

ES180 – Circuits & Devices – Example Problems Classes

The topics you have covered in the Circuits and Devices section are mostly straightforward, and are adequately covered by the problems and solutions you already have from the briefing sheets. I will use the Example Problems Class to cover four of the topics that are more likely to give problems to some students

If you think you could not answer the following four problems – print off this sheet and bring it to the Example Problems Class for which you are timetabled in Wk 19.

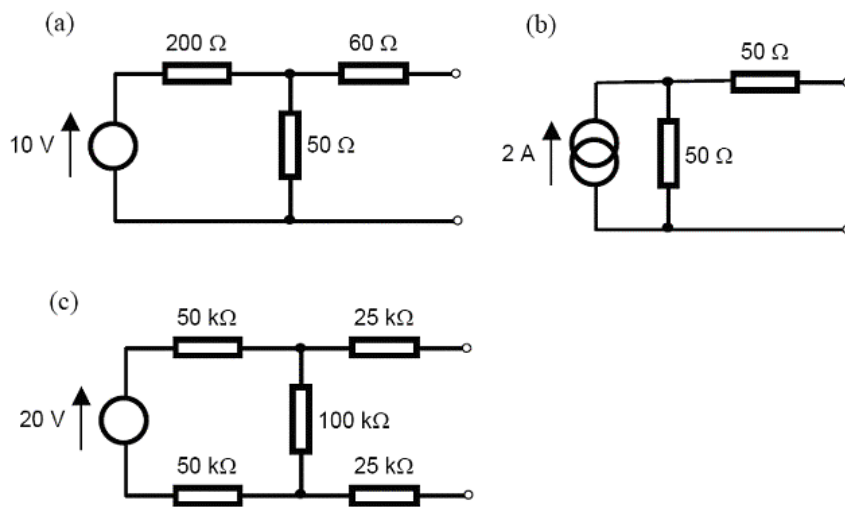
1. Design a general feedback amplifier arrangement with a stable voltage gain of 30 using a high-gain active amplifier. Determine the effect on the overall gain of the circuit if the voltage gain of the active amplifier varies from 20,000 to 50,000.

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2. A voltage source provides +2 V at a maximum current of +10 mA. Using this voltage source as an input, design two operational amplifier circuits - one that will provide a voltage gain of +5, another that will provide a voltage gain of -5. Assume that you have a selection of resistor values that range from 100 Ω to 2000 Ω in steps of 100 Ω .

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3. Derive Thévenin equivalent circuits for the following arrangements



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4. A voltage is formed by summing two sinusoidal waveforms of the same frequency. The first has a magnitude of 20 V and is taken as the reference phase (that is, its phase angle is taken as 0°). The second has a magnitude of 10 V and leads the first waveform by 45° . Draw a phasor diagram of this arrangement and hence estimate the magnitude and phase of the resultant signal.