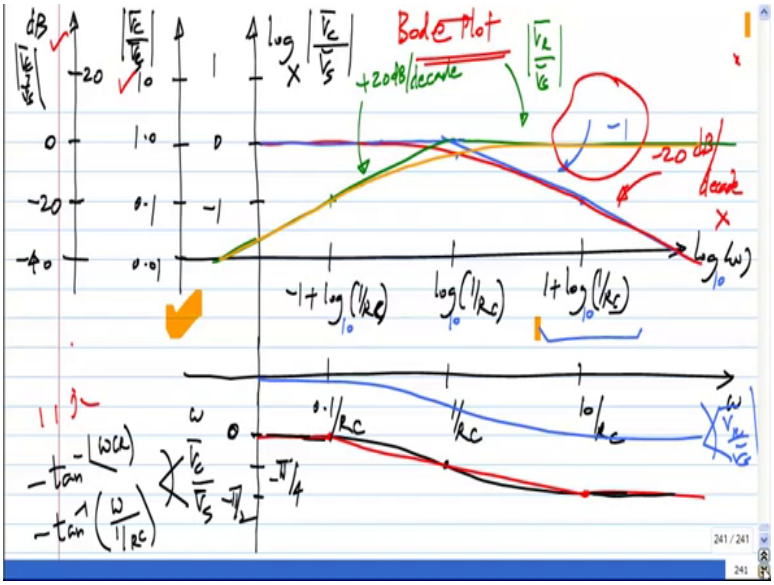
Basic Electrical Circuits
Dr Nagendra Krishnapura
Department of Electrical Engineering
Indian Institute of Technology Madras

Lecture - 149

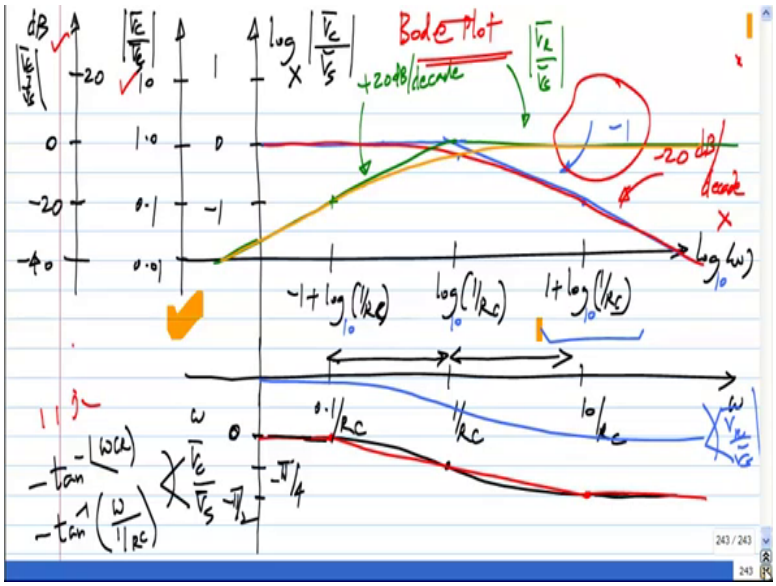
(Refer Slide Time: 00:00)

So, now, let us try to quickly do this for the second order case again it is not always that



you will use only the logarithm the mix up were this usefulness to the linear part as well..

(Refer Slide Time: 00:13)



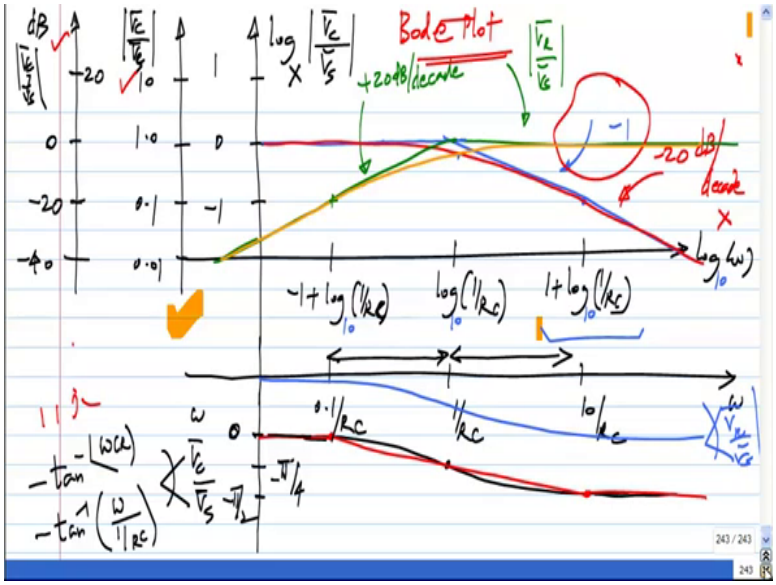
So, I will not spend too much time on this you can choose in any quantity, but let say this the V s, which is driving it meaning some sinusoids driving that one I told you we to plot things white range you need love plot you can see anything is not it I mean. let say, what

is the frequency range audible to the human ear 20 hertz to 20 kilo hertz approximately. So, let say I make this 0 and then, 20 kilo hertz, so where is 20 hertz here. So, you cannot tell, what happening is not it in fact, lets, so let us this is 10 and this 5 this is 2.5 kilo hertz still this is 1.265 this is 0.625 you can go on end on.

So, the low sequence system the base you cannot plot on this alternatively I can first say the day base performance is very important to me I will put 20 hertz here, where is 20 kilo hertz outside campers. So, to show this the only reasonable way is low scale. So, what you we do 20 hertz 200 hertz 2 kilo hertz 20 kilo hertz. So, it is a useful way of defecting things, which very our large things and I mean these two very even bigger over range look at light if you go from in farad to ultra violate and so on, frequency changes by many orders and magnitude.

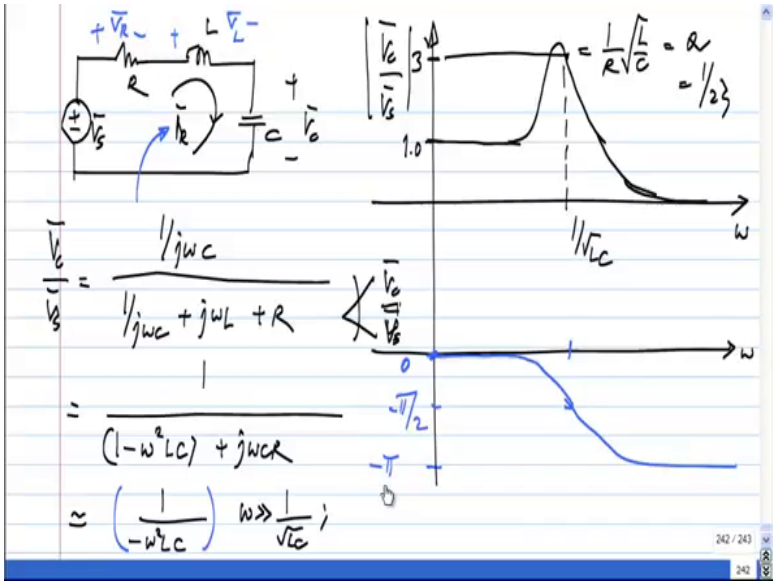
So, that is logarithm I mean it is facing between, what is meaning of large scale the physical distance between 0.1 by R C and one by R C is the same as physical distance between 1 by R C and 10 by R C that the meaning of log scale.

(Refer Slide Time: 02:30)



Now I can mark in any number of point from this logs scale means that lets say this was 4centimeter this is also 4 centimeters. So, equal factors mean equal distances where linear scale means equal distances mean equal increments you can any kind of scale it just the marking us variables lets solve, but these are some useful things.

(Refer Slide Time: 03:12)



So, you can do this for any variable you want let say i R or V c or anything. So, first I will do only linear scale you can do it yourself log scale and then, see what happens V c by V s verses omega, what is the expression for V c by V s you know what is it, what is it just the voltage divider, which comes out to be 1 by we start fine. Now, what do you think key sequence it plot to the circuit 1 by this is the magnitude and this is the angle. So, first do it on linear scale you can attempt it in large scale, what is for very low frequencies in the magnitude this is not the angle of the magnitude.

But, just a angle of this complex number what is the magnitude are frequency is much, much lower than one by L C the really, really low frequency, what is it one. So, if you apply dc all of the capacitor open circuit all of the applied voltage comes up the all output across the capacitor. So, it is one frequency much, much more than 1 by L C, what is the good approximation something better than 0 all something not all detail at this, which is there was dominal term the highest power in omega.

So, this is approximately minus omega square L C for omega much greater than 1 over square root L C. So, how does this change the changes as this square, square of inverse square of omega. So, it goes rapidly to 0, what is the value act omega equal to l by c what is that in define that to be some constant is it quality factor q of the circuit. So, let us assume the Q is quite high for this just for the may be Q is some are there. So, this is three or something, so what happened is that it will go up and then, so in fact, that logarithmic plot with not good at covering things in this area these things it will do here it is unity and here it goes the 1 over omega square.

So, you can see on the lock what is it this yes you have to evaluate separately. So, the value act 1 over square root of L C is equal to 1 hour are square root L by C, which is Q 1 over 2 zeta. So, you can have a capacitor voltage there is much higher than apply voltage, because residence of in this case now quickly what is the face at low very frequencies ha very low frequencies 0 and very high frequencies it just to see where its changes from and, where it changes to what is at very low frequencies 0 very high frequencies 0 why what is the phase of this pie and what is the phase at one over square root L C minus, minus 5 by 2 it is an imaginary number 1 over j omega C R.

So, it goes from like this reaches minus pie ad please plot same thing on a large scale and also you can plot other variables like V r and V l and i R. So, on please do that I won't discuss this further, because this is just about plotting, but plotting very important and its look particularly like you do not have enough practicing doing this these things I will plotting different kinds of function and. So, on please do that even when you are trying to sort problems etcetera. So, that you gives you a good starting point of solving many things.