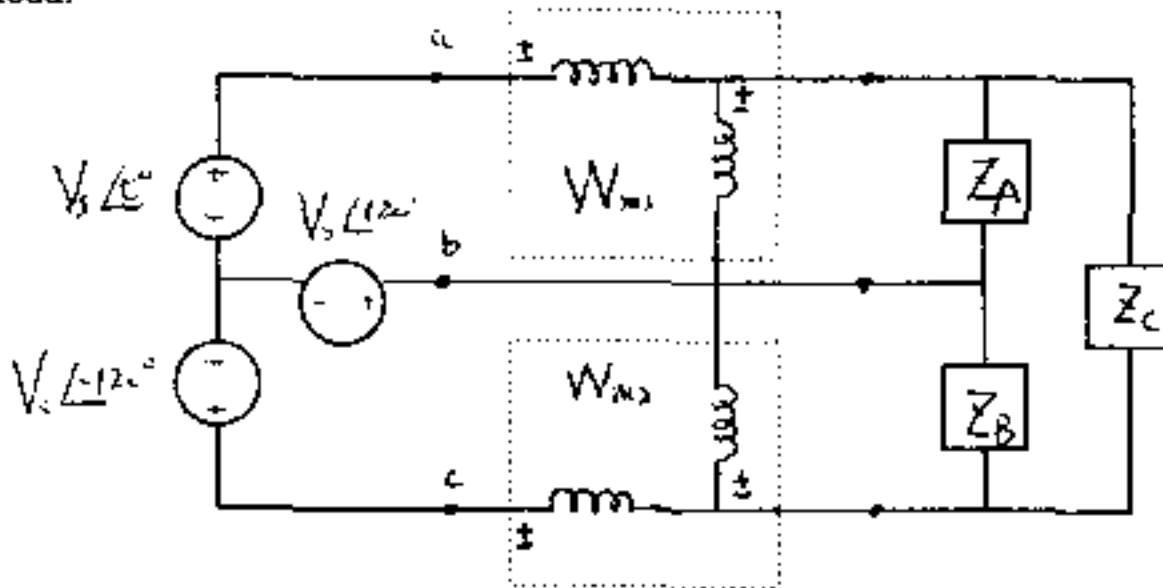


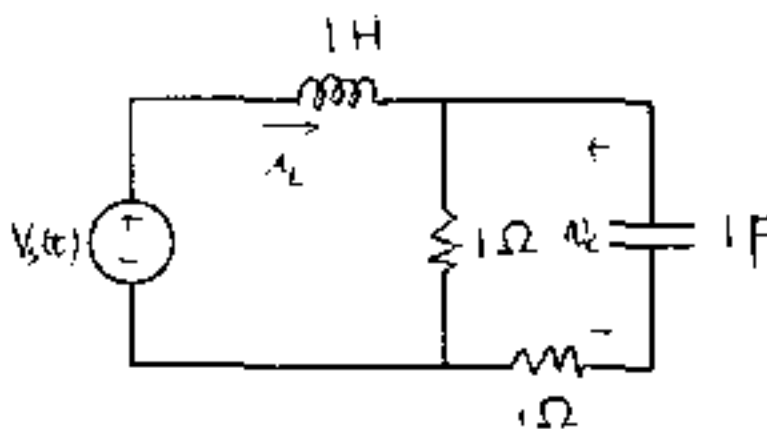
八十七學年度 電機工程系(所) 甲 組碩士班研究生入學考試

科目 電路學 科號 2902 共 3 頁第 1 頁 \*請在試卷【答案卷】內作答

1. For the circuit shown below with unbalanced three-phase load, show that the sum of the two wattmeter readings equals the total average power delivered to the unbalanced three-phase load. (15%)



2. For the circuit shown in the figure below driven by a periodic voltage source  $v_s(t)$  where  $v_s(t) = 1$  for  $0 \leq t < \pi$ , and  $v_s(t) = \sin t$  for  $\pi < t \leq 2\pi$ , and  $v_s(t+2\pi) = v_s(t)$ , find the steady-state inductor current  $i(t)$  and capacitor voltage  $v(t)$ . What's the average power supplied by the voltage source? (25%)



3. (15%) What is the value of  $Z$  that will absorb the maximum average power for the circuit shown in Fig. 3?

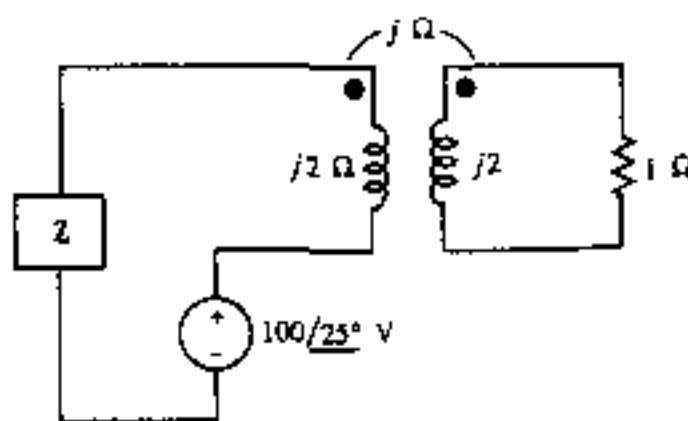


Fig 3

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科目 電路學 科號 2902 共 3 頁第 2 頁 \*請在試卷【答案卷】內作答

The following dc measurements were made on the resistive network shown in Fig. 4

Measurement 1	Measurement 2
$V_1 = 25 \text{ V}$	$V_1 = 41 \text{ V}$
$I_1 = 1 \text{ A}$	$I_1 = 1 \text{ A}$
$V_2 = 0 \text{ V}$	$V_2 = 20 \text{ V}$
$I_2 = -0.5 \text{ A}$	$I_2 = 0 \text{ A}$

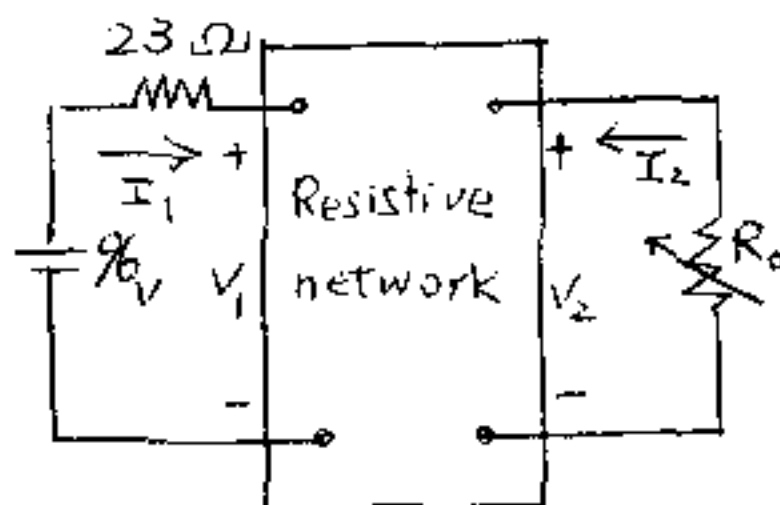


Fig. 4

A variable resistor  $R_o$  is connected across port 2 and adjusted for maximum power transfer to  $R_o$ . Find the maximum power. (20%)

5. The circuit shown in Fig. 5. represents three identical RC lowpass filters separated by buffer amplifiers.

(5%) (a) Show that the voltage transfer function of the circuit is

$$\frac{V_o}{V_s} = H(s) = H_1^3(s)$$

where

$$H_1(s) = \frac{1}{1 + sRC}$$

(5%) (b) Draw the Bode amplitude and phase plots associated with  $H(s)$

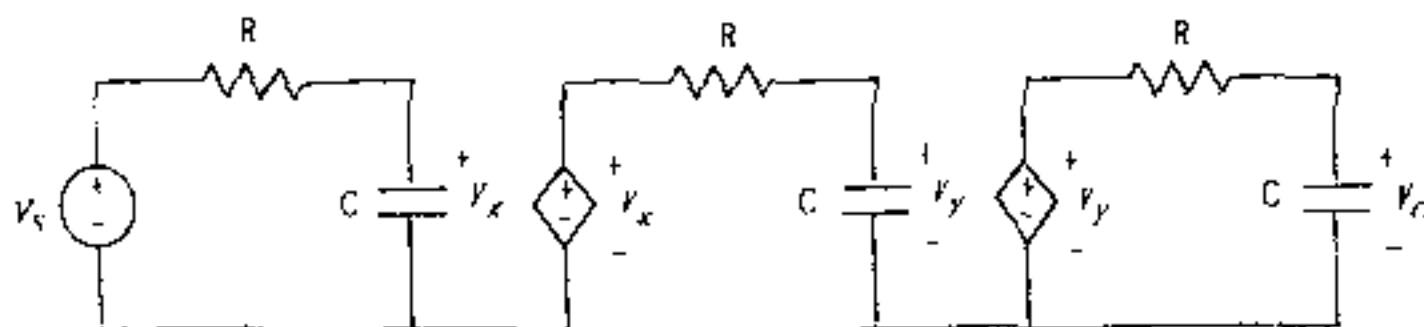


Fig 5.

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科目 電路學 科號 2902 共 3 頁第 3 頁 \*請在試卷【答案卷】內作答

6. The switch in the circuit shown in Fig. 6 has been open for a long time. The initial charge on the capacitor is zero. At  $t = 0$ , the switch is closed. Find the expression for

a)  $i(t)$  for  $t \geq 0^+$ , and (7%)

b)  $v(t)$  when  $t \geq 0^+$ . (8%)

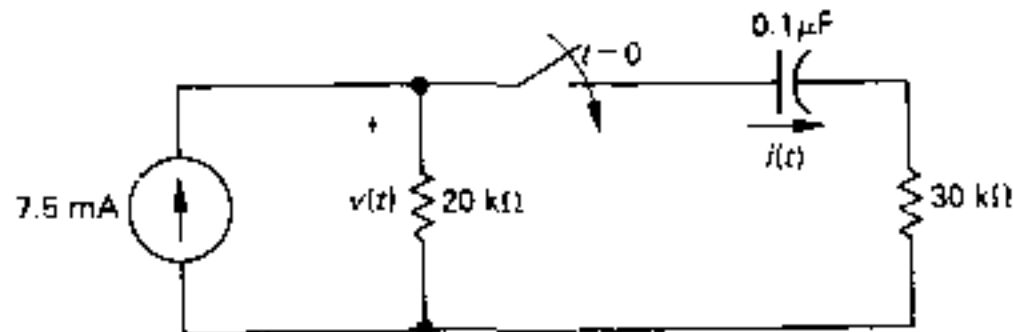


Fig. 6