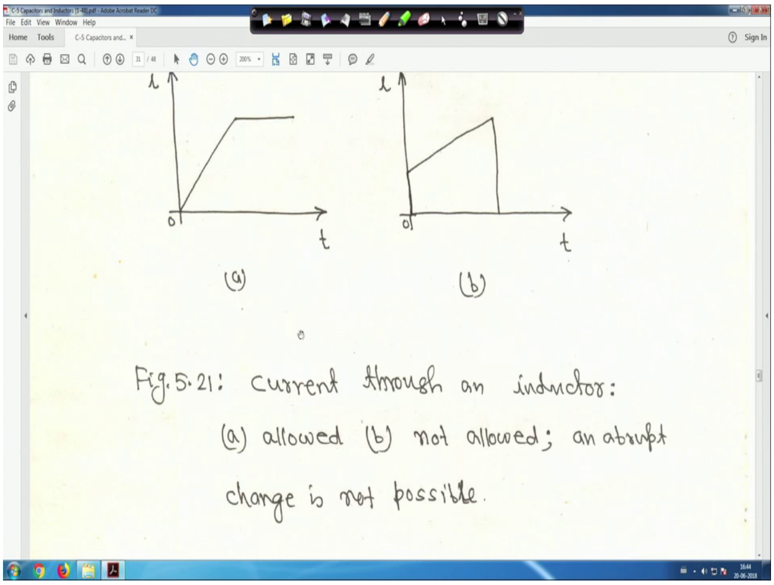

That means, this kind of change for inductor in figure a it is an it is ok, but here abrupt suddenly it is directly suddenly from here it is falling to 0 it is it is not it is not possible in real life right. So, this kind of discontinuous not possible right so this is given current through inductor this is not allowed right. But this kind of thing not allowed right and abrupt change is not possible in the inductor right.

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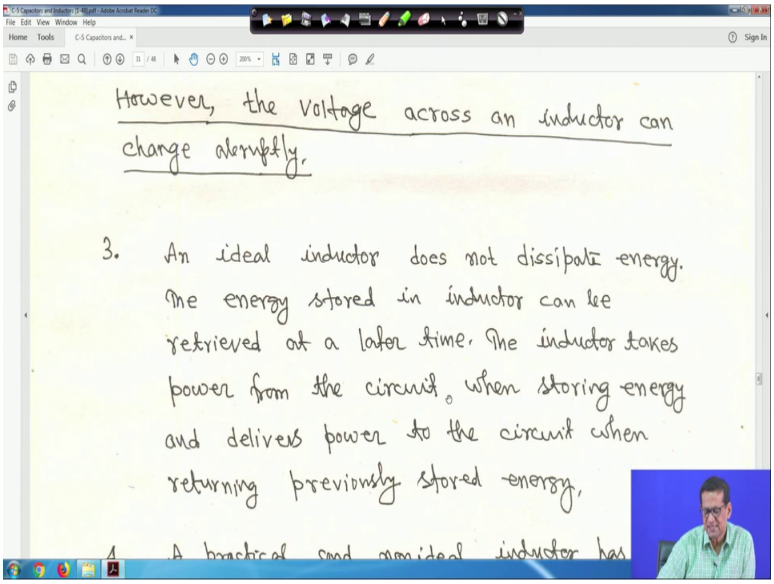

However the voltage across an inductor can change abruptly, next 1 is an ideal inductor does not dissipate energy right. The energy stored in the inductor can be retrieved at a later time it is same philosophy like capacitor whatever we have just seen before; the inductor takes power from the circuit when storing energy and delivers power to the circuit when returning your previously stored energy right.

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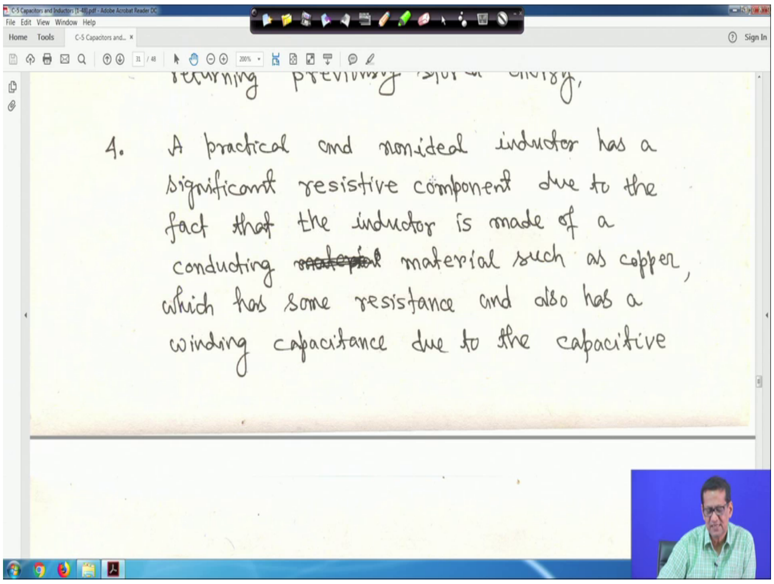

So, if practical and non ideal inductor has a significant resistive component, it has significant resistive component due to the your fact that the inductor is made of a your what you call conducting material such as copper, which has some resistance and also has a winding capacitance due to the your capacitive coupling between the conducting coils; that means, it has resistance also some capacitance is there right.

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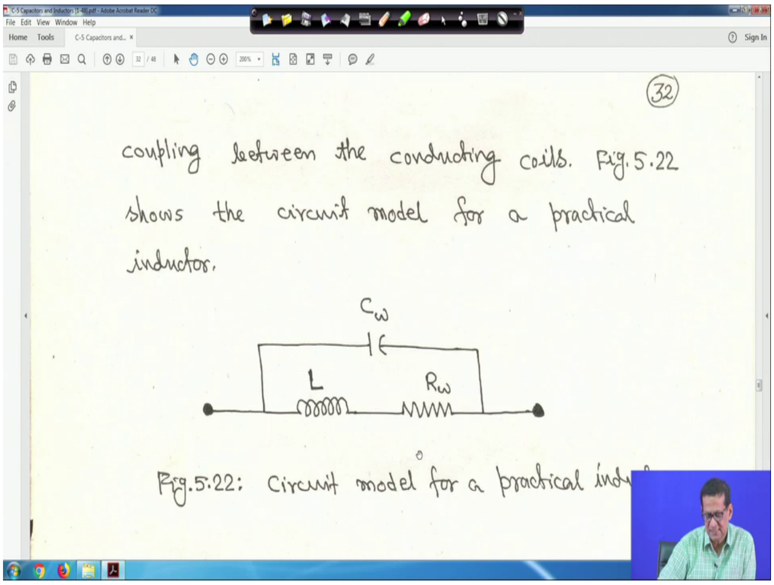

So, it is the it is that your what you call exact circuit for an inductor right; practically inductor, but generally R w is the resistance of that coil inductive coil and Cw is that your capacitance in between that your coupling capacitance between the your what you call 2 winding say so many windings are there.

So, this is called cup Cw coupling capacitor so this is a exact circuit for the inductor, but in reality Rw is very negligible and Cw also negligible. So, we only consider inductor resistance we generally not consider for some problem we also consider to find out the resistance and inductance of the inductor that we will see later and Cw generally we do not consider for our as far as our circuit is considered circuit analysis is concerned.

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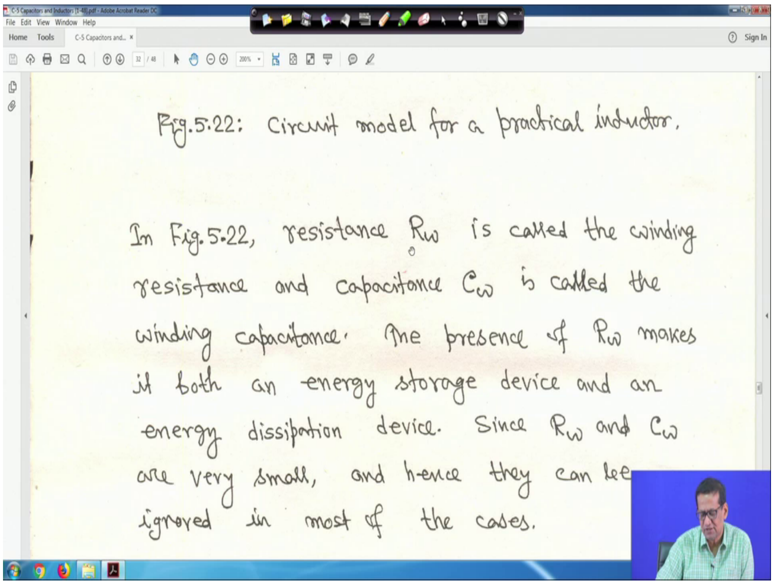

So, in figure 22 that that I told you Rw is called winding resistance and capacitance Cw is called the winding capacitance right. So, the presence of Rw makes both an energy storage device because resistance is there and then energy dissipation device right because, inductor store energy can be dissipated in the form of a heat say in the resistor since Rw and Cw are very very small and hence they can be ignored right in most of the cases so we will ignore that. Next is series and parallel inductors right.

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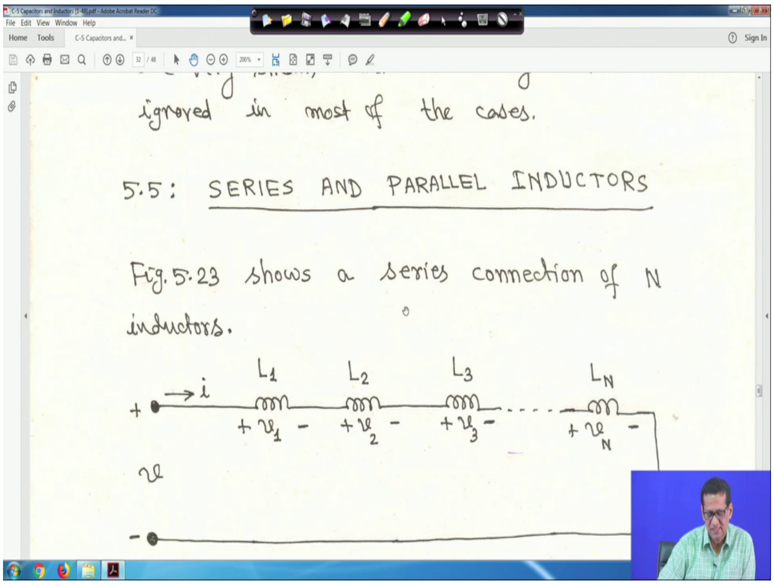

So, this is a simple circuit that your 23 shows series combination of N inductors, where voltage v is there L 1 L 2 L 3 all are up to L N all are connected in series current flowing to this i voltage across L 1 is v 1 and L 2 is b 2 like this across L N in v N right, so this is series connection of N inductor.

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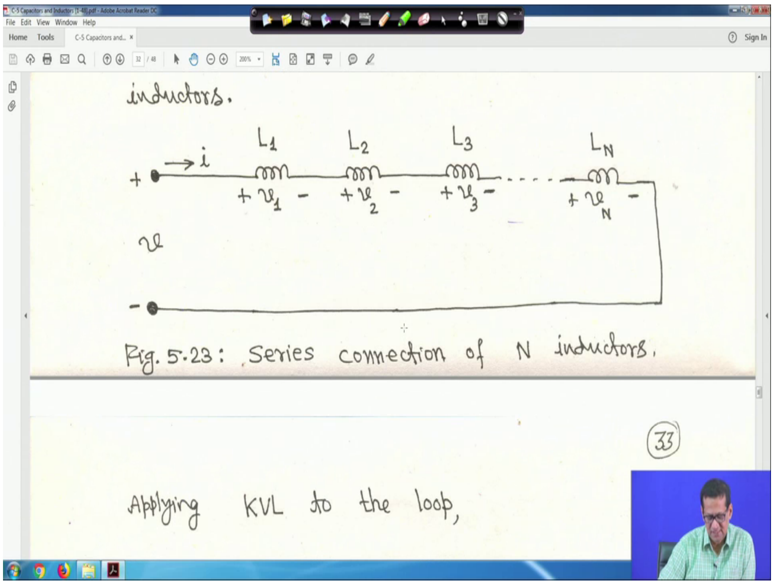

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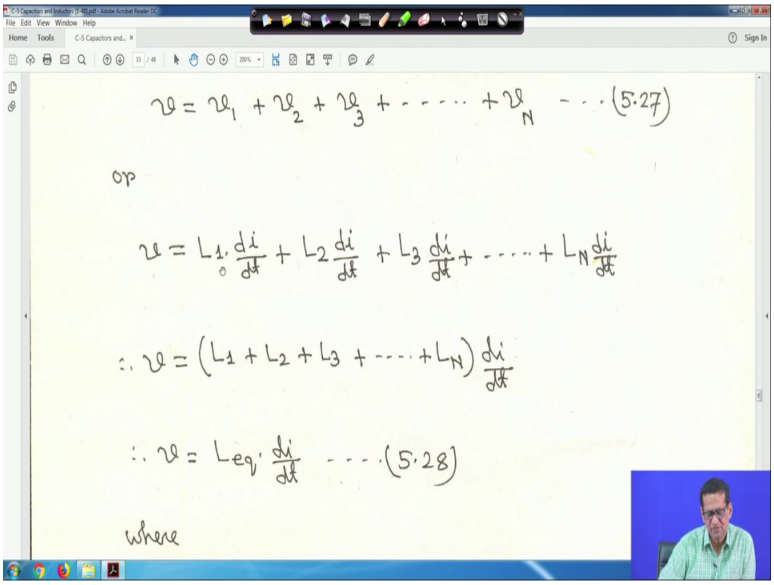

So, you apply KVL. Then will write v is equal to v 1 plus v 2 up to v N sum it up this equation 27, then or v is equal to L 1 into di by dt plus L 2 into d 2 by di by dt plus L 3 di by dt andso on up to L N di by dt right you take L 1 L 2 L 3 all common. So, it will be into di by dt right or v is equal to L eq di by dt this is equation 28. Where L is equal to L 1 plus L 2 plus L 3 up to L N equation 29 right.

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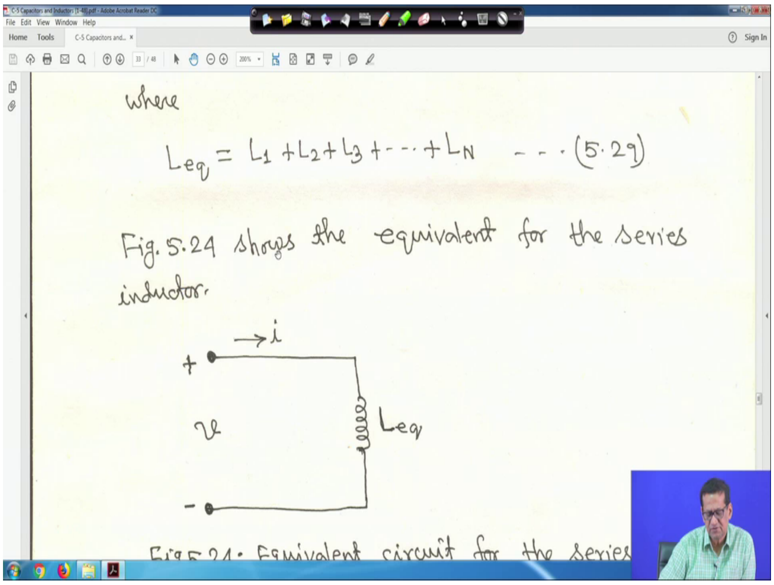

Therefore equation 24 shows the equivalent equivalent for the series inductor, it is like a resistance this for inductor case it is like a resistor in series when R1 R2 R3 all resistance are in series we add it you do the same thing, but inductor also just you add it right. So, this is an equivalent circuit and this is L eq L eq is equal to L 1 plus L 2 plus L 3 and so on all the inductors you add equivalent circuit for the series inductor.

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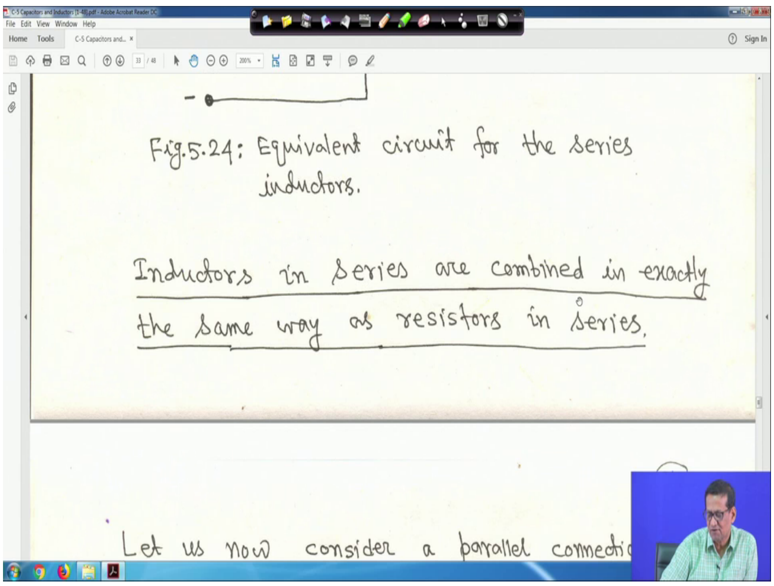

So, inductor in series are combined in exactly the same way as resistors in series right.

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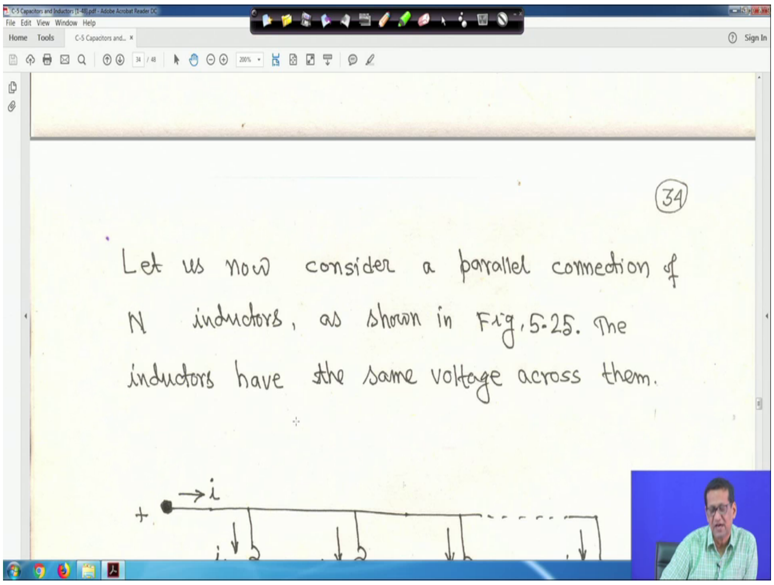

So, now consider the your parallel connection of N inductors that shown in figure 25, the inductor have the same voltage your across them.

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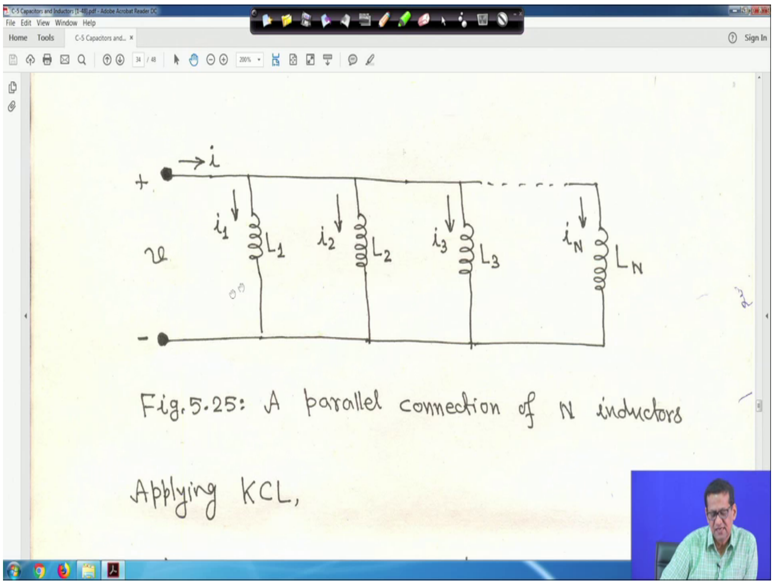

So, this is the voltage and this L 1 L 2 L 3 up to L N all inductors are connected in parallel and this is the current entering into i right and then i1 i2 i3 all current going through inductor 1 inductor 2 like this. Therefore, Kirchhoff's if you apply your KCL right then i is equal to i1 plus i2 up to iN right.

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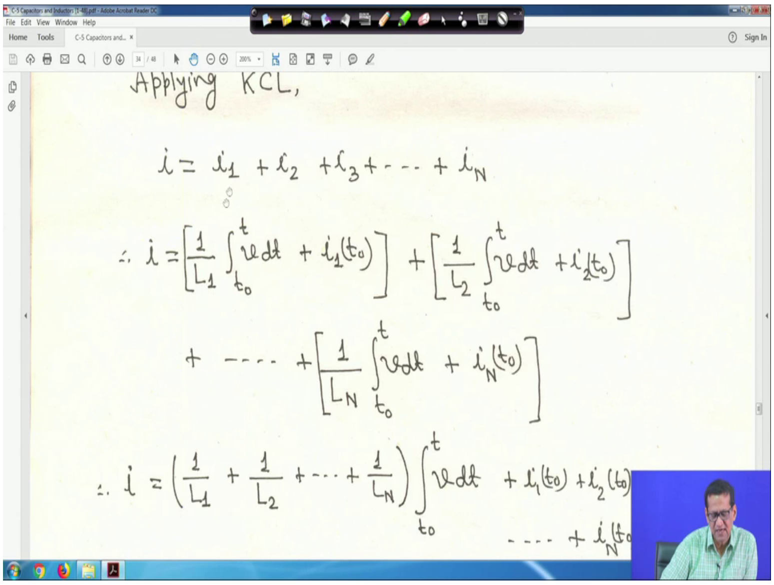

If you make it i is equal to i1 plus i2 plus i3 up to i N right and we know that i i1 is equal to 1 upon L1 t 0 to t v dt plus i1 t 0 that is initial inductor current or like like capacitor whatever we do it same thing plus 1 upon L 2 t 0 to t v dt plus i to t 0 and up to what you call 1 upon L N t 0 to t v dt plus i N t 0.

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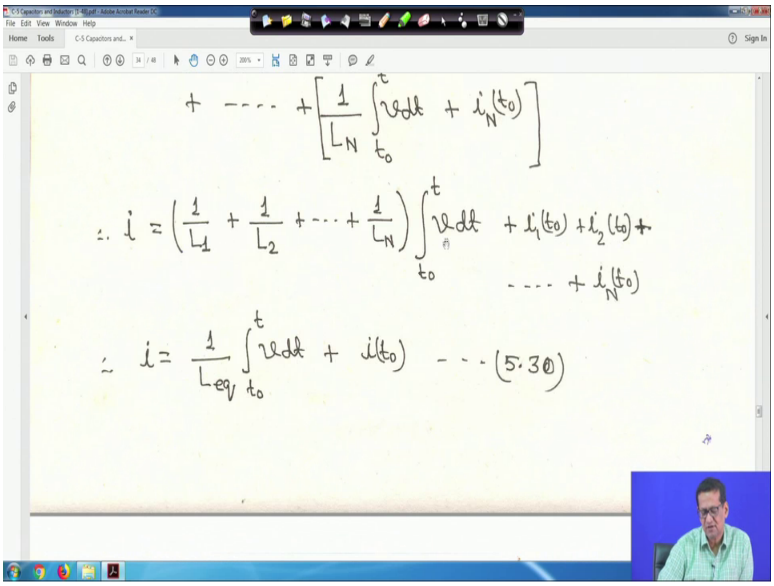

Now, collect all the terms of your what you call multiplied by integration t 0 to v dt. It is 1 upon L 1 plus 1 upon L 2 plus up to plus up to 1 upon L N into t 0 t t 0 to t v dt plus i1 t

0 plus i2 t 0 plus your up to i N t 0 or you can write i is equal to 1 upon L eq t 0 to t v dt plus i t 0.

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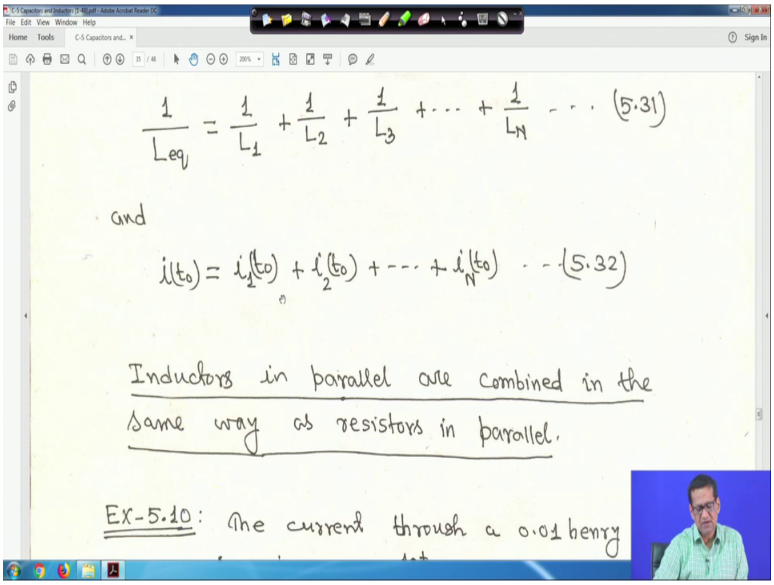

Whereas, 1 L eq is equal to 1 upon L 1 plus 1 upon L 2 plus 1 upon L 3 plus 1 upon up to LN, it is same as that your resistance are in parallel when 1 up on R eq is equal to 1 upon R 1 plus 1 upon R 2 like this same as resistor and there initial thing i t 0 is equal to i 1 t 0 plus i 2 t 0 up to i N t 0 this is equation 31 and this is equation 32 right. So, inductors in parallel are combined in the same way as resistors in parallel, next will take 2 3 examples.

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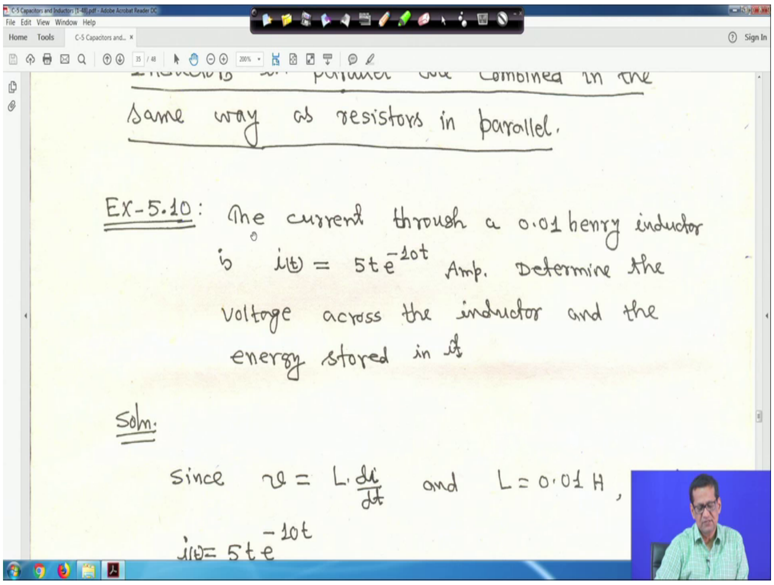

So, just look into the this the current that current through a 0.01 Henry inductor is i t is equal to 5 t e to the power minus 10 t ampere. Determine the voltage across the inductor and the energy stored in it since we know that v is equal to L into di by dt and L is given 0 point 0 1 Henry and i t is given 5 t your what you call into e to the power minus 10 t it is given it is given, so v is equal to your what you call L into d dt of i e.

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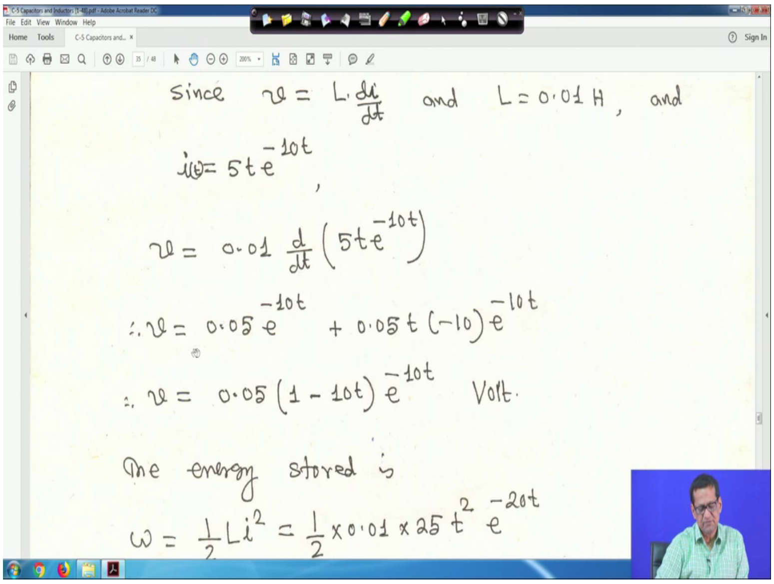

So, if you do if you take the derivative of it will become 0.05 e to the power minus 10 t plus 0.05 t into minus 10 into e to the power minus 10 t. If you simply it will be v is equal 0.05 into 1 minus 10 t into e to the power minus 10 t volts, so energy stored is half Li square.

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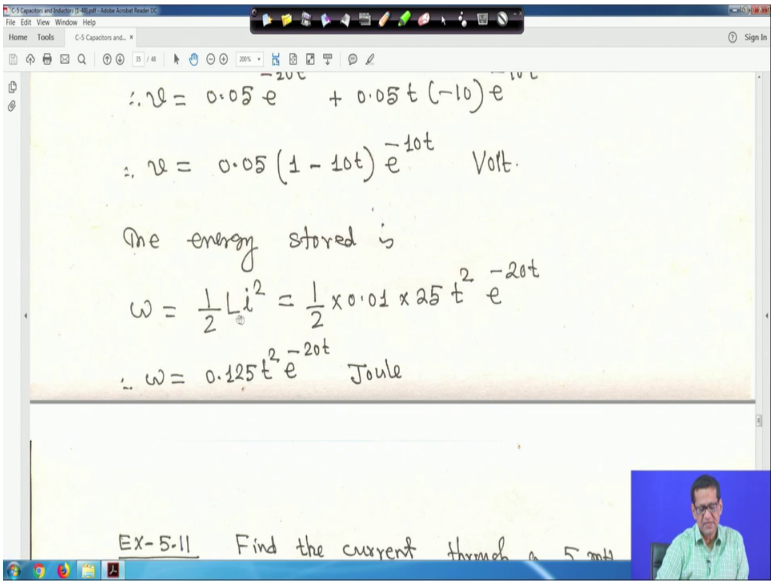

So, half L into this is your i square right, so 25 t square into e to the power minus 20 t. So, it is basically 0.125 t square e to the power minus 20 t joule right, so this is simple example next 1 is find the current through a 5 milli Henry inductor if the voltage across it is v t is equal to 30 t square for t greater than 0 and it is 0 for t less than 0 this is given right.

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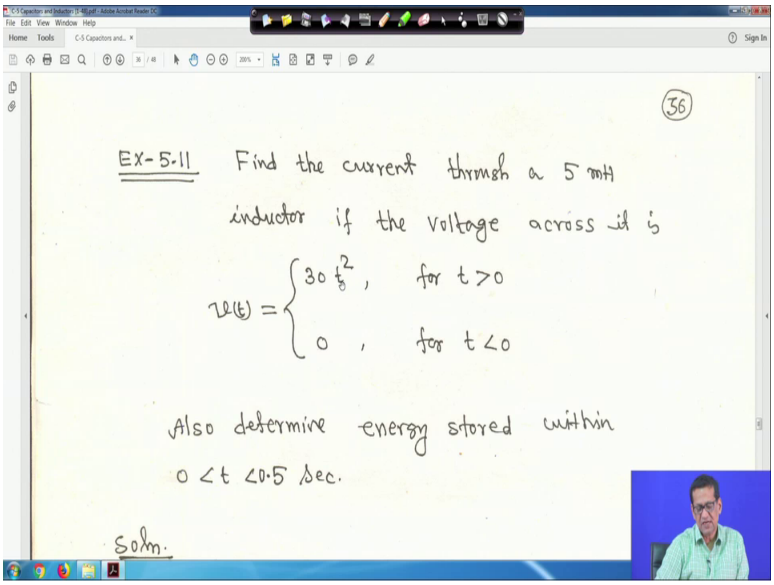

So, also determine the energy stored within 0 t greater than 0 less than 0.5 second this is also asked to do it.

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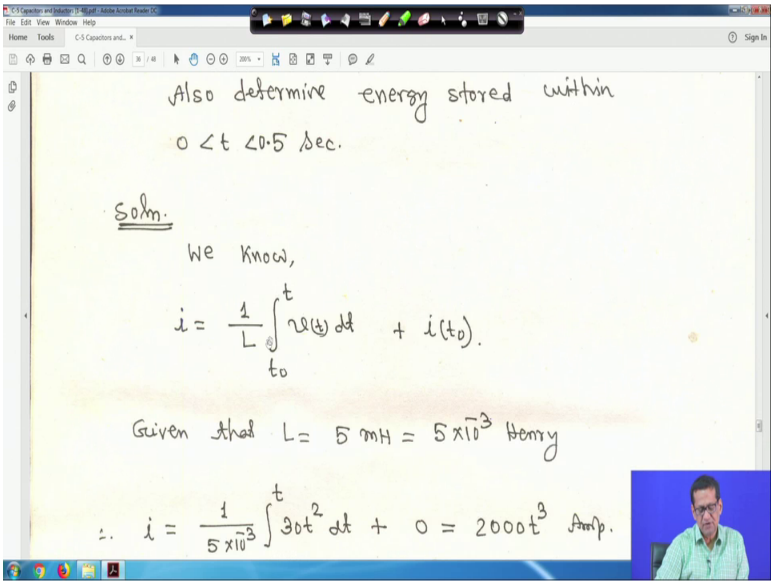

So, you know that i is equal to 1 upon L t 0 to t v t dt plus i t 0 right, so given that L is equal to 5 milli Henry. So, it is 5 into 10 to the power minus 3 Henry and I is equal to 1 upon your L that is 5 into 10 to the power minus 30 to t third v is equal to 30 v t is equal to 30 t square given dt plus 0 that is that is your i t 0 is equal to actually 0 right. Because anything that v t is given and find the current your 5 milli ampere if the voltage across because, v t is 0 for t less than 0 right, so your in this case your i t 0 is equal to 0.

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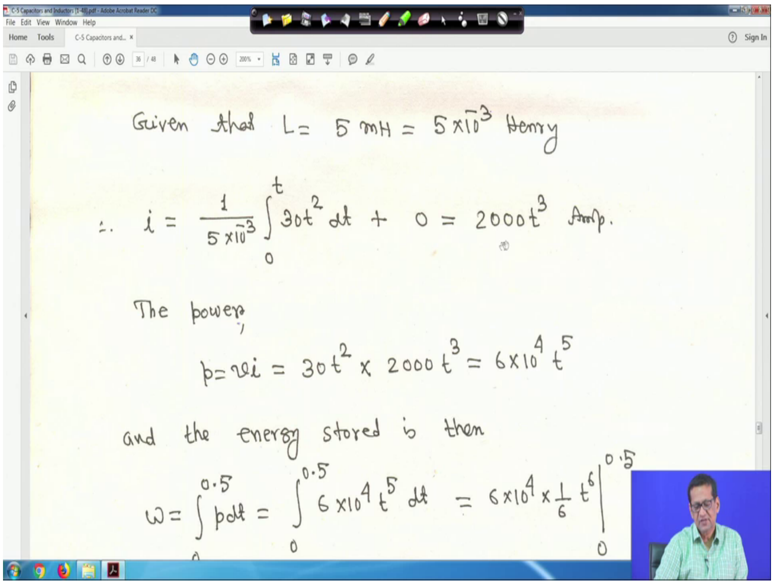

So, it is 2000 t q ampere so the power p is equal to v i p is equal to thirty t square into 2000 t cube is equal to 6 into 10 to the power 4 into t to the power 5 right.

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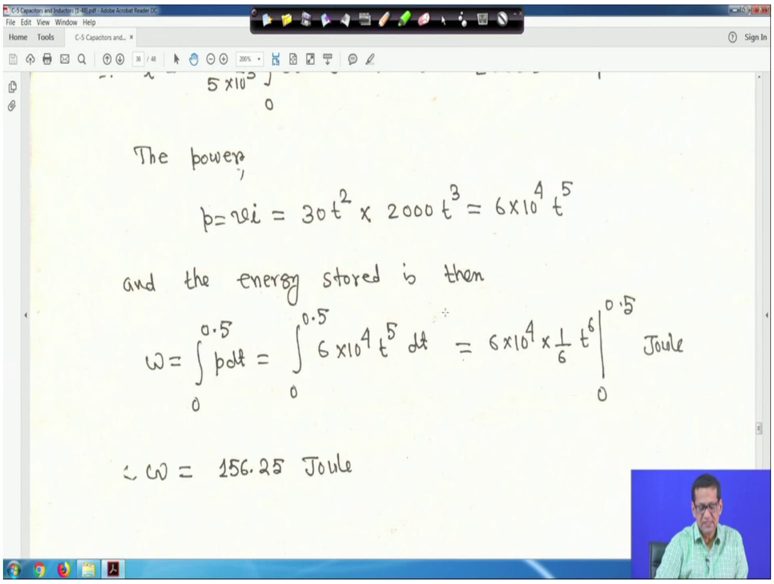

And the energy stored is then given by we it has been asked in between 0 and 0.5, so integrate this 0 to 0.5 pdt p is equal to 6 into 10 to the power 4 into t to the power 5. So, you substitute here and integrate you will get your omega is equal to 156.25 joule right it is a simple example simple example.

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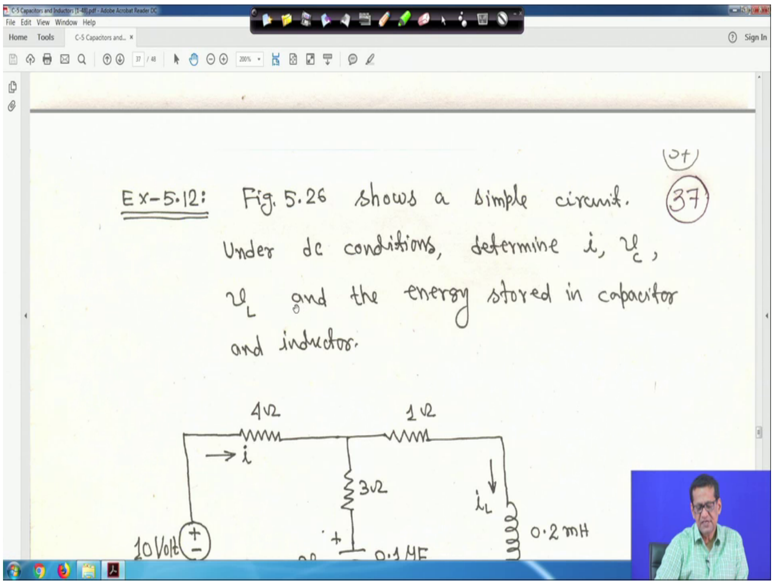

Now, another 1 is that figure 26 shows the simple circuit under dc condition, determine i v C v L and the energy stored in the what you call in the capacitor. So, you have this is the simple circuit is given this is and you have to find out under dc condition you have to find out i v C v L right.

This is i and this is v C and this is your voltage your what you call and your v L right and energy stored in the capacitor and inductor this we have to find out.

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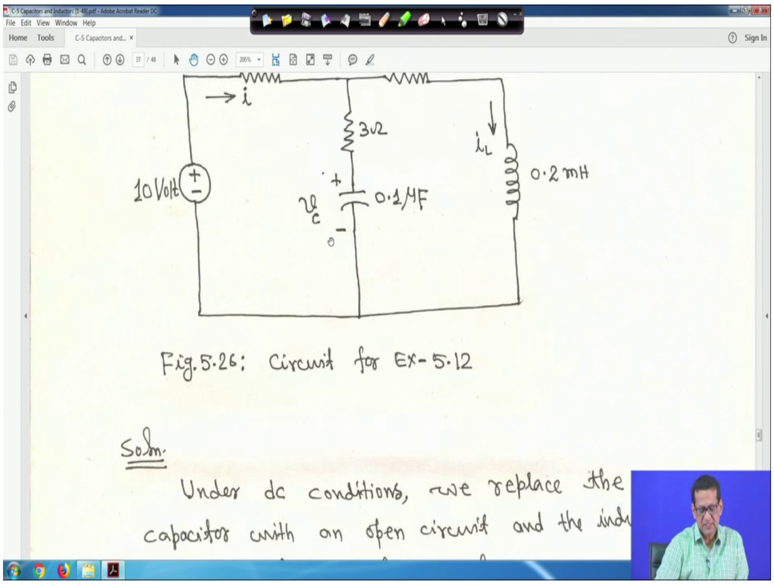

So, question is that under dc condition right under dc condition.

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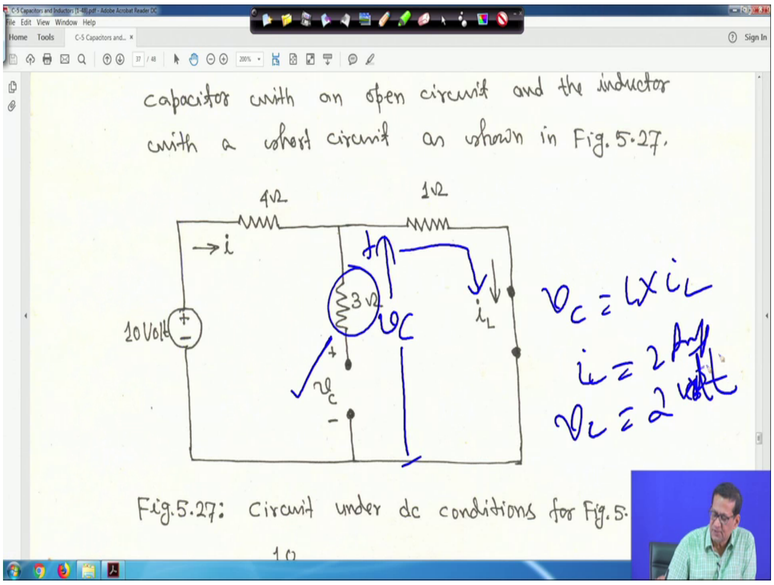

We replace the capacitor with an open circuit for dc just we have seen for capacitor and for dc condition inductor should be short circuit. So, it is short circuit inductor is short circuit; that means, this 3 ampere there is no current is flowing through 3 ampere because it is open circuit right no current is flowing.

So, then what will be i it is 4 plus 1 5 ohm and 10 volt. So, it will be 10 by 5 so 2 ampere, so i is equal to and same condition this is the simple series circuit then nothing is flowing here so i and i L this it is same right. So, i is equal to i L is equal to 10 up on 4 plus 1 is equal to 2 ampere and v C is equal to voltage across the capacitor is actually this is this 1 your this is your voltage v C this is your voltage v C no current is flowing here. So, basically this is actually I can write in better way this is actually v C and it is your what you call this current i your I L is flowing to this. So, v C is equal to 1 into i L right and i L is equal to 2 ampere therefore, v C is equal to basically 2 volt right.

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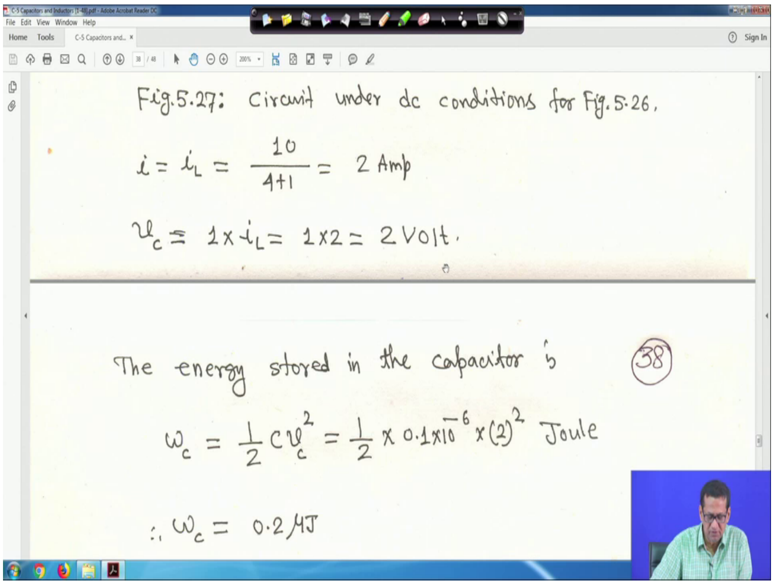

So, let me clear it so that that is why v C is equal to 2 volt now energy here what you call energy stored in the capacitor is Wc is equal to half C v C square. So, we have got your half C is given 0.1 into 10 to the power minus 6 farad because 0.1 micro farad. So, farad into v C is equal to 2 volts or 2 square joule so 0.2 micro joules right and that in the inductor will be your half L i square.

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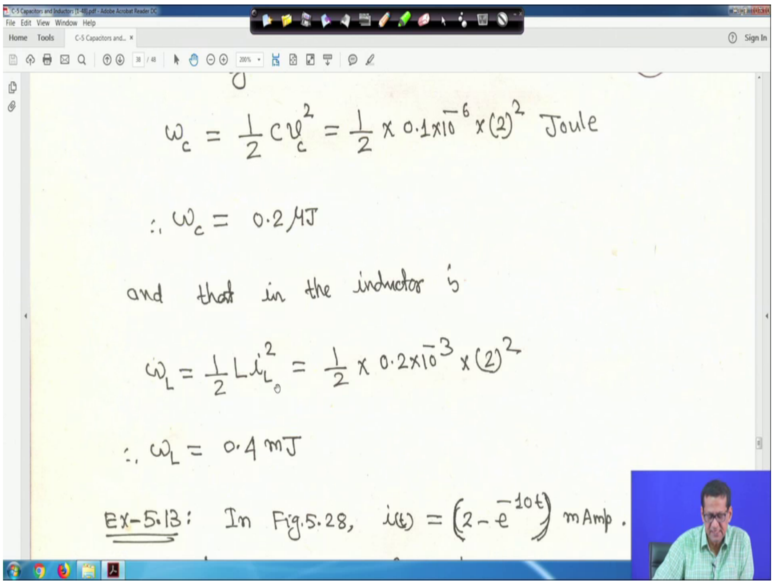

So, it will be half into 0.2 into 10 to the power minus 3 to 2 square, so WL is equal to 0.4 micro milli joule right. So, this is your what you call that your energy stored in that inductor right. So, next is next is this problem another problem so simple problem it is simple problem. So, in figure this that your in this figure.

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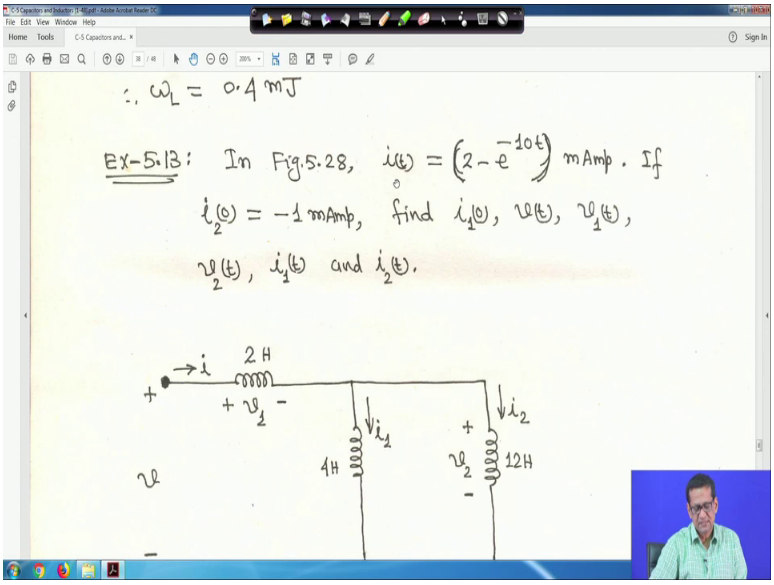

That this figure i t is given 2 minus e to the power minus 10 t milli ampere if initial condition of i t is given minus 1 milli ampere find initial conditions i1 0 then v t then v 1 then v 2 t then i 1 t and i 2 t all you have to find it out right, so this is the circuit is given.

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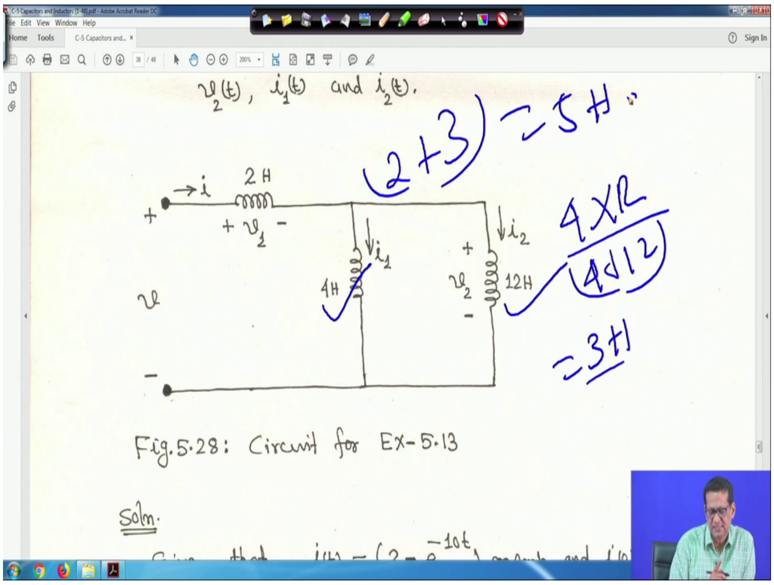

This is the circuit is given when 2 inductors are there in parallel right so and these 2 inductors are in parallel means that this inductor this inductor and this inductor these are parallel means that equivalent inductance will be 12 H into 12 divided by 4 plus 12 right.

So, it will be your 3 Henry right and then 2 Henry is in series to find out your same like a resistor, inductor case whatever you whatever series parallel combination you have done for resistor for inductor case it is same right and this and then this 2 Henry is there. So, 2 plus this 3 equivalent your thing will be 5 Henry equivalent inductors right so let me clear it.

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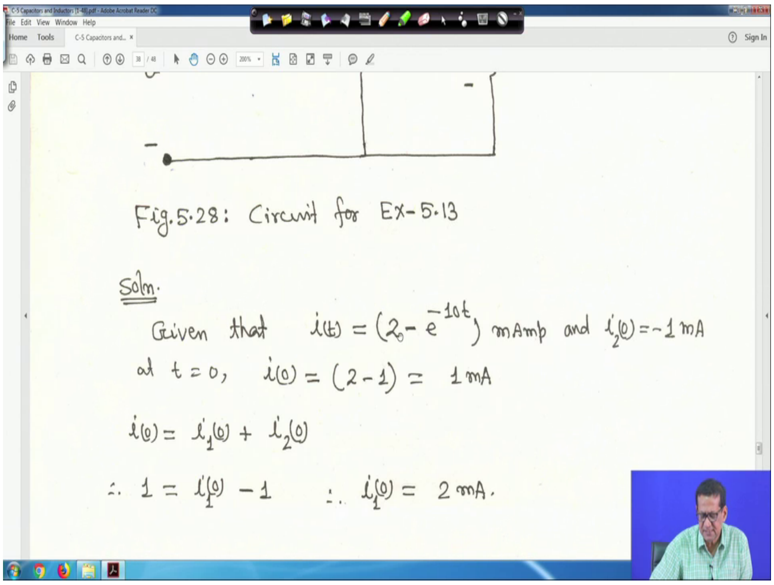

So, in this case the given that i t is equal to 2 minus e to the power minus 10 t milli ampere and i 2 0 is given minus 1 milli ampere it is given. Now, at t is equal to 0 you find out that t is equal to 0 you put here in this expression that t is equal to 0 right. So, in that case you will get i 0 is equal to 2 minus 1, so 1 milli ampere.

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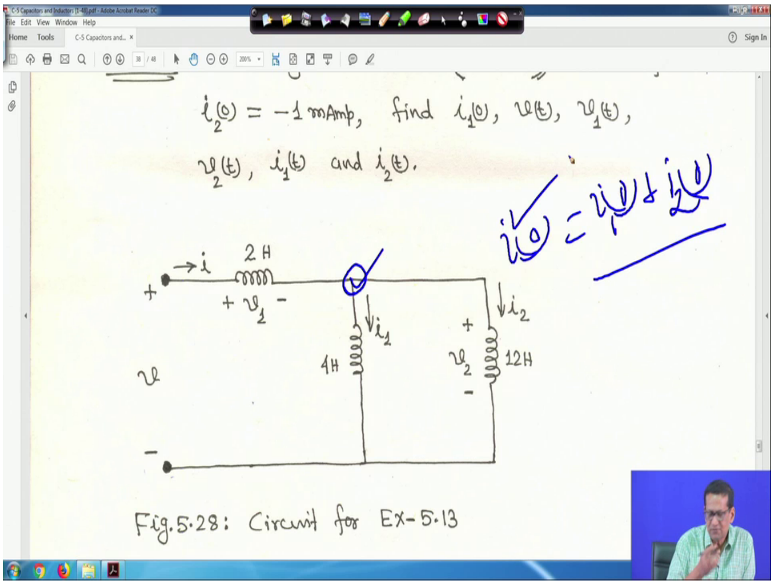

Therefore, if you if you apply your if you apply your KCL in at this at this node right, for initial condition you can write that i 0 is equal to i 1 0 plus i 2 0 right. So, then and 1 of them is given and i 0 also we have computed so other 1 easily you can get it, so let me clear it. So, i your then i 0 is 1 we have got it and i 2 0 is given minus 1 ampere therefore, i 1 0 initial condition that is your initial current that is 2 milli ampere right the L eq equal to that.

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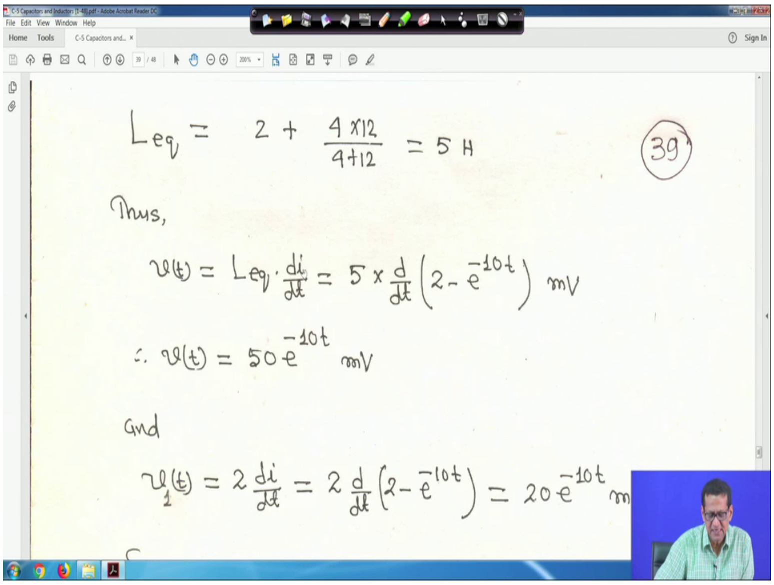

We just calculated I just show you how to calculation it will be 2 plus 4 into 12 upon 4 plus twelve it will be 5 Henry; just I showed you therefore, v t is equal to that means, this is the circuit. So, this is your v so v t is equal to I mean if you draw the equivalence circuit if you draw the equivalence circuit, so this is actually your v, v is equal to say v t plus minus and this is actually your 5 Henry right and this is the current say i right.

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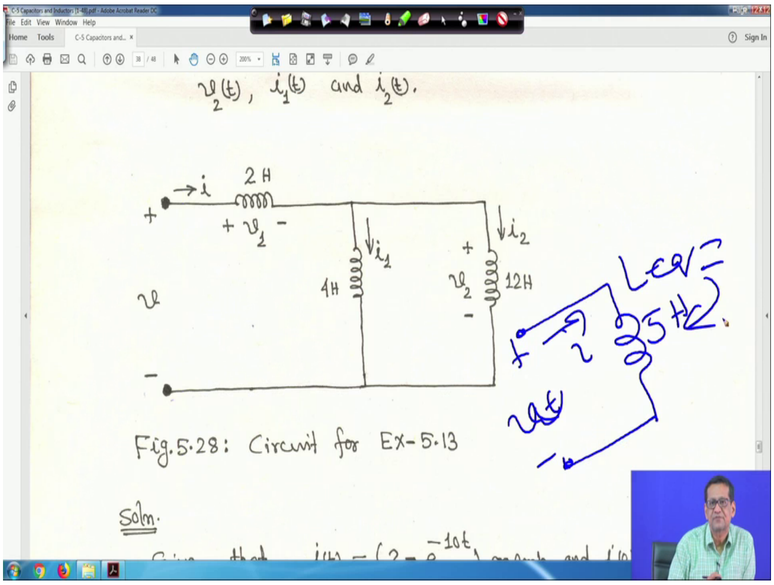

So, that is why and this is actually your L eq is equal to this 5 Henry right. So, let me clear it so v t is equal to L eq di by dt. So, L eq is 5 and I is equal to 2 minus e to the power minus 10 t milli volt. So, if you just take the derivative it will become v t is equal to 50 e to the power minus 10 t milli volt right.

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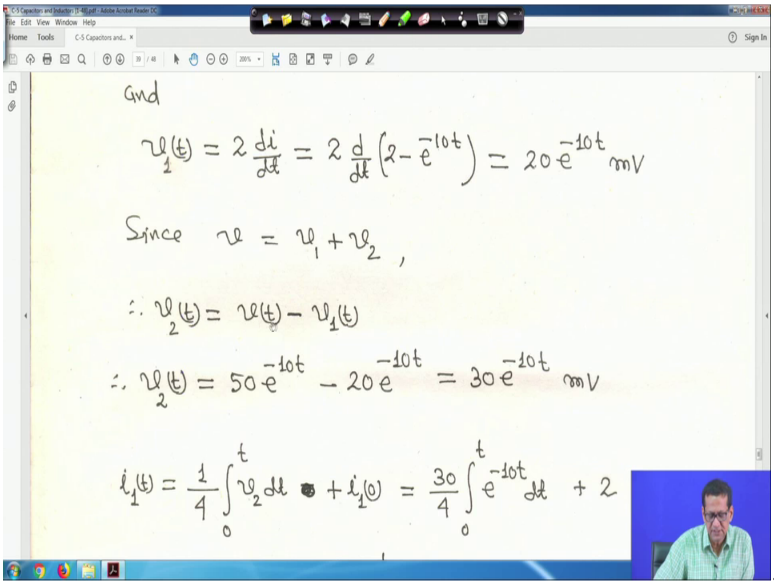

Now, therefore v 1 t will be 2 into di by dt right I mean if you if you your what you call this is this is 2 your Henry and voltage across is v 1. So, it will be 2 into that is your L into di by dt. So, here it will be your v is equal to your 2 into di by dt if i you know this is given. So, it is 20 e to the power minus 10 t milli volt now since v is equal to v 1 plus v 2 right; therefore, I mean this 1 your this is the this is the voltage v 2 that means.

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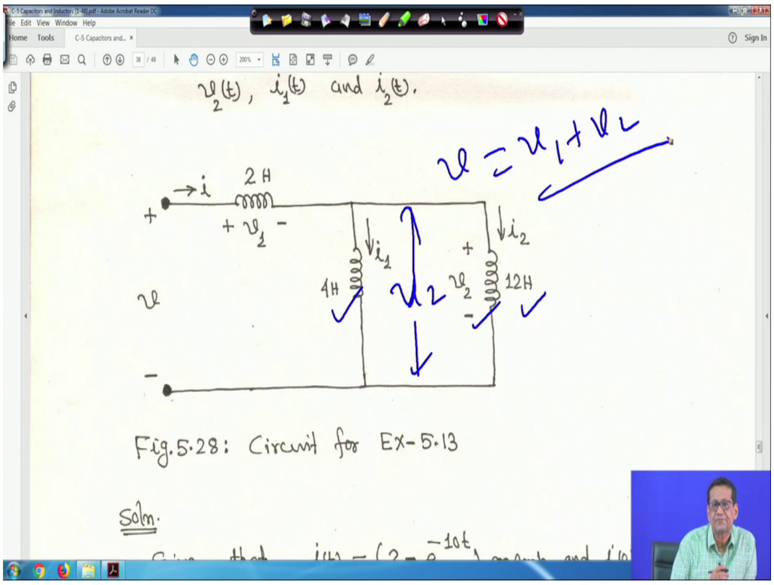

This is actually voltage v 2 right that means, voltage across these and across these it is v 2 therefore, if you apply KVL so it will be v is equal to v 1 plus v 2 right. Therefore let me clear it therefore, your v 2 is equal to v 2 t is equal to v t minus v 1 t, v t we have computed earlier 50 into e to the power minus 10 t and v 1 t minus 20 e to the power minus 10 t equal to 30 e to the power minus 10 t milli volt right i 1 t will be is equal to 1 up on 4 0 to v 2 dt plus i 1 0.

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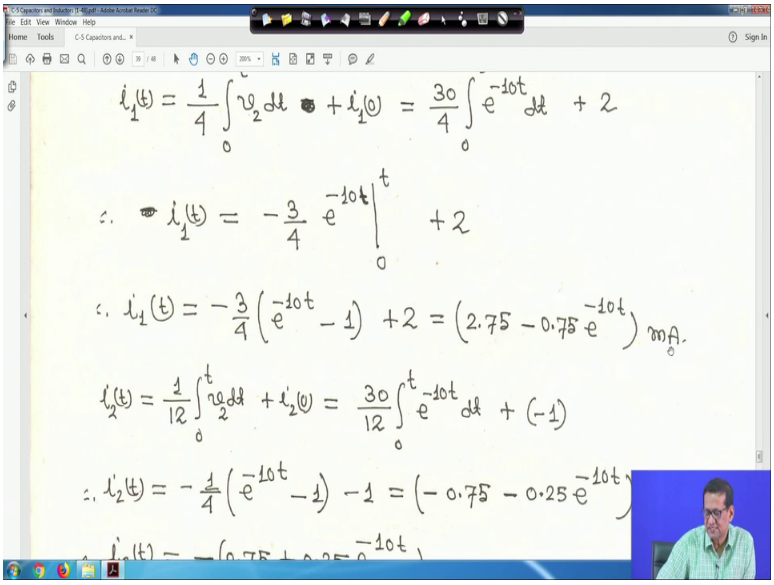

So, 30 by 4 right and your then 0 to t e to the power v minus 10 t dt and i 1 0 is equal to 2 right. If you just simplify integrate and simplify you will get i 1 2 i 1 t is equal to 2.75 minus 0.75 e to the power minus 10 milli ampere you please simplify.

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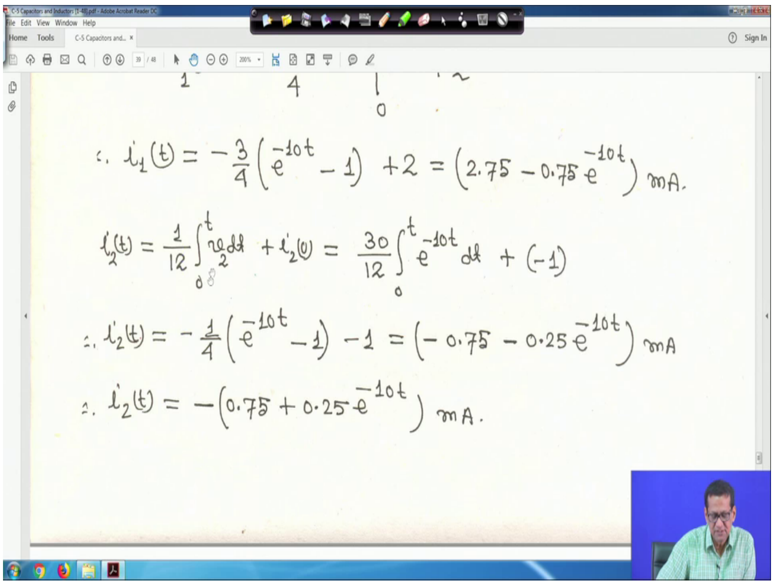

Similarly, for i 2 t 1 upon twelve 0 to t v 2 dt plus i 2 0. So, it is it will be 30 by twelve 0 to t e to the power minus 10 t you put here v 2 t is equal to right plus your i 2 0 is given known it is minus 1 and then you integrate and simplify you will get i 2 t is equal to minus of 0.75 plus 0.25 e to the power minus 10 milli ampere this is i 2 t. So, with this capacitor inductors topic is closed 1 and 2 example is given here.

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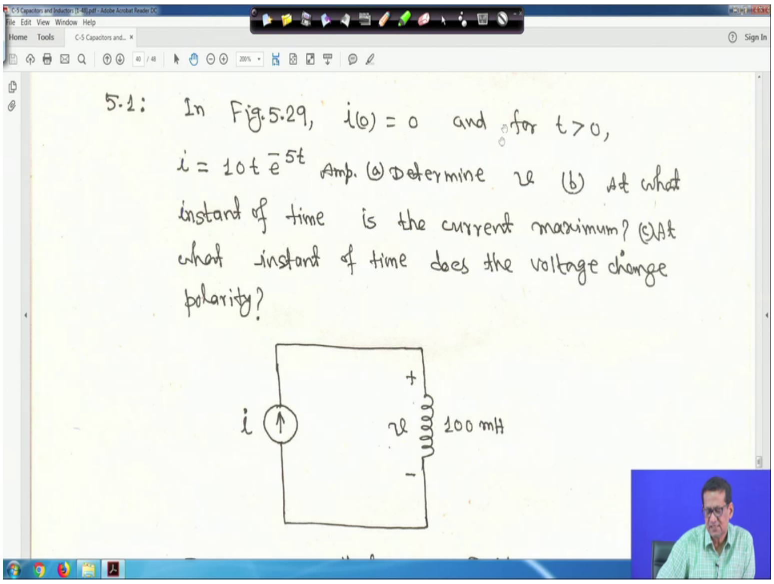

Like example 1, you will solve it for that so this is the that you read it and am not reading everything is given here right so and the answer is answer is also given this is the answer this is the answer is given right.

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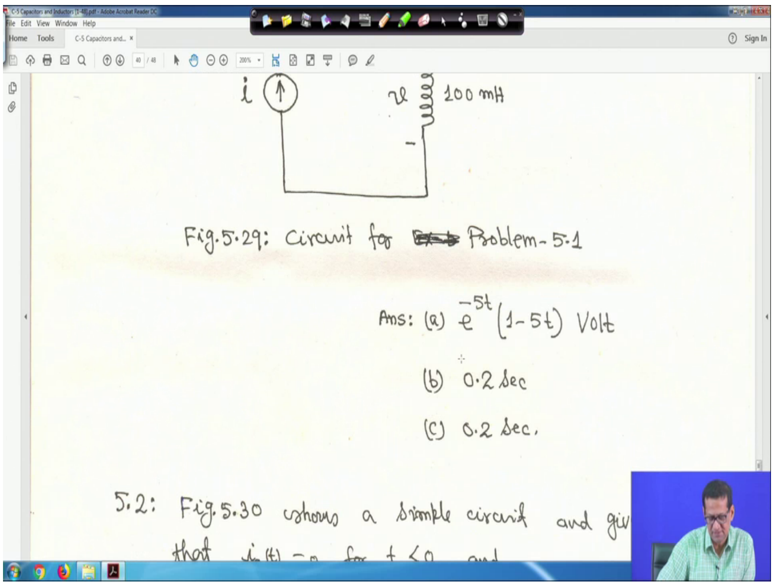

So, one only one problem here I will giving here and this is the answer and this is your problem right.

Thank you very much we will be back again.