

※ 考生請注意：本試題 可 不可 使用計算機

1. (12%) Translate the following paragraph into Chinese as precise as possible:

A power distribution system should offer constant voltage and high efficiency. The user wants constant voltage, independent of load, because her/his equipment is designed to operate at standard voltage. This implies that the voltage should remain reasonably near 110 V whether she/he uses 1 kW or 10 kW of power. This requires that the output impedance of the source, as seen from the user's point of view, be as low as possible. Of course, an ideal voltage source has zero output impedance, but the generator has an inherent output impedance and the distribution line also has an impedance.

2. (15%) Determine V_1 and V_2 for the circuit shown in Fig. 1.

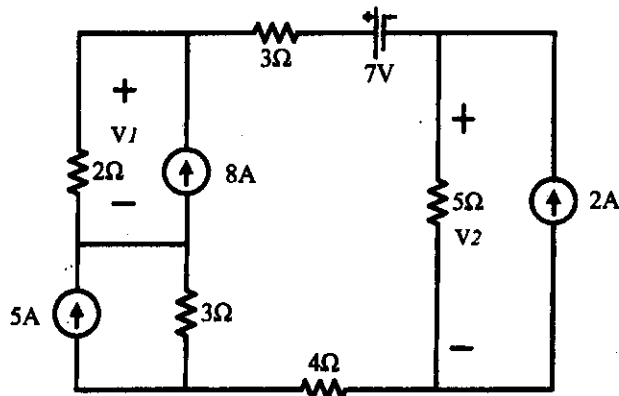


Fig. 1

3. (20%) For the circuit shown in Fig. 2, the switch has been closed for a long time until it opens at $t=0$. Determine the currents $i_C(t)$ (10%) and $i_L(t)$ (10%) for $t>0$.

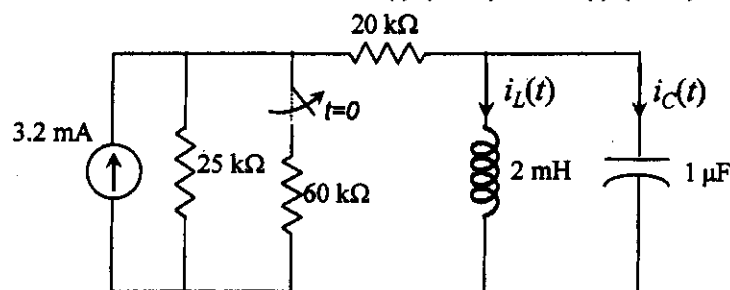


Fig. 2

4. (18%) The circuit in Fig. 3 has been in position *a* for a long time. At $t=0$, the switch instantaneously moves to position *b*. Determine $V_c(t)$ at node *c* for $t>0$.

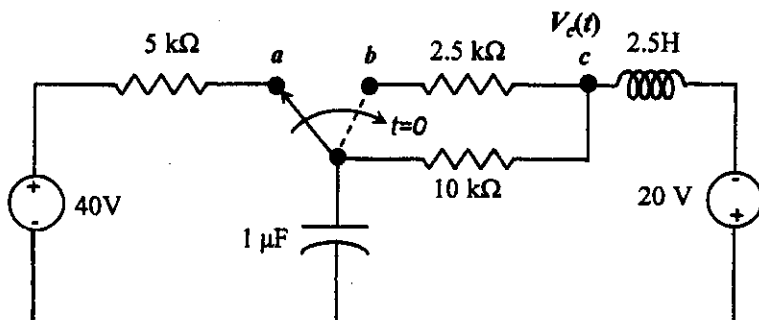


Fig. 3

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5. (20%) In Fig. 4, the design target is to make the current $i(t)$ lead $v_s(t)$ by a phase of 55 degrees.

The ac voltage source is given as $v_s(t) = 120\sqrt{2} \cos(120\pi t)$ V.

(a) What is the only reactive component in the box and what is its value? (8%)

(b) What is the amplitude of $i(t)$? (6%)

(c) If the frequency is doubled, what would be the phase difference between $v_s(t)$ and $i(t)$ (ignore the sign)? (6%)

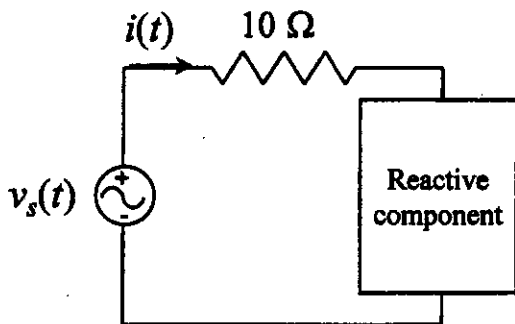


Fig. 4

6. (15%) In Fig. 5, the circuit works at $\omega = 100$ rad/s. Determine the current phasor I .

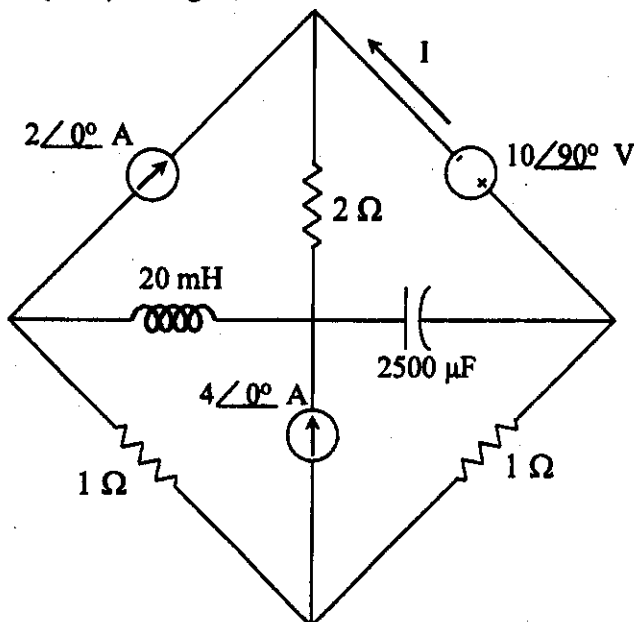


Fig. 5