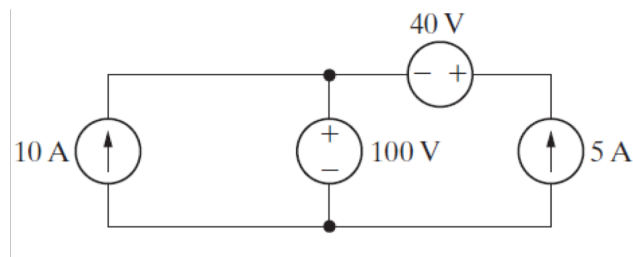


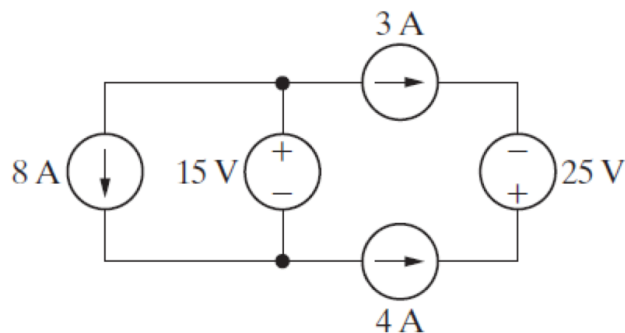
Question 1 [10]

If the interconnection in the figure below is valid, find the power developed in the current sources. Whether the circuit is valid or not, either way provide an explanation why.



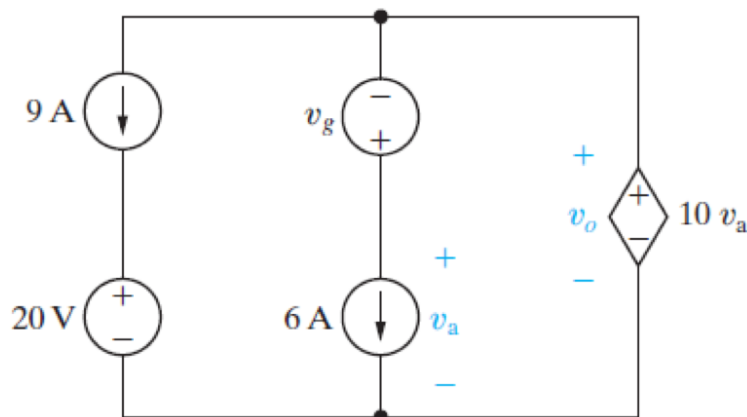
Question 2 [10]

If the interconnection in the figure below is valid, find the power developed in the voltage sources. Whether the circuit is valid or not, either provide an explanation why.



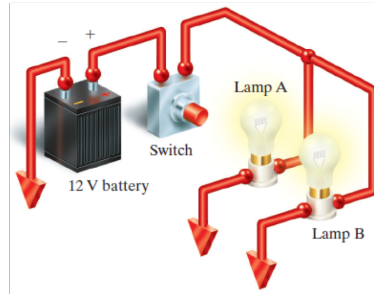
Question 3 [10]

Find the total power developed in the circuit if $v_o = 5$ V.



Question 4 [10]

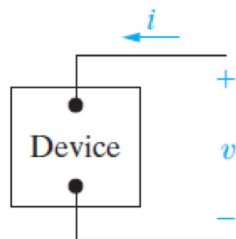
A pair of automotive headlamps is connected to a 12 V battery as shown below. The symbol ▼ indicates that the terminal is connected directly to the metal frame of the car. [Hint: take into account internal resistance and resistances of wires and between other connectors.]



- (a) Construct a circuit model using resistors and an independent voltage source.
- (b) Identify and list the correspondence between the ideal circuit element and the symbol component that it represents in the figure.

Question 5 [10]

The terminal voltage and terminal current were measured (b) on the device (a) shown. Construct a circuit model for the device consisting of a single resistor. Provide a graph (either hand-drawn or software generated) showing how you determine the value of the resistor.



(a)

i (mA)	v (V)
-10	-120
-5	-60
5	60
10	120
15	180

(b)