Pre-Lab 1

Michael Brodskiy
Professor: M. Onabajo

September 10, 2024

1. Review section read ✓

2. The power supplies can be connected as shown:

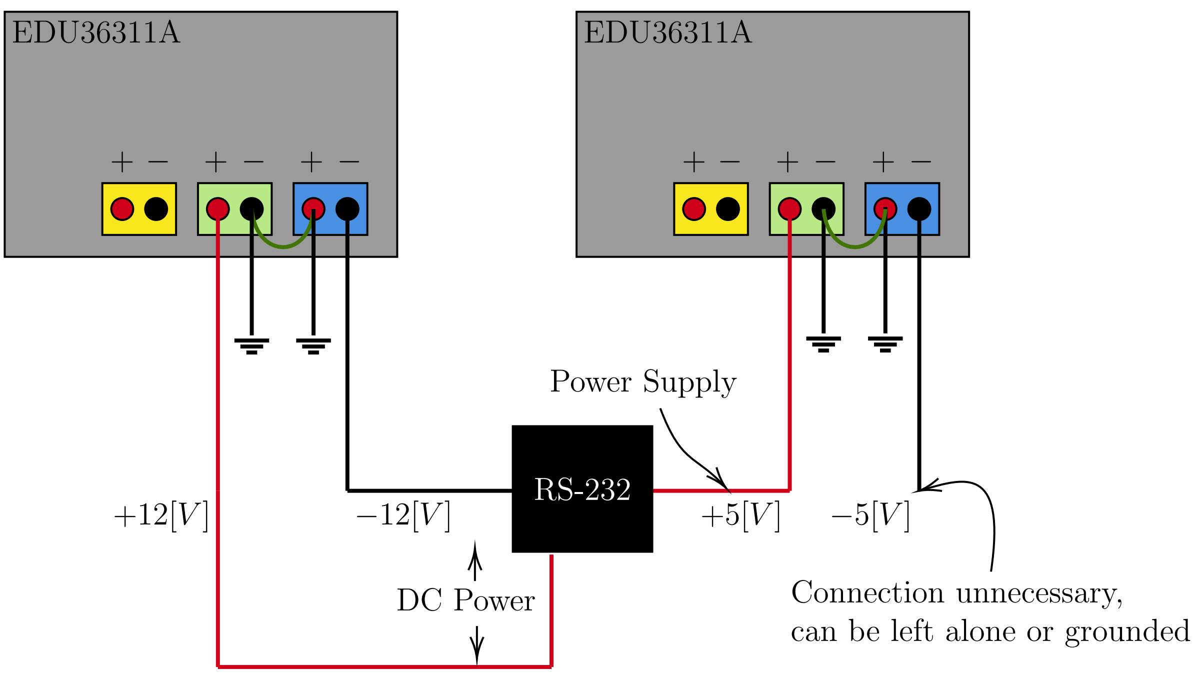

Figure 1: Power Supply Connection

3. (a) Assuming the output channel we need is active with the provided initial setting (channel is toggled ON), we would proceed to the FREQUENCY setting. We press the soft key next to "Frequency," after which we enter the desired frequency (in this case, 2000) value and then select hertz (alternatively, we may select 4000π radians per second, if the units are available, though this usually is not an option).

(b) As a result of the $50[\Omega]$ equivalent load, the output voltage would be:

$$R_{eq} = \frac{50}{50+50} = \frac{1}{2}v_o$$
$$\frac{1}{2}v_o = \boxed{2.5 + 5\sin(4000\pi t)}$$

(c) DC offset may be eliminated using the AC Coupling feature. First, the corresponding channel number must be pressed (say that, for this example, we are working with channel 1, or CH1). After pressing CH1 to confirm it is enabled, the Coupling soft key must then be pressed to select the input channel coupling. While the options are AC or DC, since we want to eliminate the DC component, we <u>would select the AC option</u>.

4. Referring to the inverting op-amp in Figure 5:

The gain of the op-amp can be defined as:

$$G_V = -\frac{R_2}{R_1} = -\frac{5000}{50}$$
$$\boxed{G_V = -\frac{R_2}{R_1} = 100\left[\frac{\text{V}}{\text{V}}\right]}$$

$\boxed{\text{The input resistance is simply the first resistor value, or } R_i = R_1[\Omega]}$

as per the above, $R_1 = 50[\Omega]$

As per the Thévenin equivalent $50[\Omega]$, the voltage would be split such that:

$$\boxed{v_o = \frac{50}{50+50}v_s = \frac{1}{2}v_s}$$