

ELEC-E8412 Power Electronics

/ Exercise # 3

22.10.2020

Problem 1:

A half-wave rectifier with a 1-k Ω load has a parallel capacitor. The source is 120 V rms, 60 Hz. Determine the peak-to-peak ripple of the output voltage when the capacitor is

- a) 4000 μ F and
- b) 20 μ F.

Problem 2:

A half-wave rectifier with a capacitor filter has $V_m=200$ V, $R=10$ k Ω , $C=1000$ μ F, and $\omega=377$.

- a) Determine the peak-to peak ripple voltage using the exact equations.
- b) Determine the ripple (using the approximate formula).

Problem 3:

For the controlled half-wave rectifier with resistive load, the source is 120 V rms at 60 Hz. The resistance is 100 Ω , and the delay angle α is 45 $^\circ$.

- a) Determine the average voltage across the resistor.
- b) Determine the power absorbed by the resistor.
- c) Determine the power factor as seen by the source.

Problem 4:

A half-wave rectifier has a 120 V rms, 60 Hz ac source. The load is 750 Ω .

- a) Determine the value of a filter capacitor to keep the peak-to-peak ripple across the load to less than 2 V.
- b) Determine the average and peak values of diode current.