

**MIDDLE EAST TECHNICAL UNIVERSITY**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICAL ENGINEERING**

**EE 464 HOMEWORK 1**

**Magnetic Design of the Hardware Project**

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**GitHub Page:** https://github.com/canberkkacan/EE464\_HW1

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**c)** After calculating the transformer parameters, as discussed in part b, the output capacitance value must be calculated for the flyback converter. To calculate the output capacitor value, the following equation has been utilized:

After calculating the output capacitor value, the converter has been simulated. The converter circuit can be seen in **Figure x**.

A diagram of a circuit

Description automatically generated

**Figure x:** Simulated flyback converter.

The converter has various parameters. First of all the duty cycle is one of the most important parameters of the converter which changes with the change of the input voltage since we try to supply a constant voltage at the load side. Change of the duty cycle with the input voltage can be seen in **Figure x+1**.



**Figure x+1:** Input voltage vs. duty cycle graph.

The second parameter is the load voltage and current. In the project, a constant and nearly ripple free, peak-to-peak ripple must not exceed 3%, load voltage and current must be reached. In the simulation we have seen that we could meet these requirements, as shown in **Figure x+2**.

A graph with a blue line

Description automatically generated

**Figure x+2:** Output voltage and current waveforms.

The last parameter is the switch voltage. Since high voltage levels on the switch can cause switching failure, the voltage on the switch must be observed. You can see the switch voltage in **Figure x+3**.

A graph of a function

Description automatically generated

**Figure x+3:** Switch voltage waveform.

As you can see, in the ideal case, the switch voltage goes up to approximately 70V, which is a value most of the switches can handle; thus, there is no need to implement a snubber circuit for the ideal case.

**e)**