

電路學(EE2210)第一次隨堂考

2015年9月23日

時間：10 分鐘

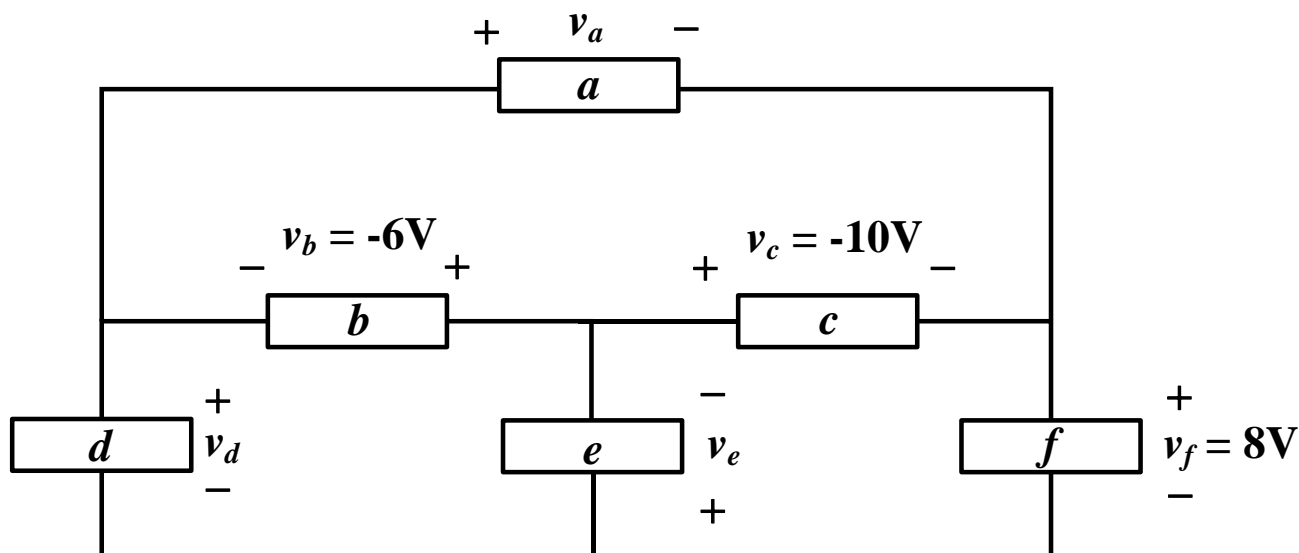
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For the circuit as shown below, there are six elements which observe the *Associated Variables Convention*. Among the six elements, the voltages for three elements are given on the figure. The current for element a is $i_a = -4\text{A}$, for element d is $i_d = 2\text{A}$, and for element f is $i_f = -10\text{A}$. By using the KVL and KCL, please find

- (i) the voltages of element d and a (v_d and v_a),
- (ii) the currents of element b and e (i_b and i_e),
- (iii) the power of element e (p_e).



(i) $v_d =$ _____, $v_a =$ _____,

(ii) $i_b =$ _____, $i_e =$ _____,

(iii) $p_e =$ _____.

Solution:

Using KVL to find the voltage of each element:

$$v_c : -4 + v_c + (-1) = 0 \Rightarrow v_c = 2V$$

$$\underline{v_d : 2 + v_d + (-6) = 0 \Rightarrow v_d = 4V}$$

$$\underline{v_a : 2 + v_a + (-6) = 0 \Rightarrow v_a = -4V}$$

Using KCL to find the current of each element:

$$\underline{i_b : 4 + i_b - 2 = 0 \Rightarrow i_b = -2A}$$

$$i_c : -4 + i_c + 10 = 0 \Rightarrow i_c = -6A$$

$$\underline{i_e : 2 + i_e + 6 = 0 \Rightarrow i_e = -8A}$$

The power of each element:

$$p_a = (-4) \times (-4) = 16W$$

$$p_b = (-6) \times (-2) = 12W$$

$$p_c = (-10) \times (-6) = 60W$$

$$p_d = 4 \times 2 = 8W$$

$$p_e = 2 \times (-8) = -16W$$

$$p_f = 8 \times (-10) = -80W$$

$$\underline{p_a + p_b + p_c + p_d + p_e + p_f = 0W}$$

(Power conservation in this circuit.)