

## Pre-exam questions

1. Circuit with capacitors and resistors both. Long-time behavior after a switch is closed.

At first, when a capacitor has no charge, the voltage across it is zero. After a long time, when it is fully charged, there will be no more charge movement involving it, so the current on the circuit branch the capacitor is on will be zero.

2. 50 Hz and 60 Hz AC circuits brought close together.

They will both induce voltages in one another, and the voltages will have the same frequencies as the inducing currents. So you'll get circuits driven by voltages with different frequencies. Beats will result.

3. How refrigerator magnets work.

Permanent magnets are due to atomic-size currents, which in magnetic materials, align when the temperature is low enough so that random motion does not overwhelm the mutual interaction of the atoms. These make the atoms in certain close-by metals align to produce an attraction between the moving charges.