**Fundamentals of Electrical Engineering**
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**Lecture – 38**
**Single Phase AC Circuits (Contd.)**

So now, average and RMS values of a sinusoidal voltage or a current right. So, let us first, go through the average value.

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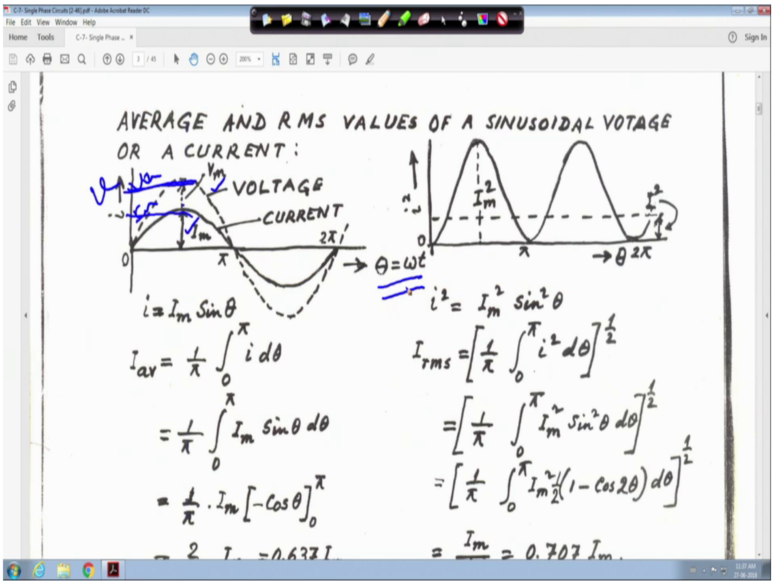


So, in this is I this is V also right. I forgot to put it here. It is V. Also, because this thick line this continuous line, it is basically, it is that current that current plot say, it is something like this and say this dash line. It is the voltage and the peak value for this one is your I m it is I m and peak value for this voltages is V m right. So, this is the peak value of the voltage. So, this is V m and this is your I m. Here it is marked and it is a V m. So, this is continuous line is current and your dash line is the voltage right.

And this is a sinusoidal waveform you only sinusoidal waveform and theta is equal to omega t right. So, i is equal to expression is I m sin theta right. Because and this is 0 and we will make the average value over a half cycle. So, this can be written as your I average is equal to is your 1 to pi because, divide this by pi and 0 to pi i d theta right. So, it is a because, we will make only for this portion this portion over a half cycle. So, limit should be 0 to pi right and divided by the base that is pi, that is 1 upon pi i d theta right.

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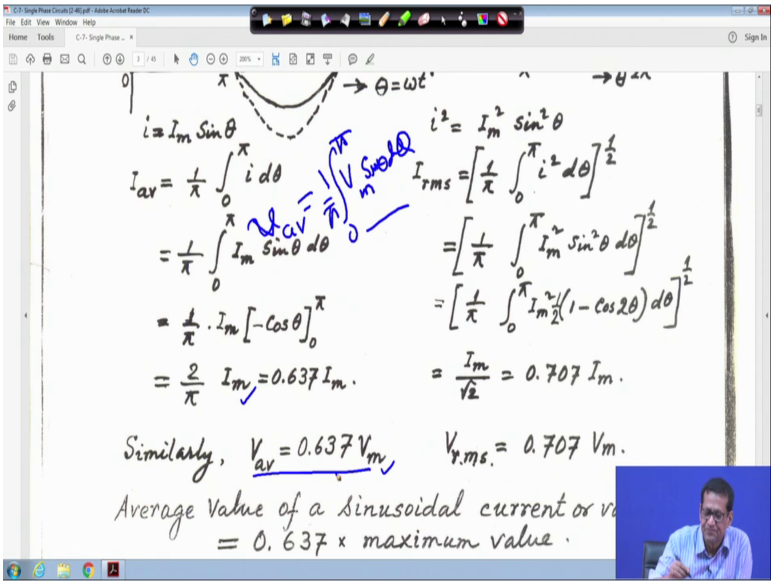

So, in this case, this side will come to that, this side is for your what you call for RMS value. So, it is basically i is equal to I m sin theta. So, 1 upon pi 0 to pi I m sin theta d theta. So, if you integrate it, it will be 1 upon pi I m minus cos theta 0 to pi right. So, let me clear it. So, in this case, it is coming basically, it comes 2 upon pi after simplification into I m is equal to 0.637 I m right.

So, this is your what you call that your average value; that means, that means my I average this same thing, I average is this much 2 upon pi I m is equal to 0.637 637 I m. Similarly, you will get V average. Also, because same way just I am writing one line. Same way, you can make say V average right. Say, V average is equal to 1 upon pi 0 to pi right. Your V m sin theta d theta same thing right; same way, you integrate. And similarly, you will get V average is equal to same 0.637 into V m same you will get because both are sinusoidal waveform only right. So, V m V a average will be 0.637 into V m right.

V m is the peak value of the voltage. Similarly, I m is the peak value of the current or maximum value of the current and here it is maximum value of the voltage. This is your average value. Now, let me clear it. Now, when you come to your RMS value. This is suppose, only in the only in this case i square plot is given right. This is I m and this is your i square i is equal to I m your sin theta. So, i square will be I m square sin square theta right. So, this is your I m this is your i i square plot this side is i square. It is marked here. It is i square right and this peak is your what you call I m square and if you plot it, it will be like this.

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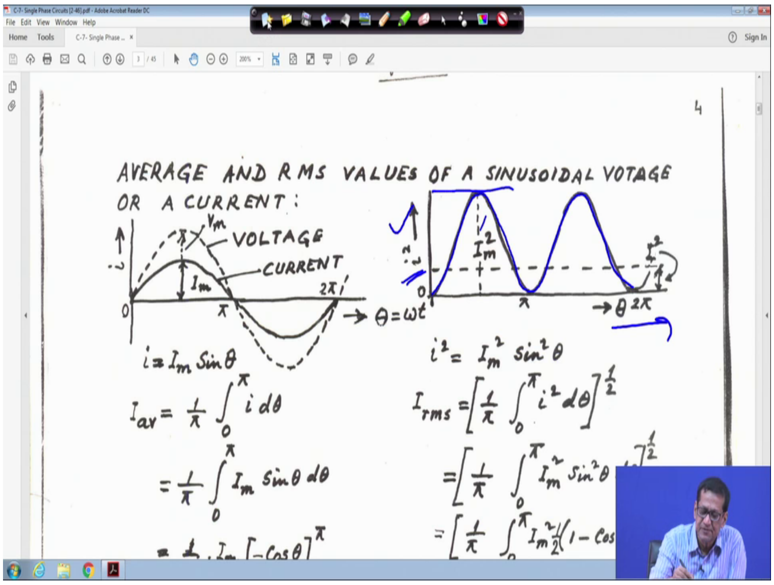


This area and this area, it is same it is symmetrical and this is pi this is 2 pi. This side is theta right. So, that means, i square is equal to I m square sin square theta. So, let me clear it. So, here I rms is equal to it is because, we have seen know this under root square we have to take. So, it is 1 upon pi 0 to pi i square d, i square d theta to the power half because it is square root. So, to the power half right. So, it is your whole thing to the power half 1 upon pi 0 to pi i square d theta.

Here is 1 upon pi 0 to pi i d theta for average value for RMS value 1 upon pi 0 to pi. Instead of i, it will be i square d theta to power half right, square root. Now, this will be your 1 upon pi then, your 0 to pi i is equal to I m square sin square theta right. So, it is i is equal to I m sin theta. So, i square is equal to I m square sin square d theta right is equal to your 1 upon pi bracket 1 upon pi 0 to pi I m square by 2 1 minus cos 2 theta d theta. Because, cos 2 theta is equal to 1 minus your 2 sin square theta. Therefore, sin square theta is equal to 1 minus cos theta by 2.

So, that is it made it here and you integrate and to the power half everywhere to the power half square root. If you integrate and simplify, it will simply become I m by root 2 that is 0.707 I m right. So, that is your I rms we call root mean square value, I rms is equal to I m by root 2 right. So, let me clear it. Similarly, for the voltage V rms also

0.707 V m the why I told you V average this thing. Here also, instead of just your I m square sin square theta, you make it V m square sin square theta d theta, V is equal to V m sin theta right. So, in that case, V rms also will be your 0.707 V m right. So, therefore, let me clear it.

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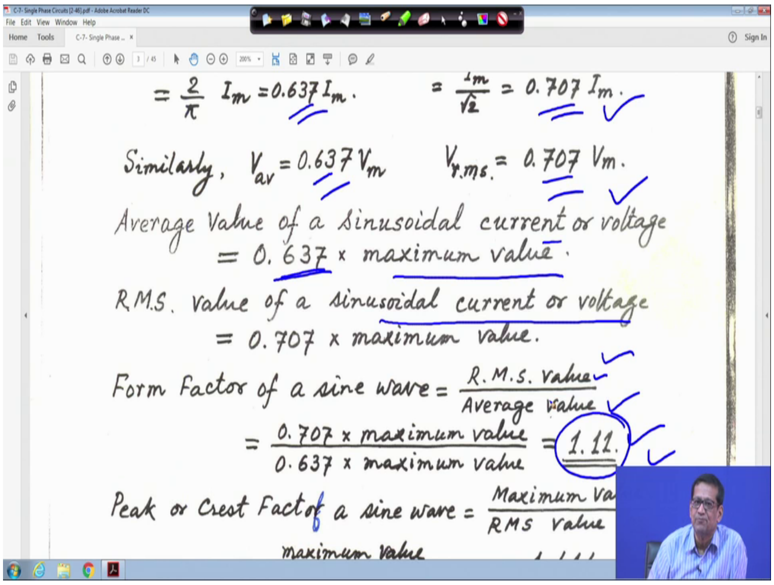


Therefore, the average value of a sinusoidal current or voltage will be 6-point sorry 0.637 into maximum value right. Average value of the sinusoidal current or voltage both are multiplied by 0.637, right. Similarly, the rms value of a sinusoidal current and voltage both are multiplied by 0.707 into maximum value. This is the maximum value; this the maximum value right.

Now, we define 1 or 2 things form factor of a sine wave right, form factor of a sine wave rms value by average value right. So, rms value is equal to point this rms value is equal to 0.707 into maximum value and the average value is equal to 0.637 into maximum value that equal to 1.11. So, for sinusoidal waveform the form factor is 1.11 right. You have you to keep it in your mind right sinusoidal wave form. Now, let me clear it. Similarly, the peak or crest factor right.

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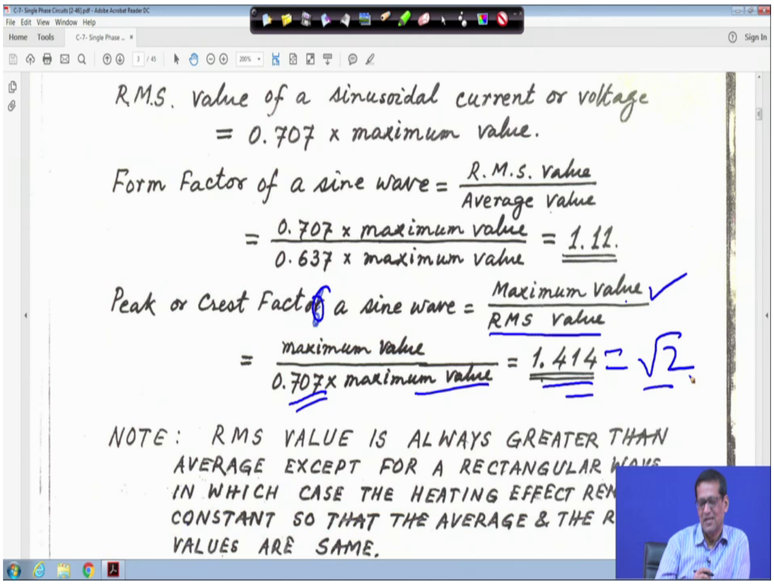


This one it is crest factor right of a sine wave maximum value by RMS value. So, maximum value and RMS the maximum value keep it as maximum value and RMS value is equal to 0.707 into maximum value, that is actually 1.414 right. This is called peak factor; that means, later we will see that any AC voltage. Suppose, if it is 12 to 20 volt, that is basically RMS value unless and until it is not mentioned and if it say 224 AC, you have to assume this is RMS value. That means, it is peak value will be multiplied by this factor this is actually root 2. You have to multiply by this factor right.

So, that that is the idea that in AC anything we calculation anything we do that is on RMS value, but if it is ask the peak value, it will be multiplied by this your what you call root 2 right. So, that is your what you call peak factor. So, let me clear it.

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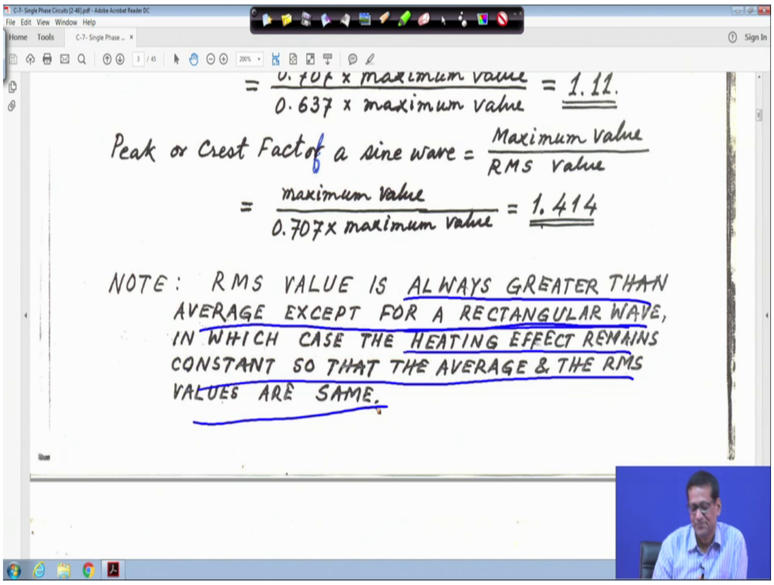


Therefore, the RMS value is always greater than this RMS value is always greater than average value for a your average value except for a rectangular wave. Particularly, for your square wave because different wave form you can generate right. In which case the heating effect remains constant.

So, that the average and the RMS values are the same right. So, RMS value is always greater than average except for a rectangular wave form right, particularly square wave. So, anyway so, that means, that that details little bit we will see on this right that how it is now symmetrical and unsymmetrical.

So, form factor case factor average value RMS value, I think it is understandable to you right. Anything is mentioned in the numerical unless and until it is specified. It is RMS value only if it is mentioned max maximum value peak value. You have to divided it by root 2 to get that your RMS value right. So now, next is that symmetrical and unsymmetrical wave forms.

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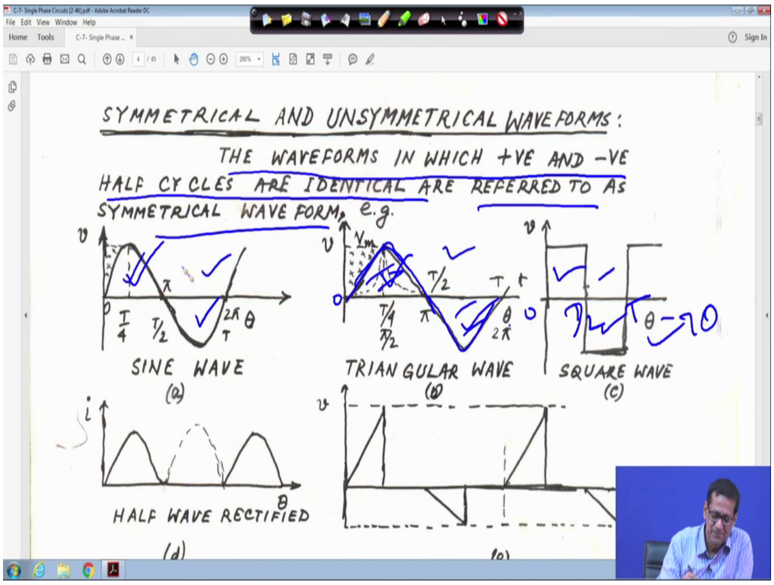


So, the wave forms the wave forms in which plus and minus half cycles are identical are referred to as the symmetrical waveform like this is sinusoidal one is plus and minus right your half cycles are identical. So, it is a symmetrical waveform this is a triangular wave form this is a triangular wave form. It is symmetrical because this side and this side is same look. This is this is 0 this is your what you call T by 4 T by 2 T. So, it is pi by 2 say if it is a pi by 2, it is pi. So, it is 3 pi by 4 and it is 2 pi right.

So, this wave this side is symmetrical and this is also symmetrical. So, this is symmetrical wave form it is triangular. Similarly, this square wave form. So, this one this one is symmetrical if it is 0, if it is T by 2, it is T. It is symmetrical and this is your theta it is theta right. So, this is say this 3, this 3 wave form are symmetrical wave form; that means, that plus and minus half cycles are identical are referred to as the symmetrical wave form right. Identical means, this side positive area negative area both will be same right. So and let me clear it.

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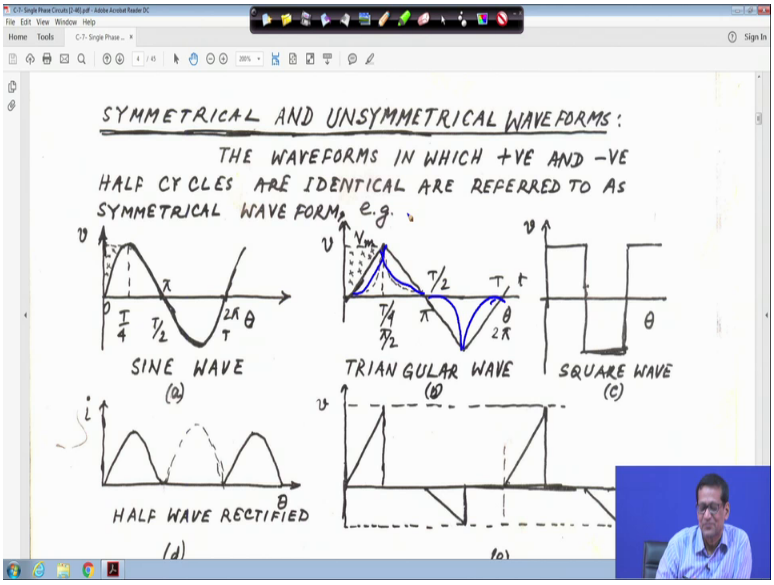


Similarly, you may have other type of wave form. Suppose, if it is goes like this, if it is goes like this, if it is goes like this it is goes like this right some exponential thing this is also symmetrical right. So, anyway, that is why 1 dash line is shown here right and another thing is that for this one.

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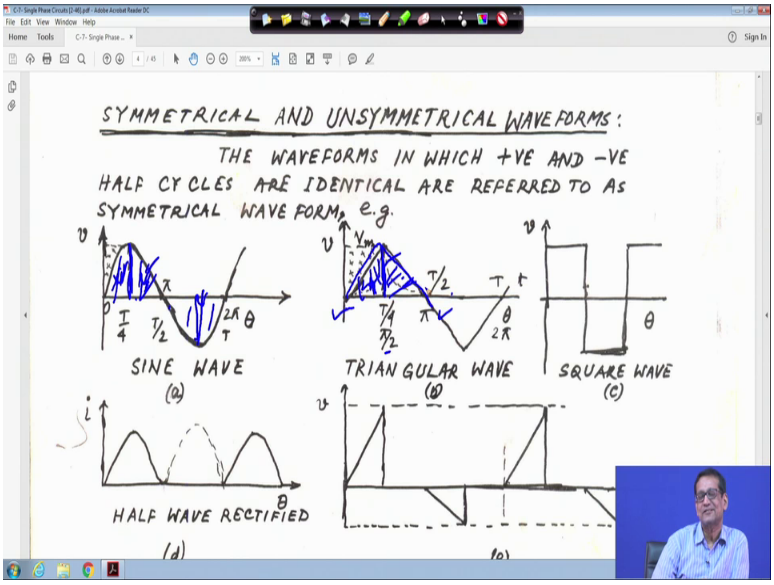


Suppose, I want to find out 0 to half cycle if you draw this line this side and this side it is same identical right, if you draw this in this thing this side and this side is same it is symmetrical. So, instead of half cycle average value you can make it quarter cycle also 0 to T by 4. It will give you the same result right. It will give you the same result.

Similarly, here also it is a triangular wave form. If you try to find out what is the average value of this triangular wave form, it is a symmetrical wave form in between 0 to pi right. Whatever result you get that right. So, same you will get in between 0 to pi or 0 to T by 2 here also 0 to your what you call this is your 0 to pi by 2 or 0 to 2 by 4, this side will get because this side area and this side area it is same.

Even quarter your; that means, in quarter cycle whatever or average value you will get you take half cycle. Also, you will get the same value because this side and this side, left hand side and right hand side are the same this is and this is this one and this one this side area and this side area. It is same symmetrical you will get the same result right. So, some problem some intuition you can do it things you can do it in very simple way rather than completing the half cycle. If you see the things are totally your what you call that is symmetrical right. So, let me clear it. Similarly, that unsymmetrical wave form if you look into, if you look into this.

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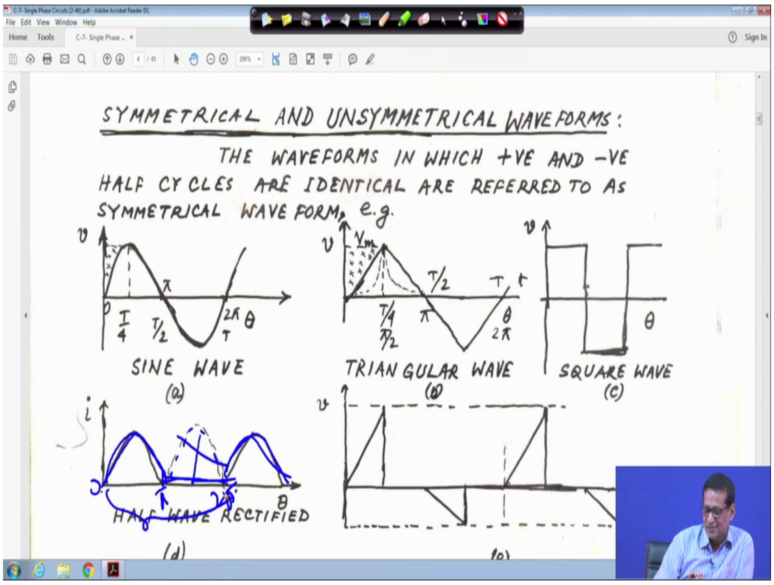


This is your i side this is 0. This is same as before. Say, this is pi this is 2 pi like this right. So, wave form is there up to this after that nothing is there then it is like this. So, this portion dash portion nothing is there here right. But complete cycle is 0 to 2 pi right, but it is going your up to 0 to pi after that, nothing is there till 0, but your total your complete cycle is 2 pi. So, it is unsymmetrical wave form you have to consider that your what you call that total your, there you are taking that base is half cycle. Here you have to take base for complete cycle right.

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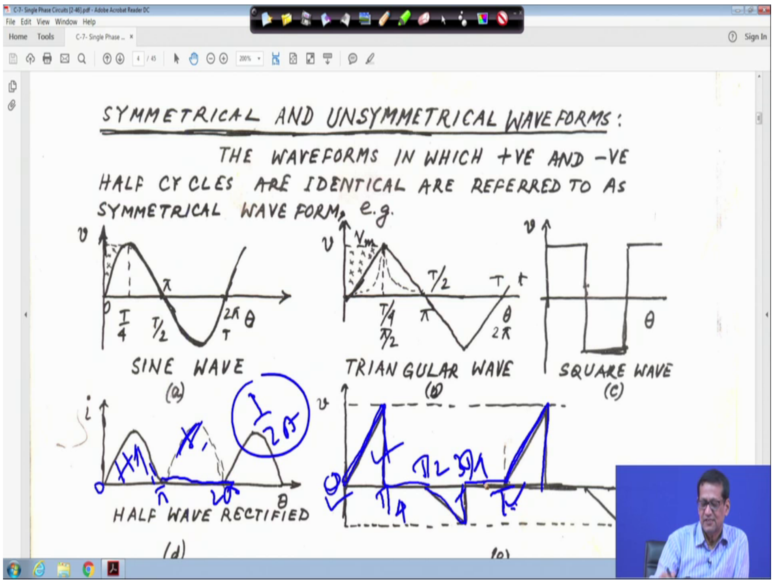


So; that means, that means although it is 0. So, it is 0, it is pi it is 2 pi. So, you have to find out this area to get this average value or RMS value, but you have to divide it by 2 pi you have to divide this by 2 pi.

But you will integrate from 0 to pi because, this dash line is shown that if it is there, but it is not there. So, it is it is going like this. So, for asymmetrical waveform right. When it is not symmetrical, you have to consider the complete cycle total base divided by whatever integration will be there 0 to pi. We will see some example. Similarly, here it is also here also it is like this it is unsymmetrical. It is unsymmetrical wave from this side than this side it is not matching this side and this side it is not matching and this is your 0 and this is your T right. Again, because this wave form is started here and again this wave form starting here, this is T right. So, it is your what you call this one, it is your T by 4 this point is T by 2 this is 3 T by 4 and this is T right.

So, this is unsymmetrical wave form. So, in that case you have to, but when you try to find out that your average RMS value, you have to complete. You have to consider the complete cycle. That is your sorry completed the your what you call that complete base from 0 to T. The division should be divider should be T right, for unsymmetrical wave form.

You have to complete; you have to consider the whole cycle forgetting the average value or your RMS value right. So, this is the idea for this one your what you call the symmetrical and your what you call as the unsymmetrical wave form for unsymmetrical wave form. You have to consider that complete cycle to get that your average value or average value or your RMS value right. For symmetrical waveform, you have to consider half cycle or even quarter cycle looking at this. It will give you the same results, but for unsymmetrical wave form, you have to consider your, what you call that your complete cycle right to get that average value or RMS value right.

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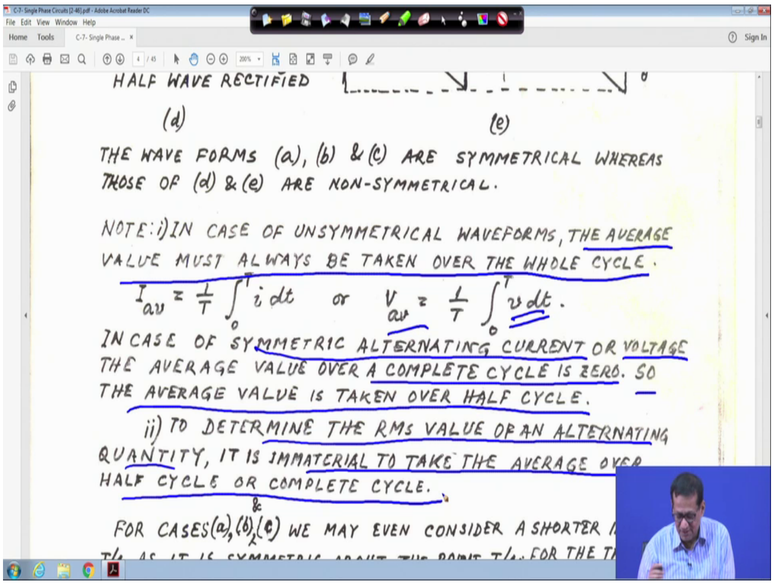


So, hope this is understandable to you. So, next is that suppose in the case of unsymmetrical wave form the your what you call the average value must always be taken over the whole cycle. I told you that average value your what you call must be taken over the whole cycle. So, I average should be 1 upon T 0 to i dt. Similarly, for voltage V average. We have to consider from the whole cycle. So, 1 upon T 0 to dt v dt right.

And, in case of symmetrical, in case of symmetrical, alternating current or voltage right. The average value over a complete cycle is 0. So, the average value is taken over the half cycle because, if it is symmetrical, that I told you the negative and positive area and negative area will be same. So, in that case you are what you call the average value will be 0. That is why, we will consider that half cycle for average value right. Now, second thing is to determine the RMS value of an alternating quantity. It is immaterial to take the average over half cycle or complete cycle. I told you RMS value means a square.

So, I told you that as soon as squaring it, if you take half cycle or full cycle, it will give you the same result right. Because, area for half cycle and another half cycle remain same. You have to take half cycle. Whatever result you will get, if full cycles, you will get the same result right. Now, just hold on.

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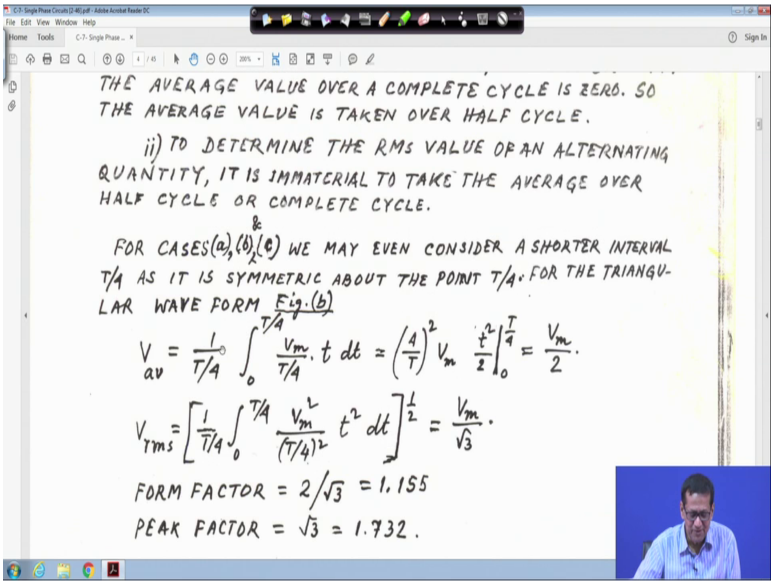


Now, therefore, for case for case a b c we may even consider a shorter interval right, that is your what you call the T by 4. As it is symmetrical about this your point T by 4 for the triangular wave form, look triangular waveform how we will do it right. Just try, just try to understand this.

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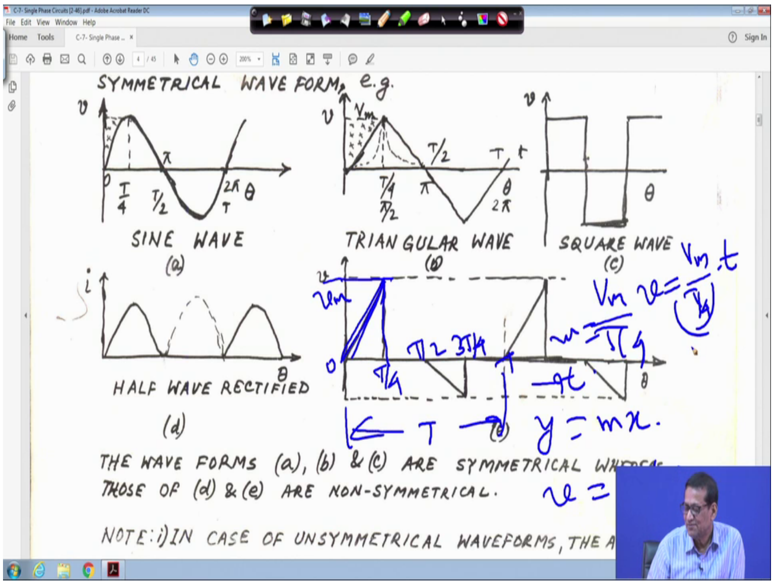


Because, suppose we want to suppose this is your what you call this is 0 this is T by 4 this is T by 2 this is 3 T by 4 and this is T right. So, this total your this total your what you call this base length is T right for this one if you take this is my this is my V m V and this is your peak value this height is your this is my V m right.

Then, the slope of the straight line the slope of the straight line will be V m this is the height is V m and base is T by 4 right and this is the slope and that equation is equal to this straight line is passing through the origin; that means, you are you know in general for straight line y is equal to m x that you know, but y side is v. So, this is v should be is equal to m into T right and your m is equal to nothing but this is your slope v is equal to V m upon T by 4; that means, somewhere I am writing.

So, I am writing somewhere here right let me see find out some space. So, here I am some writing that v is equal to right m is equal to your V m divided by T by 4 right into the T this is the straight line passing through the origin because this time you say T right. So, this is the time this we will take say T instead of theta we will take T right. So, v is equal to V m T by 4 into T right. So, let me clear it. So, that means, if you come here we will come to that again.

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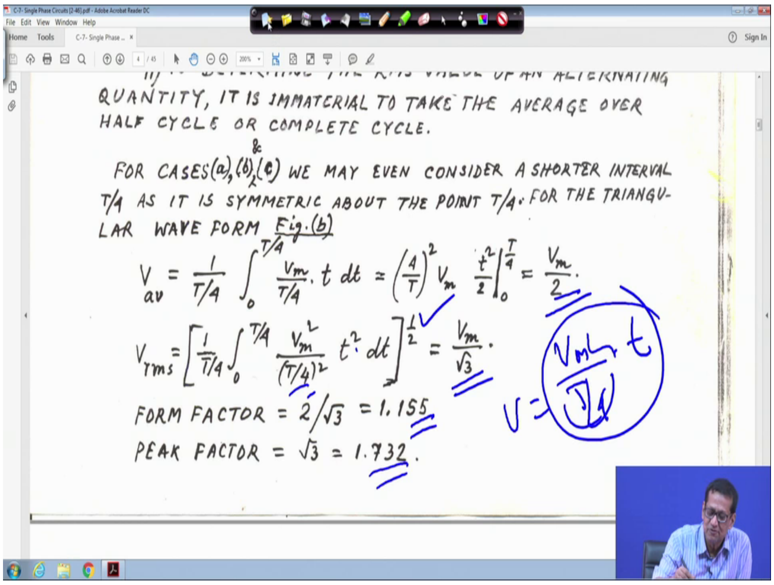


That means, if you come here that V average value. We are taking 1 upon T by 4 right for your what you call, then 0 to T by 4 V m by T 4 into dt right. So, this is your what you call that your V average that I told you 0 to T 4 and I told you this equation this equation I told you that V m by 4 t dt right. So, if you simplify this, it will be V m by 2 right. So, in your what you call that is your V average. Now, that is your just hold on because it is symmetrical waveform. Just hold on sorry.

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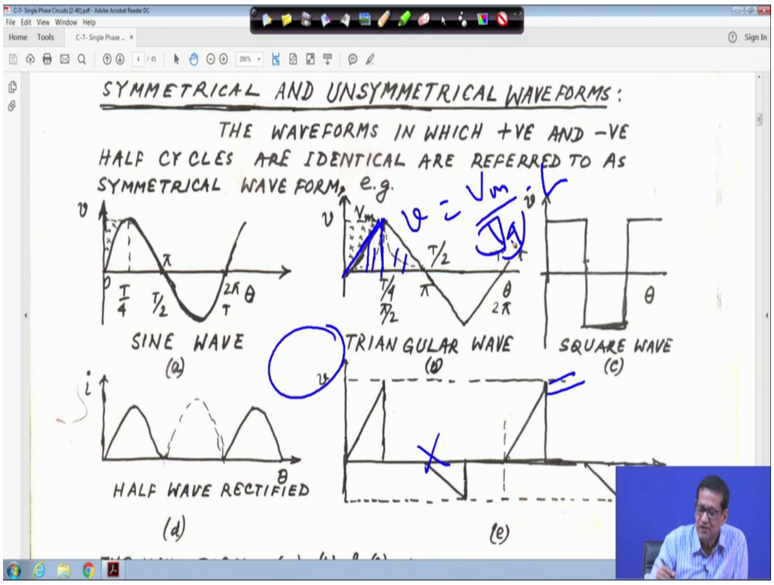

This one previously I talked about this one this one, this one sorry this one this one actually T by 4 not this one right. I just I overlook this one this one. But, this is your T by 4 and in that case for symmetrical waveform because this side area and this side area is same.

So, I told you this equation will be v is equal to V m divided by T by 4 into T this is also same thing for this one. We will come later right. So, it is T by 4. So, let me clear it. So, this is your average value this is your average value. So, if you 0 to T by 4 if you integrate, it will become your what you call V m upon 2 right. So, this will become V m upon 2. Similarly, that V rms value, it will be your 1 upon T by 4 0 to T by 4. So, we got v is equal to V m divided by T by 4 into t and you square it. If you square it, it will V m square divided by T by 4 square into T square dt to the power half right and 0 to T by 4 you integrate, you will get V m upon root 3 right. So, similarly form factor you can find out. It will become 2 by root 3 1.155 and peak factor will be 1.732.

So, let me clear it. So, that means, I mean here if you come again that your form factor is equal to RMS value by average value and your peak factor is equal to maximum value point points your what you call is equal to maximum value by RMS value. So, for this triangular wave form then you will get your peak factor 2 by root 3. Just simplify. You will get it 1.155 and peak factor root 3 is 1.732. And, this one, now next one is this is triangular waveform.

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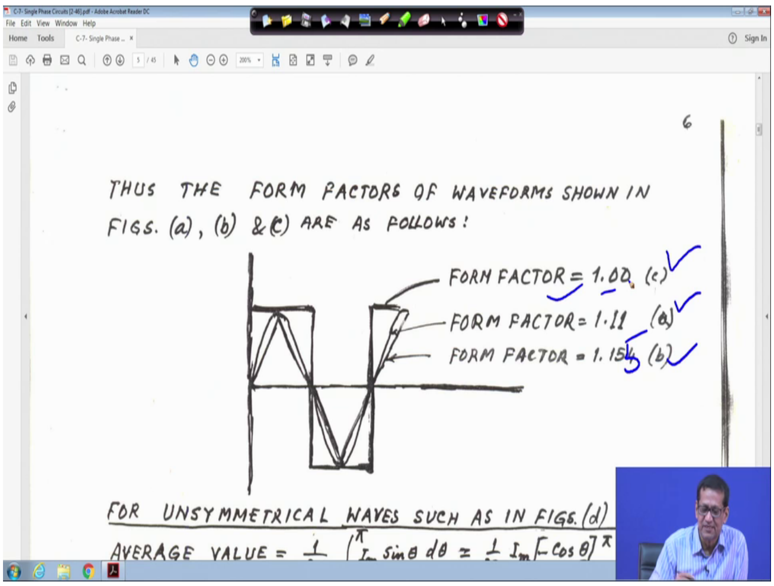

Now, does form factor of all wave forms, if you look into this. If you look into this that this one your, this one is for your square waveform. It will be 1 for sinusoidal waveform, it will be 1.11 and for this triangular waveform. You just do it it will be 1.154. Just now, we calculated know just now we calculated for the triangular one for the triangular one we calculated 1.155. So, here also it is 1 point actually it is 1.155 right. So, this is for figure c for figure a and figure b right. So, for form factor for your square waveform it is 1 right.

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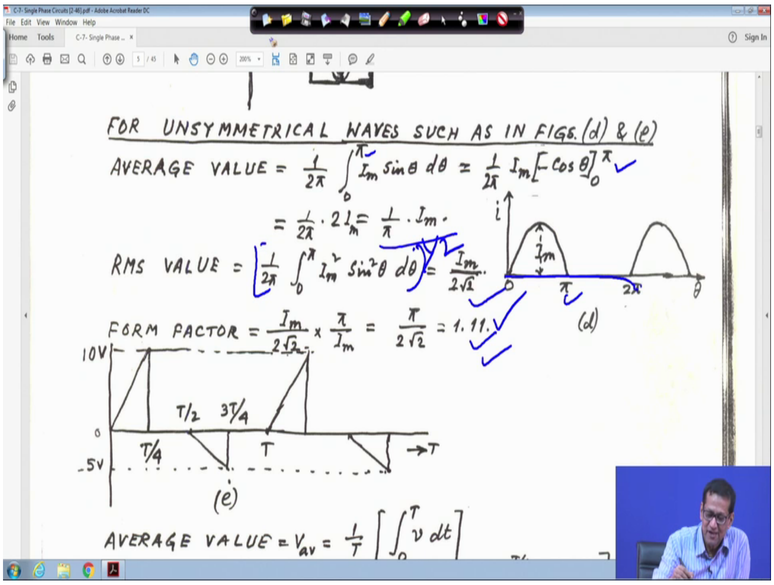


Now, next actually after unsymmetrical waveform suppose this for this case for this case if you look into this for unsymmetrical waveform you have to consider that whole base 2 pi right, but this is your integration should be 0 to pi. So, average value 1 upon 2 pi 0 to pi I m sin theta d theta will be 1 upon 2 pi I m minus cos theta between 0 to pi right. So, it is 1 upon 2 pi into integrate it, you will get 1 upon pi into I m right. Basically, I m by pi now for RMS value it will be 1 upon 2 pi 0 to your pi I m square sin square d theta here your what you call one half is missed. So, to the power half right.

So, if you integrate it then you will get I m upon 2 by root 2 right. So, this is your RMS value now form factor will be same way you can get it, it will be 1.11 right. So, although it is your half cycle other thing, but for sine waveform is sinusoidal your I m getting 1.11 right now for this triangular waveform your what you call at that time I was showing this one this triangular waveform that this for finding out.

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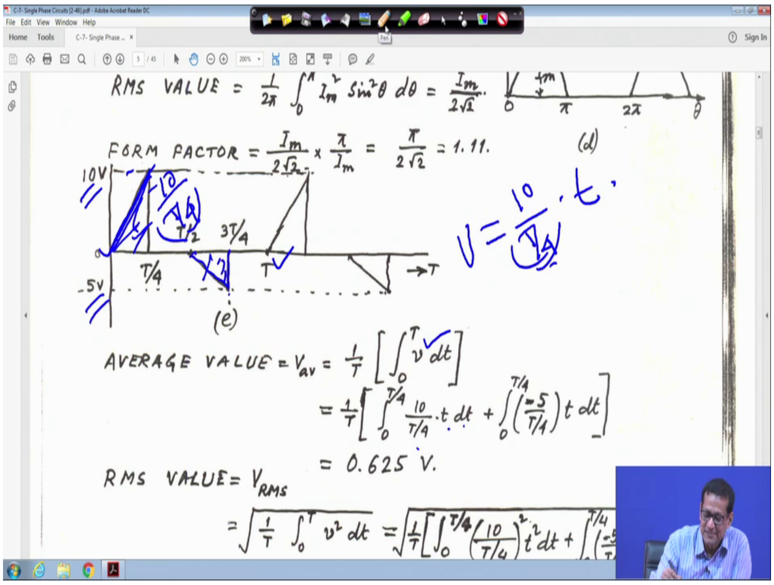


Suppose this is given suppose this is unsymmetrical waveform suppose peak is given 10 volt right and T by 4 t by and this side it is minus 5 volt this is plus 10 volt right. So, and that means, the slope of the straight line slope of the straight line will be this 10 divided by T by 4 right.

So, and the another thing is that we have to come from 0 to t right from 0 to T you have to come. So, in this case, we have to complete the, you have to consider the whole cycle. That is why we have taken V 1 upon T 0 to T v dt this is a V average value. So, first we have to consider this area and then we have to consider this area. So, for this, this is the equation passing through a straight line. So, it will be your this equation this equation for this straight line will be your V is equal to your that your. This slope 10 divided by T by 4 into t right.

So, for this part it is 1 upon T, then 0 to T by 4 10 divided by T by 4 into t dt. Now, next one is look for your intuition you have to make it. Next one is that, this one this portion. Now, let me first clear it. Now, this portion if you try to find out, a straight line of this equation you have to make it y is equal to m x plus c.

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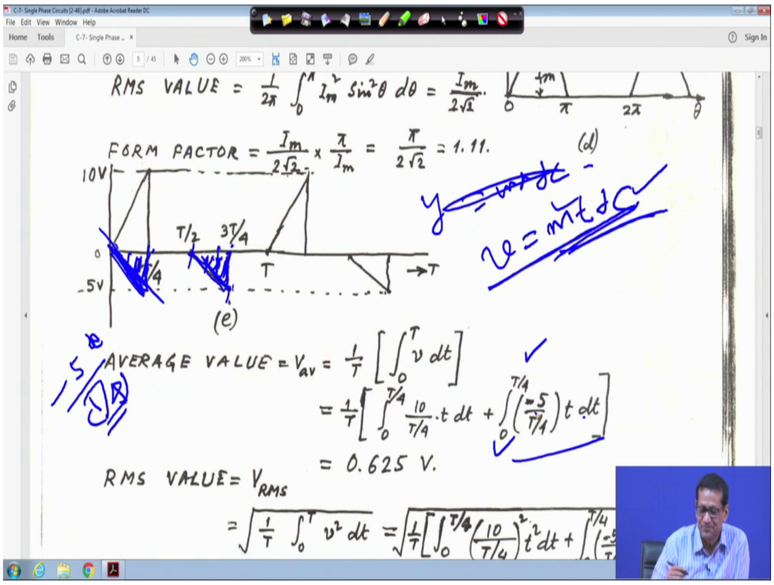

This way you have to make it or other way, you have to make it V is equal to your slope m into t plus C right.

So, forget about this. So, in this way you have to get the equation, but remember from the symmetry our interest to get what is the area right how we will find out. So, what you can what you can do is, suppose if I super if I bring this one, I mean just for the mathematical computation, nothing else. If I bring this one, suppose if it is here and if it is here, the area will remain same as if another straight line is passing through the origin right.

So, in that case this slope will be minus 5 your what you call minus 5 divided by T by 4 just we are just we are for mathematical things because if you want to find out y is equal to m x plus C, I mean v is equal to m t plus c. Then you have to obtain m you have to obtain C right. Because this is one coordinate. This is another. You have to put and you have to solve for m and c no need.

Just from the symmetry you bring this bring this portion to here, as if it is passing although reality it is not, but as if it is passing through the origin right. So, in that case slope will be minus 5 into T by 4. Therefore, this is also and integration will be also 0 to T by 4. This duration also 3 T by 4 minus T by 2 will be again T by 4 same thing right.

So, this from here to here this duration your 3 T by 4 minus T by 2 will be again T by 4, but; that means, same integration 0 to T by 4 we are taking this portion we are taking this portion that is minus 5 T by 4 into t dt. Because this is straight line passing through the origin this is a slope minus 5 T by 4 into t dt right. So, therefore, your what you call you need not find out this equation again just say because just we are super imposing it here because our interest is only this area and the negative sign. So, I hope you have understood this right.

So, this is I have taken intentionally to make you think that it is understandable to you right. Ultimate ultimately, if you make this one and integrate, you will get the same result. So, why I will spend more time on this, directly I will do it. So, that is why I have written like this that minus 5 T by 4 into t dt. This a straight another straight line passing through the origin the slope is negative right.

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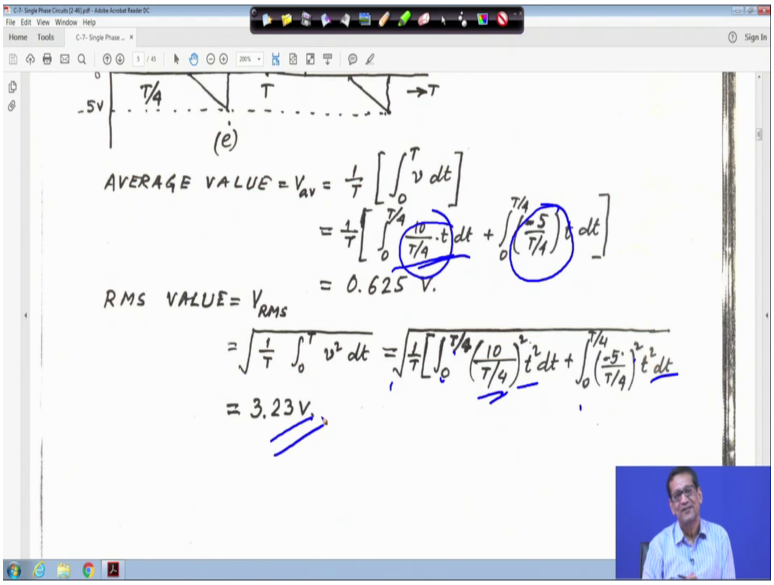


So; that means, this RMS value average value will be if you integrate this it will become 0.625 volt this will be the average value right. Similarly, RMS value also same thing if you if you if you look into this, this RMS value also square root of this. So, it is 1 upon T 0 to T v square dt. So, this portion first this portion 1 under root , 1 upon T 0 to T T by 4 and this 10 upon T by 4 square into this whole thing you make it square right plus 0 to T 4. This whole thing you make it square minus 5 by T by 4 square t square dt right.

So, if you simplify just do it know otherwise my time my time will be saved. So, it will become 3.23 volt right. So, this; that means, this example intentionally I have taken. So, for unsymmetrical waveform from the intuition, you can make out that how to compute it right. This is very easy. This is also unsymmetrical waveform, this is also unsymmetrical waveform. So, while explaining this one this triangular waveform, I should have gone. Here, I have over looked that is why, initially I told, but everything is correct right. Every, I mean, same equation everything is correct right.

So, this is your what you call this is that example I took such that such that you can understand this right. So, hope you have you have understood this. Only thing is that that I hope this whatever things you can see it here, that is my class notes right. So, I have totally scanned it for you just to see that things are or not right anyway.

So, this is thing. Now, next we will take another interesting example and before going to this thing, we have taken this kind of example. Just see that how it is.

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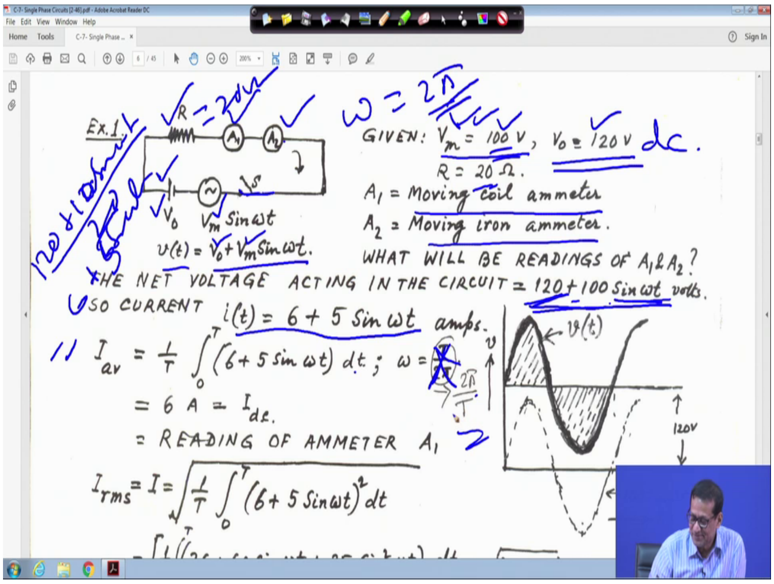


For example, a simple series circuit is there where resistance R. R is there. 2 ammeters are there; A 1 and A 2 two ammeters are there. A 1 is called moving coil ammeter. Actually, moving coil ammeter, it measures DC right. DC current or DC voltage here it is current ammeter right. Moving coil and moving coil instrument, it measure the DC quantity. So, here it is a moving coil ammeter.

So, it will measure DC and A 2 is the moving iron ammeter. This another ammeter A 2 is there. It measures the AC right. Now, in this case 2 sources are there; one your DC voltage source is connected in series, another is AC source AC voltage source is connected one switch is there you close the switch right. So, this is the this is the series circuit.

It is given V m is equal 100 volt that is the peak value is given 100 volt and V your what you call and DC voltage V 0 is given this is 100-volt DC this is 120-volt DC right and AC peak value V m. These 2 are connected in series. Initially, I have taken these kind of example. You will see this one example we will make our your understanding very clear right and then and A 1 is the moving coil ammeter and A 2 is the moving iron ammeter.

So, moving coil measures DC and moving iron measures AC right and the voltage acting in the circuit is the total voltage will be 100 plus 100 sin omega t. Because, peak value is given 100 volts right and it is; that means v t is equal to V 0 plus V m sin omega t.

So, V 0 is your 120. So, this is 120 right and your V m is equal to 100 volts. So, 100 120 plus 100 sin omega t volt right. So, this is my your V m now. So, the current i t will be your 6 plus 5 sin omega t because this resistance R is given as 20 ohm it is 20-ohm R is given and this is my voltage 120 plus 100 sin omega t. So, it is 120 plus 120 sin omega t divided by 20 that will be 6 plus 6 sin omega t that is sorry it is your what you call 100. So, it is your 25. So, 6 plus 5 sin omega t.

So, this is your i t is equal to 6 plus 5 sin omega t ampere right, now if you try to find out the average value it will 1 upon T 0 to T 6 plus 5 sin omega t dt because this is i t into dt and omega is equal to 2 pi by T. Your this one you should keep it in mind. This you know it also form your higher (Refer Time: 29:49) physics omega is equal to 2 pi by T right. So, that is written here right. By mistake initially written T by 2 pi. Actually, it is not a 2 pi by 2 T right.

So, then what you do you just 0 to T 6 plus 5 sin omega t dt and using this relationship omega is equal to 2 pi by T right. You integrate this if you integrate this I am not showing it here sometime will be saved then you just integrate it I have this I can do it integration for you, but it is a simple thing from just simply integrate and use this relationship that omega is equal to 2 pi by T right. So, let me clear it.

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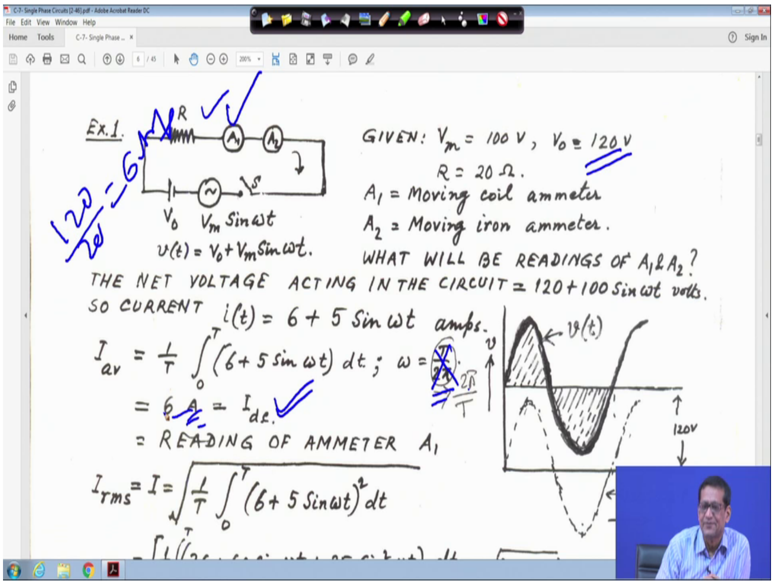


So, you will use this you use this relationship omega is equal to 2 pi by T and integrate it you will get I average will be 6 ampere that is your I dc right; that means, that you are you are what you call average value will be just 6 ampere. Because, if you look into that 124 DC is there and your R is 20 ohm. So, if you take 120 by 20 you will find it is 6 ampere right. It will 6 ampere. So, you are getting 6 ampere. So, I dc will be 6 ampere. Then, it is moving coil ammeter the ammeter A 1 will read 6 ampere because you are you are what you call moving coil ammeter is this DC right.

So, let me clear it. So, similarly the RMS value reading of ammeter this is the reading of ammeter A 1. Now, for you are just 1 minute. Now, for the diagram we will come later.

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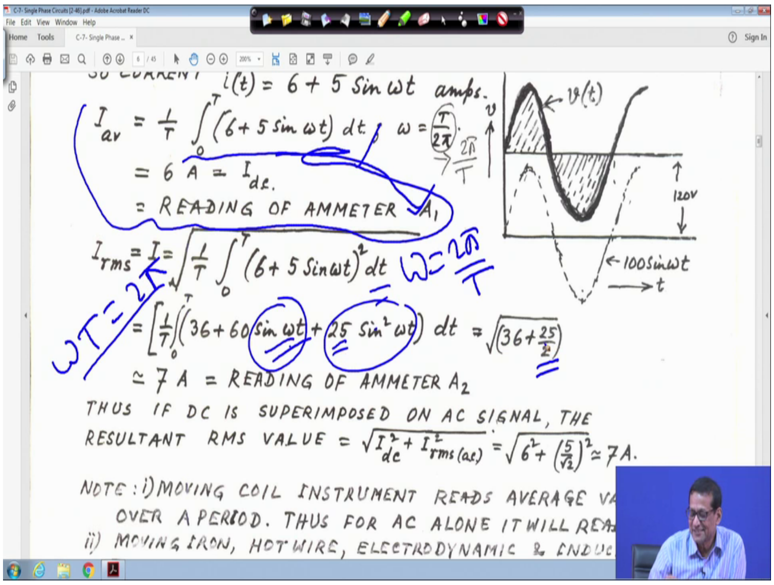


Now, I RMS value that is your reading of ammeter your this will be the whatever you will get this portion is the reading of ammeter A 1. This is your DC; this will read A 1 will read your 6 ampere. Now, come to RSM value.

So, in this case I is equal to square root of 1 upon T 0 to T 6 plus 5 sin omega t square because I is equal to 6 plus 5 sin omega t square dt. Now, you just break it and just you integrate it. If you integrate it, you will find that your and you will use this relationship. After integrating, you have to use this omega is equal to 2 pi by T; that means, I am telling you somewhere it will come in integration you substitute omega is equal omega t is equal to 2 pi right. Then you substitute right. After the substitution, you will find integration of sin omega t 0 to T you will find this term will become 0 and this one also you make it your what you call that sin square omega t.

So, it will be 1 minus cos 2 omega t by 2 and then you integrate right. So, you will find that your this term only 2 from this integration, whatever will come it will be 25 by 2. So, integration of this term will vanish it will 0.

And, 36 will be there your T T will be cancel and under root 36 plus 2 pi by 2. So, I am not doing it here, but please do it. It is very interesting. You please do it, but you will use omega is equal to 2 pi by T. So, that is omega into capital T 2 pi.

Similarly, here also, in this integration also you will put this one omega t is equal to 2 pi omega capital T is equal to 2 pi right. So, because when you will integrate this that is your what you call sin omega t. So, it will be minus cos omega t upon omega right and there I put T is equal to capital T and at that time you have to use this thing and you simplify. So, we will get root over 36 plus 25 by 2.

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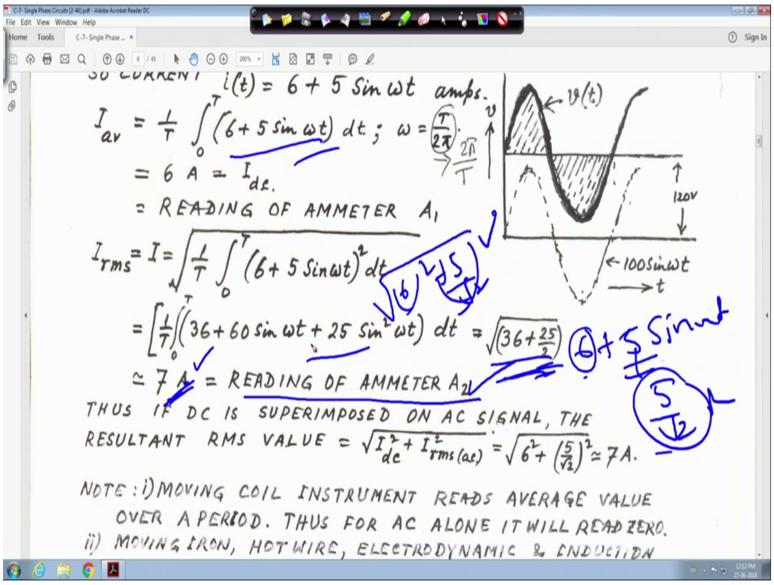

So; that means, whatever it will come it will coming around say your 7 ampere. So, that will be the reading of ammeter a 2 that is the moving iron ammeter. It will measure this called RMS value. So, that means, moving iron ammeter that is ammeter A 2 will measure the RMS value and this is your RMS value. So, ultimately, what we got? Ultimately, what we got? Ultimately, the current value was 6 plus 5 sin omega t right that is your i t.

So, this is the fixed value constant value and this is the peak value, the peak value; that means, it is the peak value and we have seen that your peak factor your root 2; that means, the RMS value of the current will be actually 5 by root 2 ampere RMS value right.

So, ultimately that ultimately the effective value will be the 6 it is 6 square plus your 5 by root 2 square. So, whatever you get know 6 square 36 pi by root 2 square is equally 25 by 2 right. So, if you have this kind of thing directly you can write this RMS value will be under root of 6 square plus whatever value is come in this case pi by root to square. So, that is your what you call this is what RMS value you are getting from this integration. So, please do this integration of your own. I told you everything right. So, please do this. Now, let me clear it. So, this is your ammeter your, what you call reading of the ammeter A 2. It is a 7 ampere approximately.

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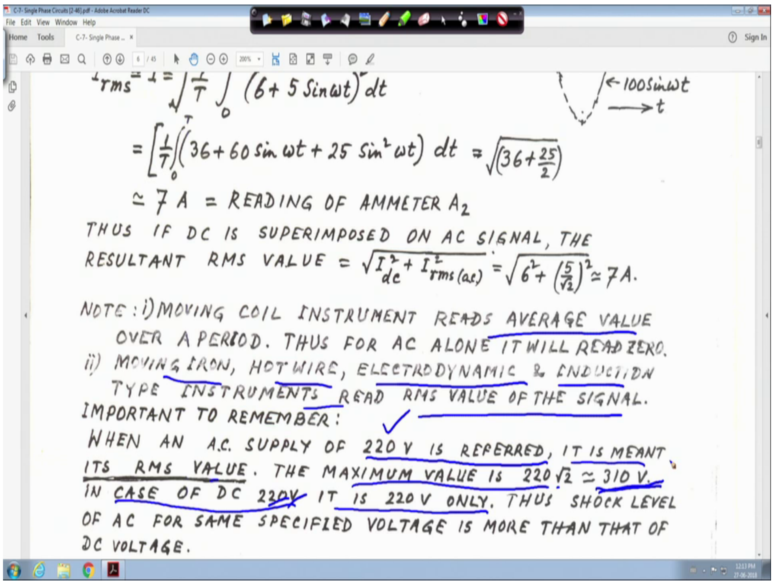


So, next is your something is written that you are moving iron where your something you should keep it in your mind that moving coil instrument. It is the average value moving iron hot wire electro dynamic and induction you are what you call type instruments read the RMS value of the signal right.

One thing is important to remember. When an AC supply of 220 volt is referred, it is meant the RMS value right. The maximum value is 220 into root 2. So, it is said 310 volts right. So, in case of DC 220 volts, it is 220 volt only. If it is DC 220 means, DC 220. If it is AC 220, means it is RMS value. You have to multiply by root 2, 310 volt.

That means that the shock level of AC for the same specified voltage is more than that of the DC voltage. That means, in AC voltage you will get the peak value shock and DC voltage you will get 220. I mean, in this DC voltage, the shock will be 220 volt only for AC supply 220 volt RMS means your shock level will be 310 volts. So, shock in AC will be more than the DC right. So, this is something I have written for you right.

So, that means, and this is that your what you call that is your just; that means, this is the wave form this is your v t v t is equal to your what you call your v your v, your V m sin omega t this is the plot of your v t v t is shown right.

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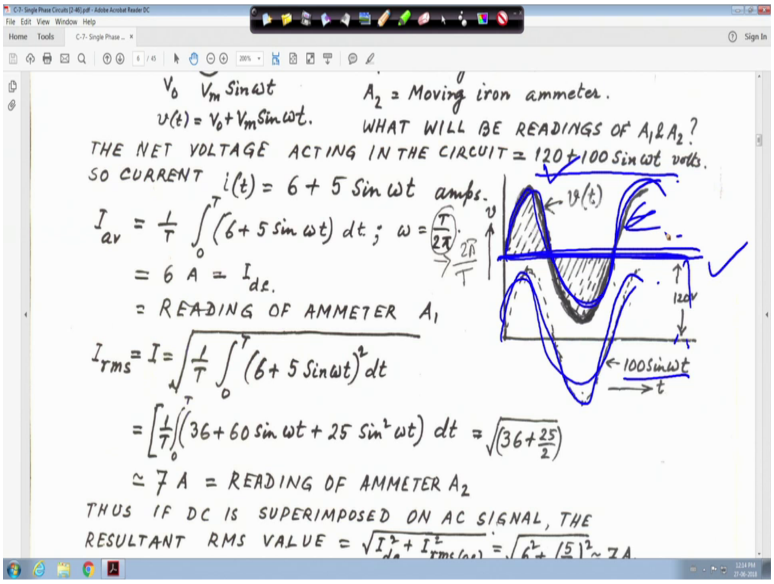


And this is your what you call that your 100 sin omega t right, 100 sin omega t and this volt this is your 120. This is 120 volts you DC this 120-volt DC is made it right. And this is your V m is 100 sin omega t. If you if you add this 2, then this will be your what you call this v t right; that means, this one your this plot this is 120 plus 100 sin omega t. This plot is this one and individually if you make it, this is 100 sin omega t and this is the DC means is the constant line this is 120 volt is mentioned. So, this is the resultant of this.

Thank you very much. We will be back again.