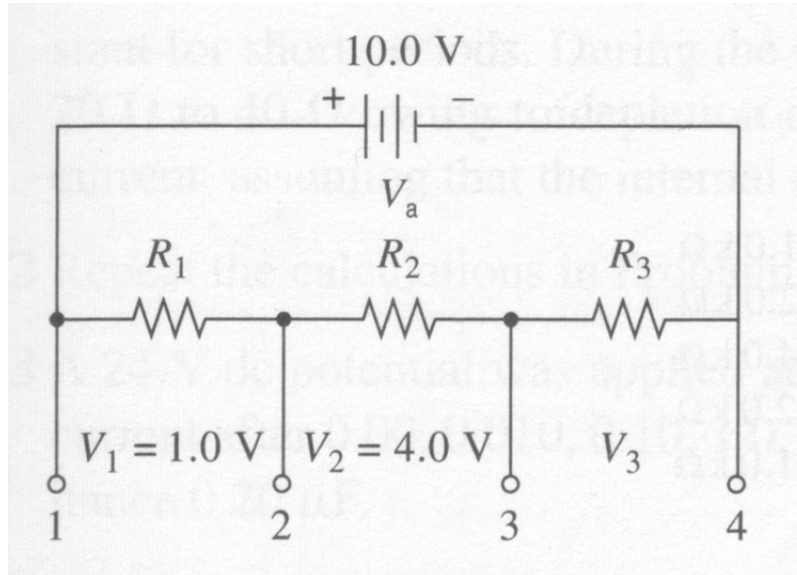


Questions: Text book assignment #1

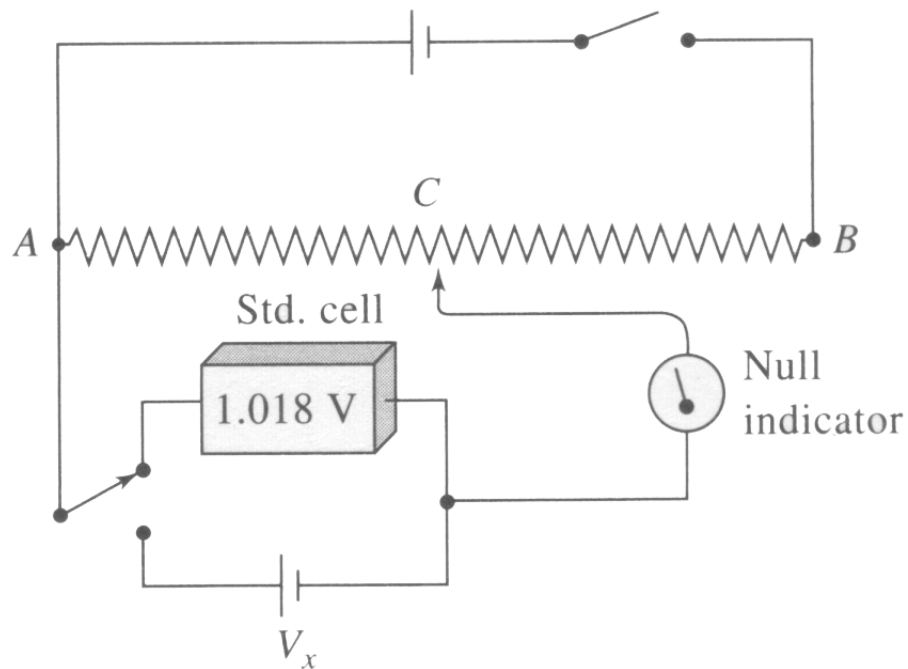
2-1 It was desired to assemble the voltage divider shown below. Two of each of the following resistors were available:  $50\ \Omega$ ,  $100\ \Omega$ ,  $200\ \Omega$ .



- Describe a suitable combination of the resistors that would give the indicated voltages.
- What would be the IR drop across  $R_3$ ?
- What current would be drawn from the source?
- What power is dissipated by the circuit?

2-3 For a circuit similar to the one shown in problem 2-1,  $R_1 = 1.00\text{ k}\Omega$ ,  $R_2 = 2.50\text{ k}\Omega$ ,  $R_3 = 4.00\text{ k}\Omega$ , and  $V_b = 12.0\text{ V}$ . A voltmeter was placed across contacts 2 and 4. Calculate the relative error in the voltage reading if the internal resistance of the voltmeter was (a)  $500\ \Omega$ , (b)  $50\text{ k}\Omega$ , and (c)  $500\text{ k}\Omega$ .

2-7 The circuit that follows is for a laboratory potentiometer for measuring unknown potentials  $V_x$ . Assume the resistor AB is a slide wire whose resistance is directly proportional to its length. With the standard Weston cell (1.018 V) in the circuit, a null point was observed when contact C was moved to a position 84.3 cm from point A. When the Weston cell was replaced with an unknown voltage, null was observed at 44.3 cm. Calculate the potential of the unknown.



2-14 How long would it take to discharge a  $0.015 \mu\text{F}$  capacitor to 1% of its full charge through a resistance of (a)  $10 \text{ M}\Omega$ , (b)  $1 \text{ M}\Omega$ , and (c)  $1 \text{ k}\Omega$ .

2-15 Calculate the time constants for each of the RC circuits described in problem 2-14.

2-18 Calculate the capacitive reactance, the impedance, and the phase angle for the following series circuits.

Frequency (Hz)	Resistance, $\Omega$	Capacitance, $\mu\text{F}$
1	20,000	0.033
$10^3$	20,000	0.033
$10^6$	20,000	0.033
1	200	0.0033
$10^3$	200	0.0033
$10^6$	200	0.0033
1	2,000	0.33
$10^3$	2,000	0.33
$10^6$	2,000	0.33

2-19 Derive a frequency response curve for a low-pass filter in which  $R = 2.5 \times 10^3 \Omega$  and  $C = 0.015 \mu\text{F}$ . Cover a range of  $(V_{\text{peak}})_{\text{output}} / (V_{\text{peak}})_{\text{input}}$  of 0.01 to 0.99.