

POWER ELECTRONICS

COURSE CODE: ELEC-E8412

Q1: For a half-wave rectifier with resistive load with $V_{in}=100\sin(400t)$ V and $R=10\ \Omega$, determine:

- Average load current.
- RMS load current.
- Apparent power supplied by the source
- Power factor. (20 %)

Q2: Figure 1 shows a rectifier with resistive load.

- Sketch the waveform of the output voltage.
- Sketch the waveform of the SCR voltage.
- Find the average value of the output voltage. (15 %)

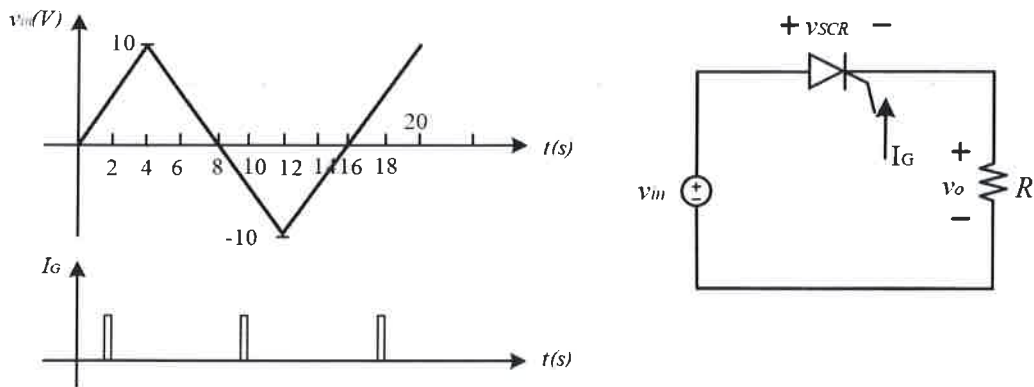


Figure 1

Q3. For the buck converter depicted in the Figure 2, $C=10\ \mu\text{F}$, $L=5\ \mu\text{H}$, $R=3\ \Omega$, $V_s=6\text{V}$, $V_o=1.5\text{V}$, and the switching frequency is 400k Hz. Find:

- The duty cycle.
- Average and peak inductor current.
- Peak and average diode current. (20 %)

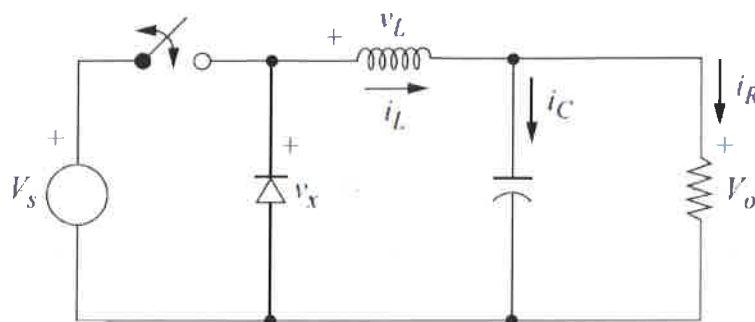


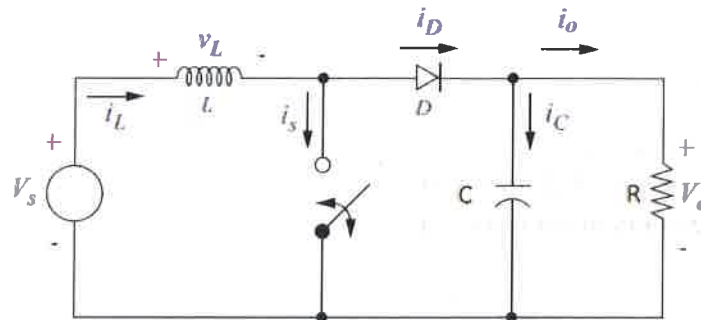
Figure 2

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Q4. For the **boost** converter depicted in the Figure:3, $L=2\text{mH}$, $R=4\Omega$, $V_s=37\text{V}$, $V_o=61\text{V}$, and $T_{\text{ON}}=1\text{ms}$. Find:

- the duty cycle
- the switching frequency
- input source current and the output load current when switch was set on 'ON' position
- Sketch the waveform for the current flow through the switch and the diode. (20 %)

**Figure 3**