**ELEC_E8412**          **Power Electronics**

**Exercise#5**          **12.11.2020**

**Problem 1:**

A buck converter has an input of 6 V and an output of 1.5 V. The load resistor

is 3 Ω, the switching frequency is 400 kHz, L = 5 µH, and C =10 µF. Determine

(a) the duty ratio

(b) the average and peak inductor currents

(c) the average source current,

(d) the peak and average diode current.

**Problem 2:**

A buck converter has an input of 50 V and an output of 25 V. The switching frequency is

100 kHz, and the output power to a load resistor is 125 W. Determine

(a) the duty ratio

(b) the value of inductance to limit the peak inductor current to 6.25 A.

(c) the minimum inductor current

**Problem 3:**

A boost converter has the following parameters:

$V_{in}$ = 5 V, $V_{out}$ = 20 V, and $P_{out}$ = 40 W

The minimum value of the inductor current must be at least 80% of the average inductor

current. The switching frequency is 85 kHz.  Determine the duty ratio and the minimum

inductor value.

**Problem 4:**

A boost converter has parameter Vs =20 V, D =0.6, R =12.5 Ω, L=10 µH, C =40 µF, and the switching frequency is 200 kHz. Determine

(a) the output voltage

(b) the average, maximum, and minimum inductor currents.

(c) the average current in the diode

Assume ideal components.

**Problem 5:**

A buck-boost converter has the following parameters:

$V_{in}$ = 24 V, D= 0.65, $R$ = 7.5 Ω, $L$ = 50 µH, $C$ = 200 µF, and switching frequency = 100 KHz. Determine

(a) the output voltage,

(b) the average, maximum, and minimum inductor currents.

**Problem 6:**

A buck-boost converter has parameters Vs=12 V, D=0.6, R=10 Ω, L =10 µH, C =20 µF, and a switching frequency of 200 kHz. Determine

(a) the output voltage

(b) the average, maximum, and minimum inductor currents, and

(c) the average value of input current.