Fundamentals of Power Electronics
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Lecture -16
Practicals

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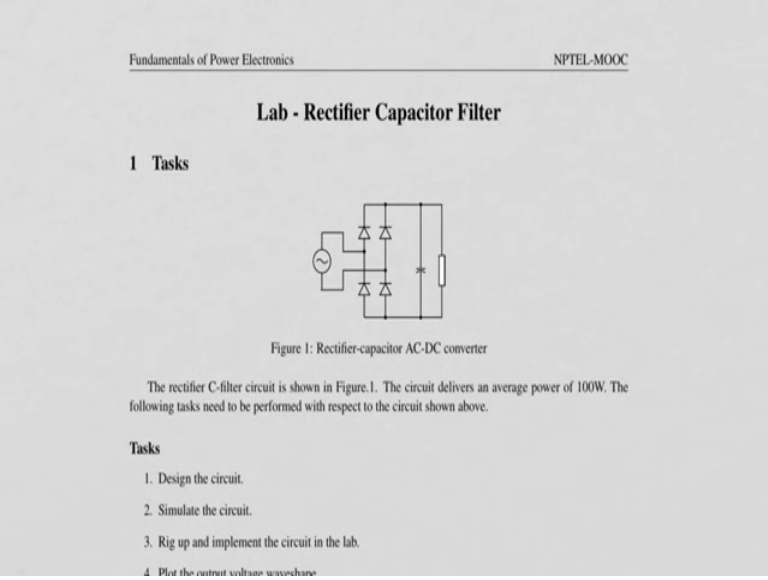

A lab on Rectifier Capacitor Filter will have this following typical tasks. This is the code circuit, this is the diode with rectifier capacitor filter. You code design for a typical specification something like this 100 Watts and there is a list of tasks here.

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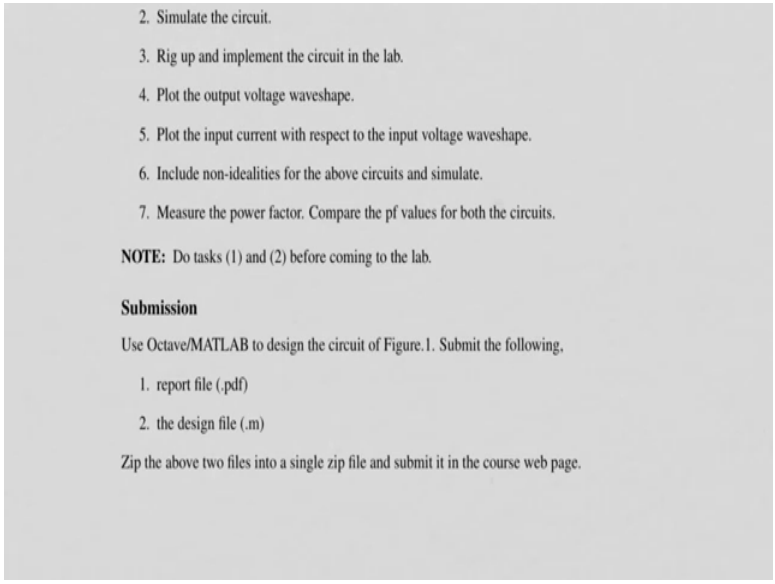

The task number 1 and 2 design the circuit and simulate. Now, this is important you do it before coming into the lab. So, 1 or 2 days before coming to the lab you will have to spend time on this design the circuit, get the values of the C and select the diodes and then use those values simulate the circuit in ngspice platform or Pspice platform or LTspice platform or MATLAB environment.

After you have understood the circuit by introducing non-idealities, you can introduce non-idealities here, you can introduce non-idealities here, track inductance and resistance; track inductance and resistance and see the effects of all these non-idealities on the operation of the circuit and the waveforms at various points. After you have become conversant with the circuit you can then begin the other portions of the tasks.

Rig up the circuit and implement in the lab, if you are doing a hardware lab, plot the output voltage waveshape and study it is repel character and see what is the effect of the non-idealities on the output voltage waveshape. Plot the input current with respect to the input waveshape and study it. You can also study the currents that are flowing here. If you are not able to measure the current hope you can put a very small resistance fraction of ohm and measure the voltage across that resistance which you will put here which will give you an estimate of the current. You should understand the circuit after having include a non-idealities also.

The last one is very important measurement of the power factor because this is a non-linear circuit and the currents are not sinusoidal, even the voltage maybe sinusoidal. The current drawn by the power supply is non-sinusoidal peaky and this is known to be a very poor power factor circuit. So, that is con, that is the disadvantage of this circuit even though it is used most popularly everywhere and that is basically because of its low cost, low component count and best volumetric efficiency.

The power factor is bad, how do you calculate the power factor, it is a non-linear circuit and the wave shape is non-sinusoidal. Of course, you could use the harmonics, then from the total harmonic distortion you can calculate the power factor, but you will need a spectrum analyzer for that. So, here let us discuss sometime next week on how to measure the power factor from the oscilloscope. So, this we will discuss on this in more detail in the next week discussion.

And typically, a submission to your instructor should be of this fashion. You need to submit a report file which is the way you have done your lab circuit implementation, and the tabulations, the specifications and the results oscillograms should be put in there along with your conclusions.

This is the design file which I said that you can use octave or MATLAB and putting the equation, so that you can do iterative design for any given specification. And give these two to your instructor as part of your lab work. However, lab work or physical lab work is not in the scope of this particular online MOOC course, but this is just a recommendation of how you should go about doing it in your own respective labs.