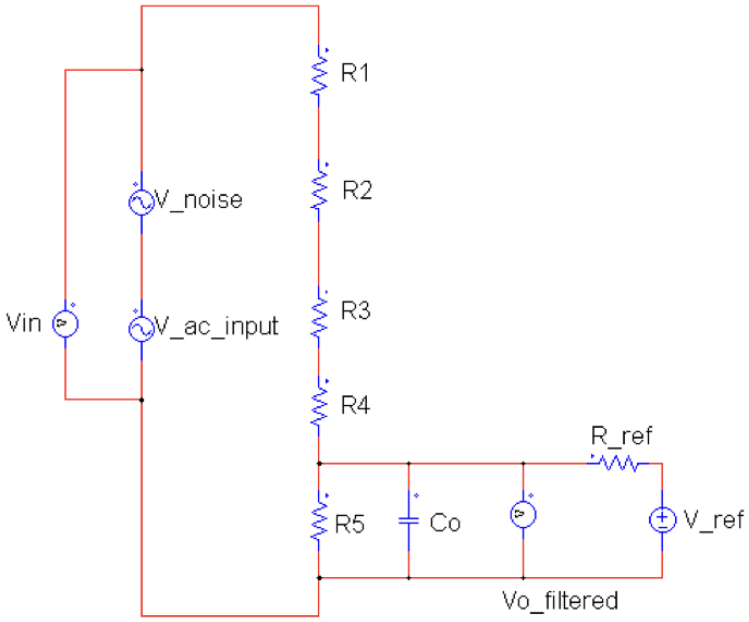
Complex Engineering Analysis

Design the following system that can measure AC voltage up to RMS voltage of 0V ~ 250V.



AC Voltage measurement Circuit

Task # 01: Design a resistor divider circuit such that a pure sinusoidal voltage with RMS value of 280V at 50Hz becomes an AC voltage with peak-to-peak value of 4V.

Task # 02: Design V_ref such that it adds a DC offset of 2.5V in the output voltage.

Task # 03: Design the capacitor such that the cut-off frequency of the low-pass filter is 1kHz.

Task # 04: Draw the bode plot for the designed filter with a Log x-axis in Frequency (Hz) from 1 Hz to 100 kHz.

Task # 05: Find the transfer function of the designed system and digitize it using Bilinear Transformation at a sampling frequency of 500 kHz.

Task # 06: Draw the bode plot for the digital filter with a Log x-axis in Frequency (Hz) from 1 Hz to 100 kHz. Compare the analog and digital filters bode plots.

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