

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Fig. 1 shows the configuration of two single-phase AC sources fed to three loads ( $Z_{an} = 30 + j40 \Omega$ ,  $Z_{bn} = 40 - j30 \Omega$ , and  $Z_{ba} = 9 + j12 \Omega$ ) through two properly connected wattmeters  $W_1$  and  $W_2$ . It is known that  $v_{s1}(t) = 240\sqrt{2} \cos(2\pi ft - 60^\circ) \text{ V}$ ,  $v_{s2}(t) = 240\sqrt{2} \cos(2\pi ft - 120^\circ) \text{ V}$ , and  $f = 50 \text{ Hz}$ . Determine:
- the three load currents  $i_{an}(t)$ ,  $i_{bn}(t)$ , and  $i_{ba}(t)$ ,
  - the three source currents  $i_1(t)$ ,  $i_2(t)$ , and  $i_n(t)$ ,
  - the readings of the two wattmeters, and
  - the total active power, total reactive power, total apparent power, and total power factor supplied by the two sources. (30%)

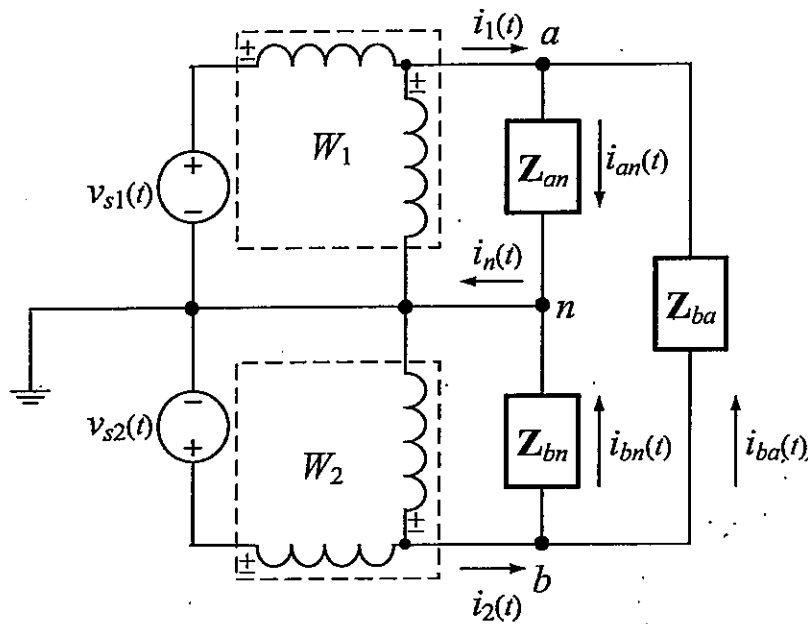


Fig. 1

2. The circuit shown in Fig. 2 has the input impedance of  $Z(s) = \frac{5000(s+1)}{(s+1+j50)(s+1-j50)}$ , where  $s = j\omega$ .

Please find the values of  $R$ ,  $L$ ,  $C$ , and  $G$ . (20%)

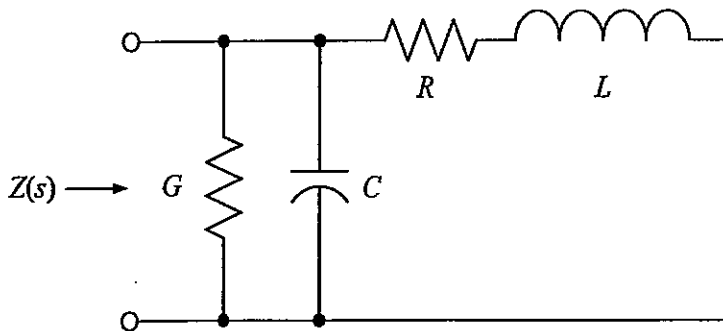


Fig. 2

3. Please calculate the equivalent resistance  $R_{eq}$  in the circuit of Fig. 3. (15%)

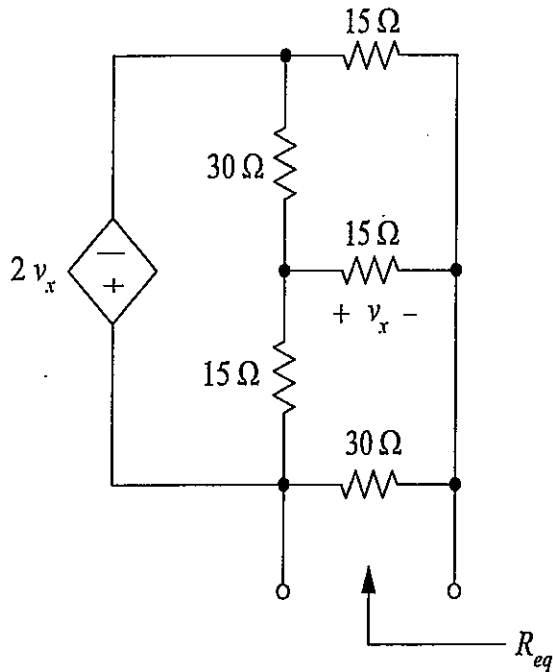


Fig. 3

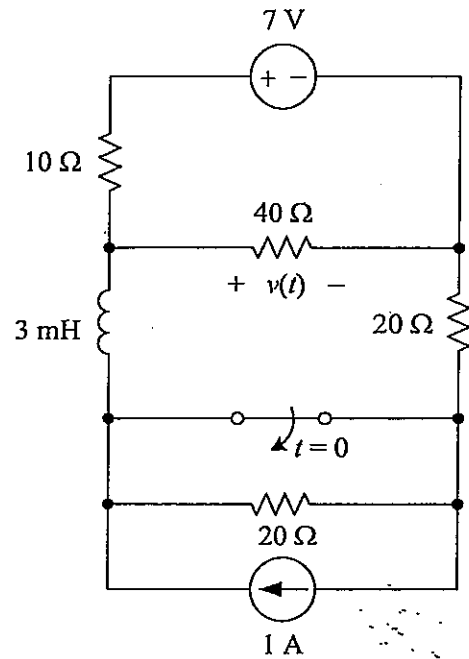


Fig. 4

4. In the circuit of Fig. 4, please find the voltage  $v(t)$  for  $t \geq 0$  s by assuming that the switch has been closed for a long time before opening at  $t = 0$  s. (15%)

5. As depicted in Fig. 5, please compute the current  $i_1$  flowing through the  $40 \Omega$  resistor. (20%)

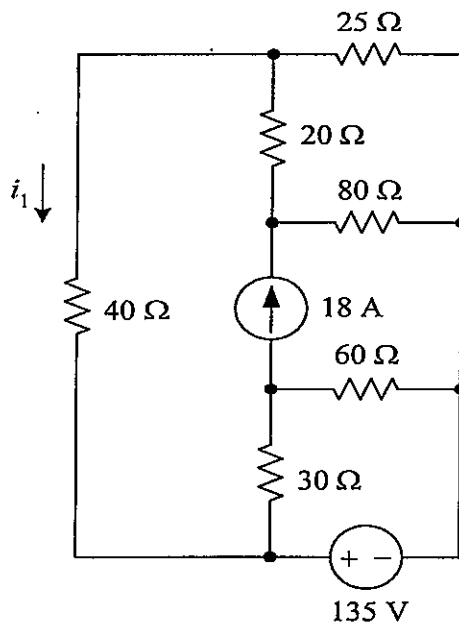


Fig. 5