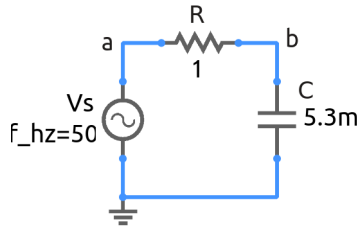


ee101_rc_ac_1.sqproj



The purpose of this simulation is to study the effect of component values on the frequency response of the series RC circuit shown in the figure. The simulation is performed in the time domain using the SSW (Steady-State Waveform) analysis which gives directly the steady-state solution. In particular, we are interested in the magnitude and phase of the output voltage (V_b in the figure).

Exercise Set

1. Derive expressions for the magnitude and phase of V_b with $V_s(t) = V_m \sin \omega t$, where V_m is 1 V and the frequency is 50 Hz.
2. For the component values specified in the figure, compute the numerical values of $|\mathbf{V}_b|$ and $\angle \mathbf{V}_b$. Check your answers against simulation results.
3. Keeping C constant, increase R by a factor of 2, 3, 4, 5, and simulate the circuit for each case. Plot $V_a(t)$ and $V_b(t)$ together for the above cases on the same plot. Comment on the trends seen in the plot.
4. Repeat the above exercise for a constant R and varying C .
5. Similarly, make plots for the current waveform and explain the trends you observe in the plots.