ELECTENG734 Assignment 1

Please refer to the marking rubric given on Canvas carefully.

Refer to Chapter 17 in the Second Edition of "The Fundamentals of Power Electronics" by Robert W. Erickson and Dragon Maksimovic.

1. Describe how the choice of filtering in the line-commutated full bridge rectifier affects its performance in one paragraph only (between 150-250 words).
2. Describe how the THD of the line-commutated full bridge rectifier be minimized in one paragraph only (between 150-250 words).
3. Using PLECs simulations, plot the RMS rectifier current (I_{rec}) as the battery voltage varies in the specified range shown in Table 1. Assume the diodes are ideal. Observe when the system transitions between CCM and DCM. Plot the graph using either Excel or MATLAB.

   Explain what causes this IPT system to go into DCM in a few sentences.

   Assume that an IPT secondary has the following operating conditions shown in Table 1. A simple example of an appropriate circuit to use for this task is shown in Figure 1

Table 1: Parameters of the series-tuned system

V_{oc}	$10\ V$
L_2	$10\ uH$
f	$38.4\ kHz$
Tuning	Perfectly series tuned
V_{bat}	$8\ to\ 15\ V$ in $0.5\ V$ steps
C_{dc}	$100\ uF$
R_1, R_2	$10\ m\Omega$

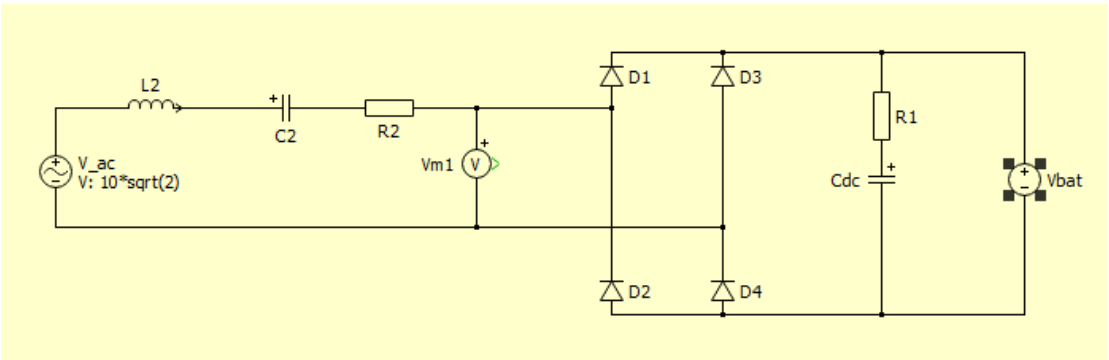

Figure 1: A simple series tuned secondary system with a battery load