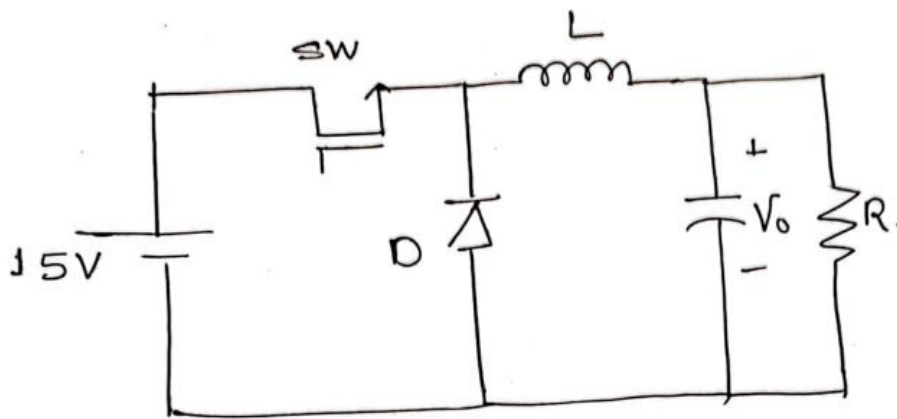
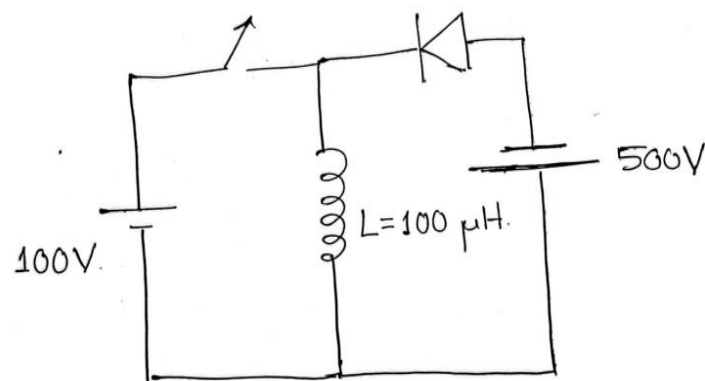


Assignment 2 (EE 238)

1. Design a buck converter with a source voltage of 50 V and duty ratio of 0.6. The load resistance is $20\ \Omega$. The maximum voltage ripple in the capacitor is 1% of the average capacitor voltage and the maximum ripple current is 5% of the average output current. Assume the converter is operating in CCM (Continuous Conduction Mode). The switching frequency is 2 kHz.
2. Find the output voltage of the following circuit considering the forward voltage drop of the MOSFET as 1 V and the forward voltage drop of the diode as 0.7 V. The switch is ON for 40% of the time in a switching cycle. The switching frequency is 5 kHz and assume CCM.



3. Consider the following circuit. The $f_s = 10\text{ kHz}$ of the switch.



The minimum current of the inductor is zero but never for a finite duration at the steady state. Find the peak value of the inductor current and also the duty ratio.

4. For a buck converter, the source voltage is 100 V, the duty ratio is 0.4 and the output voltage is 50 V. Given $L=200\text{ }\mu\text{H}$ and $f_s=20\text{ kHz}$, find
 - a) the peak value of the current.
 - b) The average output current.
5. Assuming CCM, draw the waveforms of the switch current, diode current, inductor current and the capacitor current for both Boost and Buck-Boost converters.