

國立高雄應用科技大學

九十七學年度碩士班招生考試

電機工程系（甲組）

准考證號碼 （考生必須填寫）

電路學

試題 共 3 頁，第 1 頁

- 注意：a. 本試題共 7 題，第 1~4 題每題 10 分，第 5~7 題每題 20 分，共 100 分。
 b. 作答時不必抄題。
 c. 考生作答前請詳閱答案卷之考生注意事項。

1. For the circuit shown in Fig. 1. Calculate the power delivered by the dependent voltage source. (10%)

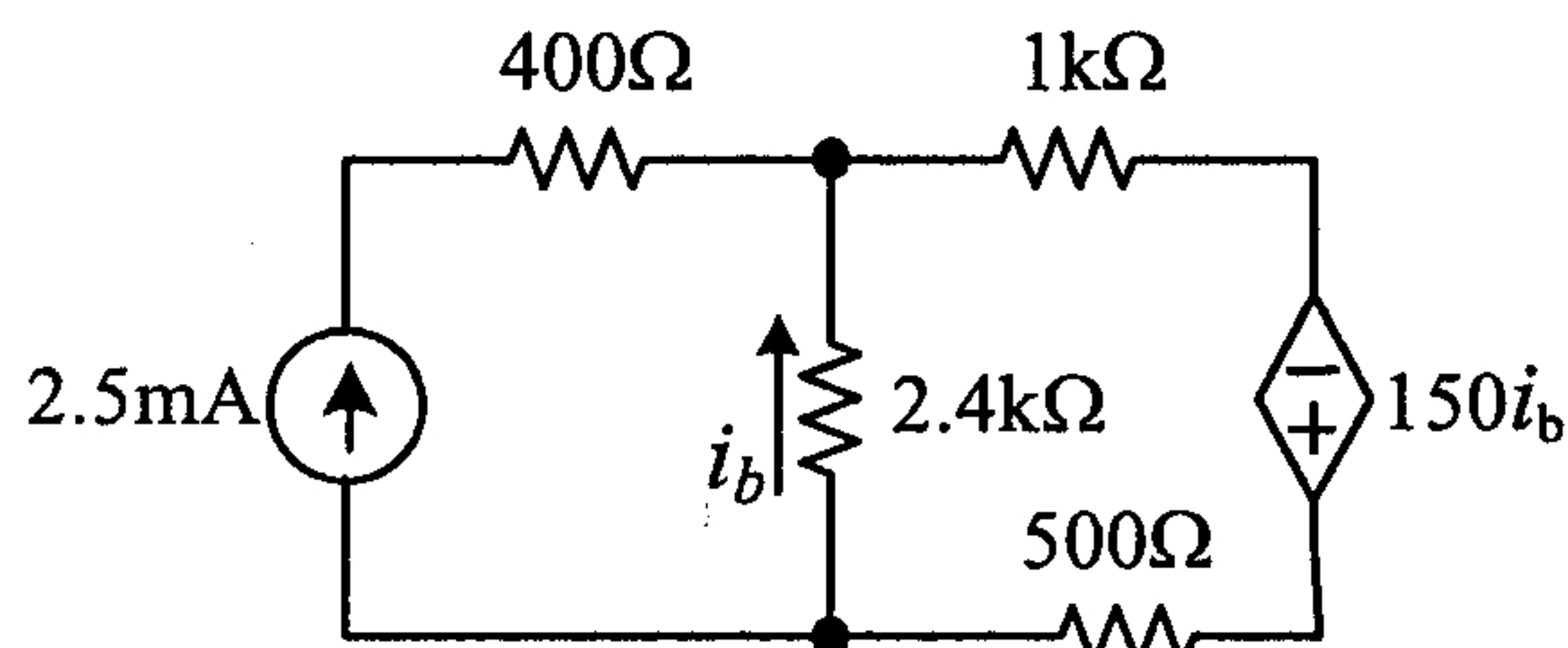


Fig. 1

2. The switch in the circuit seen in Fig. 2 has been closed for a long time. The switch opens at $t = 0$. Find the time constant for the circuit when $t > 0$. (10%)

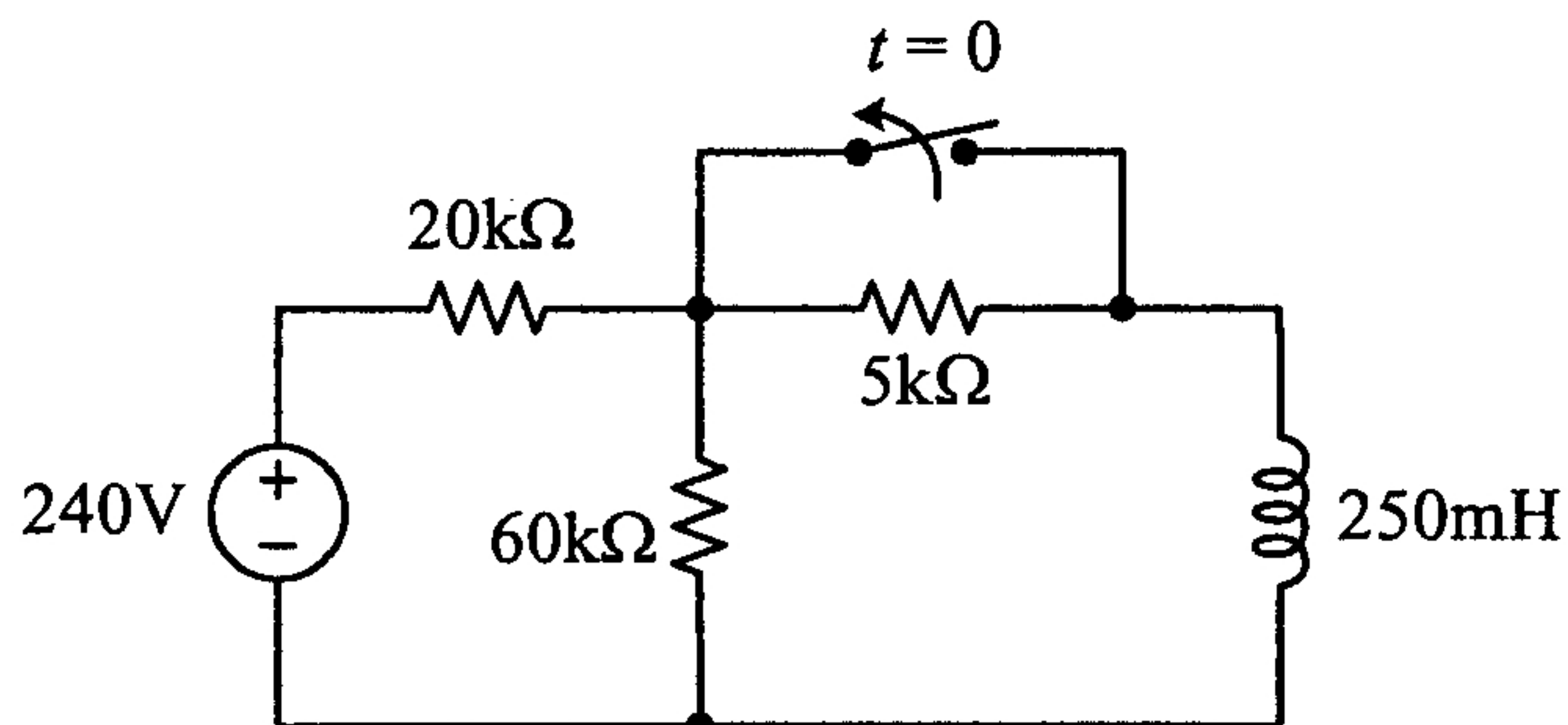


Fig. 2

3. The natural voltage response of the circuit in Fig. 3 is $v(t) = -5e^{-5000t} + 20e^{-20000t} \text{ V}$.
When the capacitor $C = 0.05 \mu\text{F}$, determine the numerical value of R . (10%)

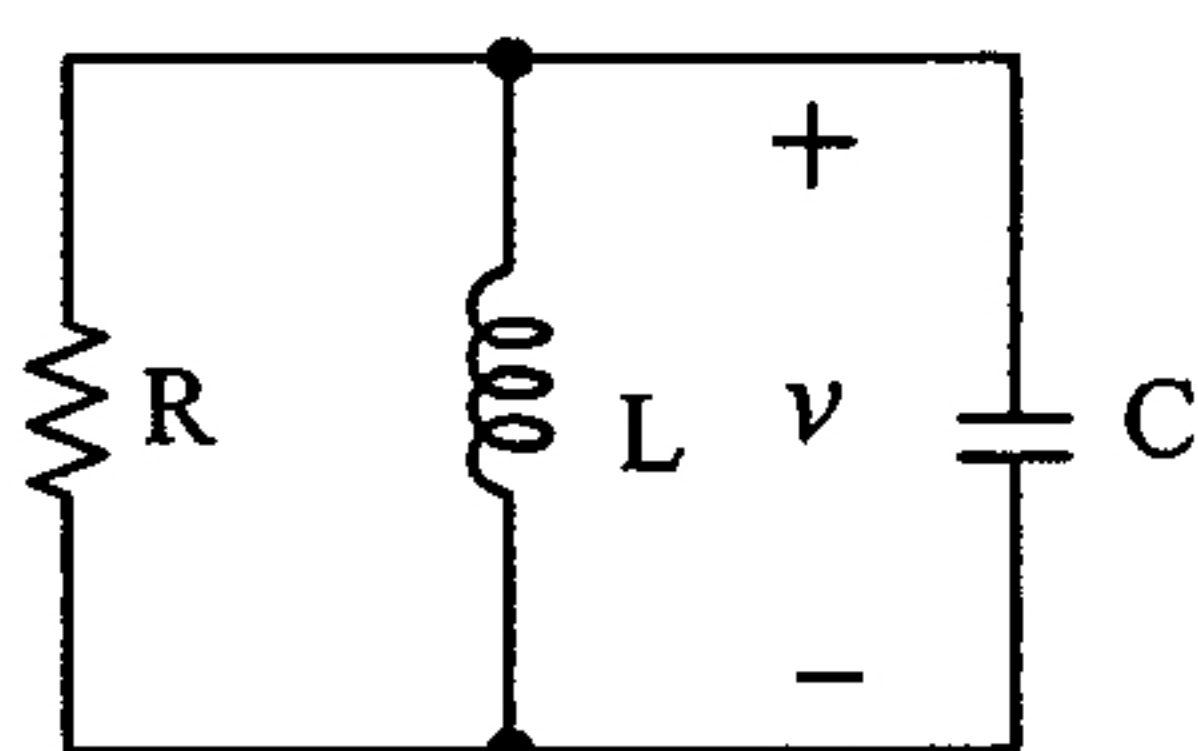


Fig. 3

4. Find the value of impedance parameter z_{21} of the two-port circuit shown in Fig. 4.
Where impedance parameters are defined as

$$\begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} \quad (10\%)$$

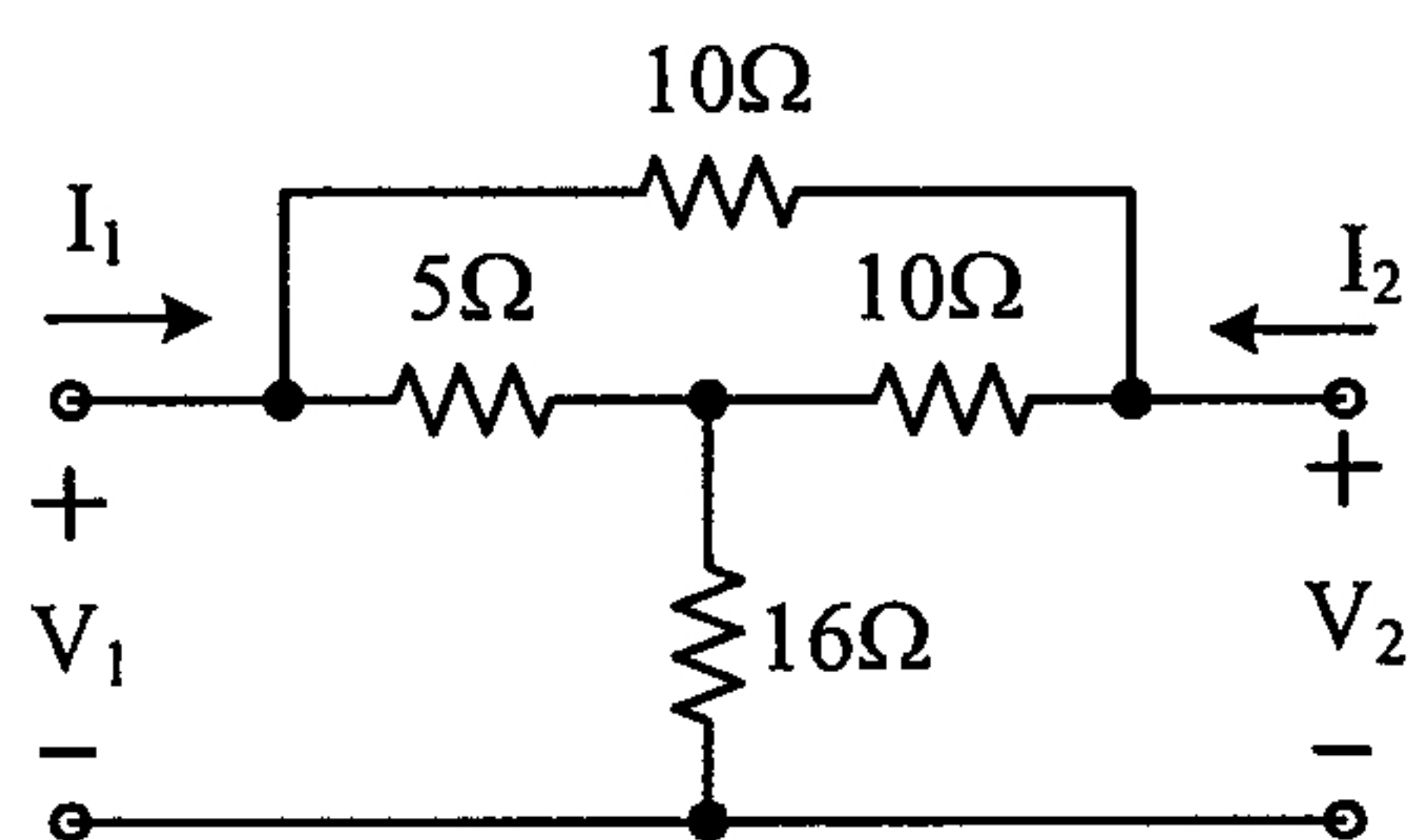


Fig. 4

5. The transformer in the circuit shown in Fig. 5 is ideal.
(a) Find the value of output voltage V_o .
(b) Find the average power associated with the voltage source. (20%)

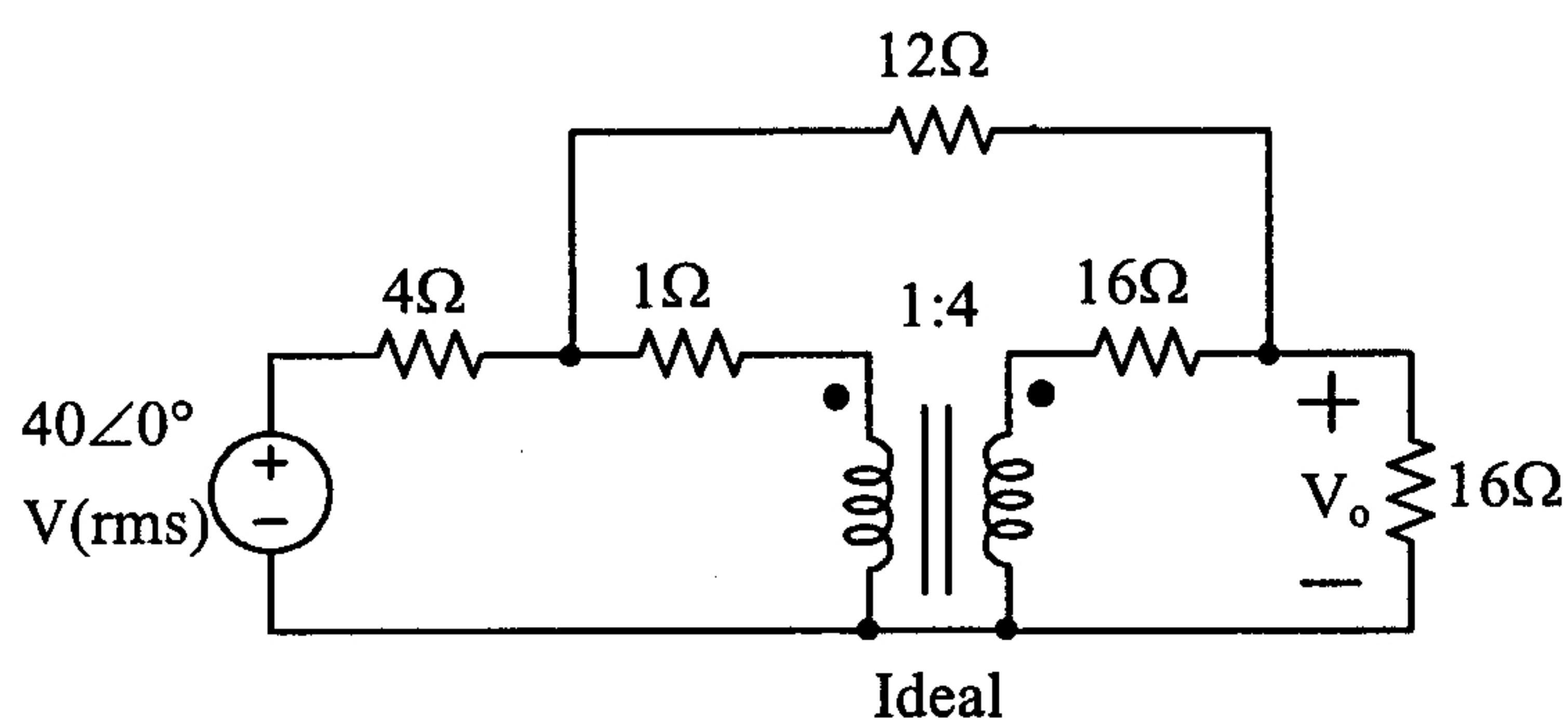


Fig. 5

試題 共 3 頁，第 3 頁

6. The OP amp in the circuit shown in Fig. 6 is ideal and operates within its linear range.
 (a) Find the numerical expression for the transfer function $H(s) = V_o(s)/V_s(s)$.
 (b) If $v_s = 0.4u(t)$ V, find $v_o(t)$. Where $u(t)$ is the unit step function. (20%)

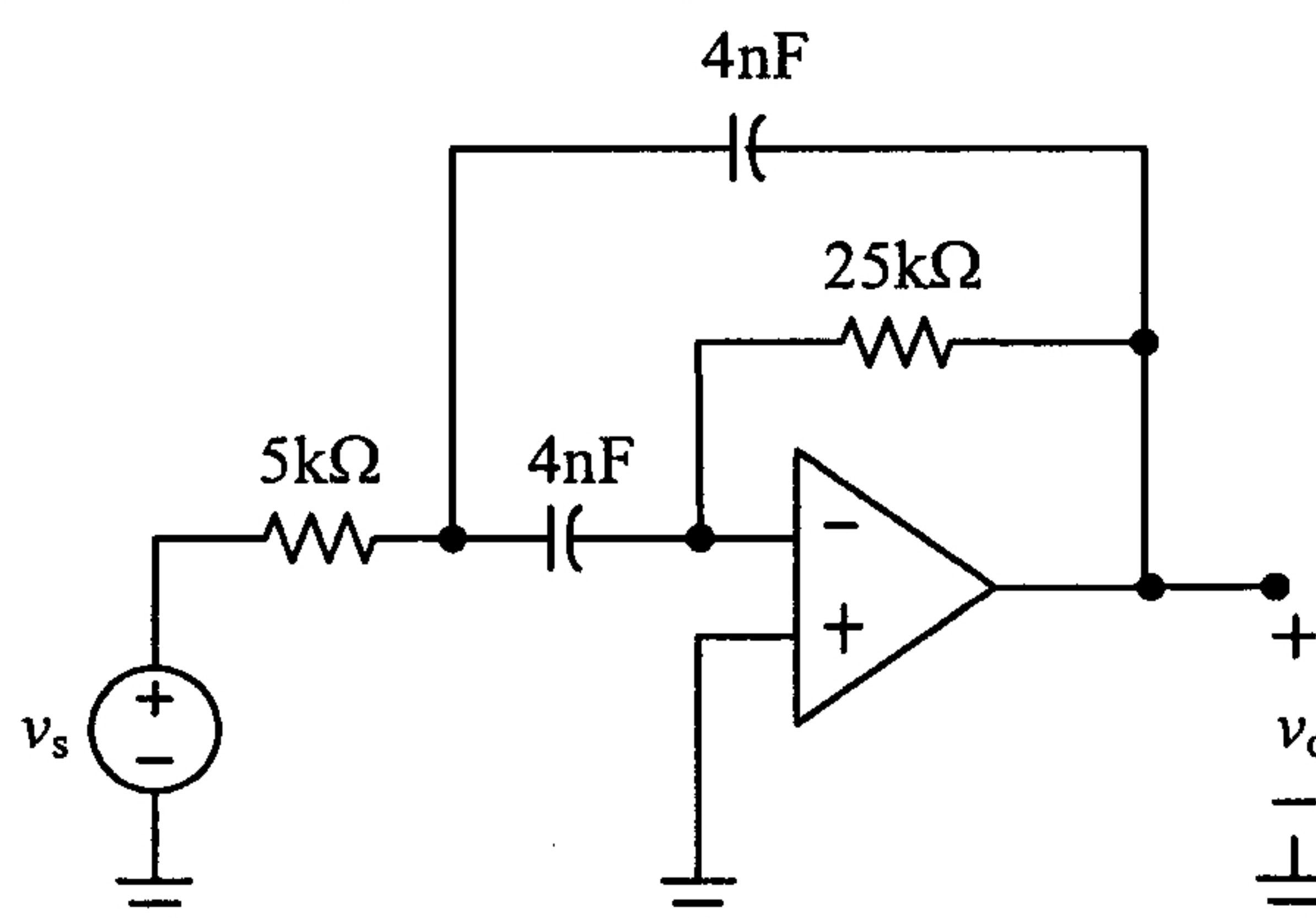


Fig. 6

7. The four circuits in Fig. 7 are passive filter constructed by RLC elements.
 (a) Which is the high-pass filter? Explain why.
 (b) Which is the band-pass filter? Explain why. (20%)

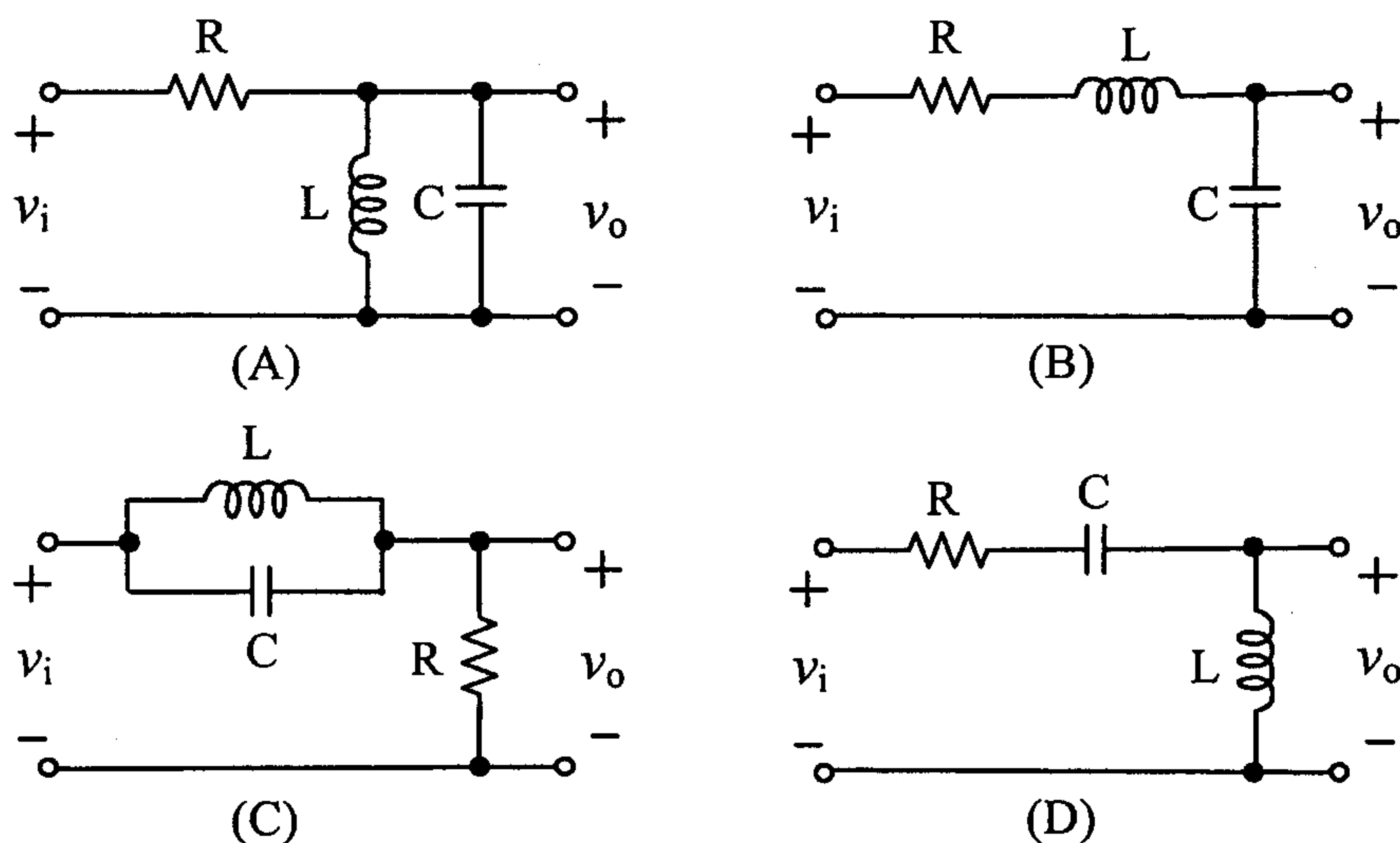


Fig. 7