

國立臺灣科技大學

九十四學年度碩士班招生考試試題

系所組別：電機工程系碩士班甲組

科目：電路學

電路學總分 100 分，共 6 題。

1. Find I_{in} , V_1 , and V_2 in Fig.P1 under dc steady-state conditions with $V_{in}=15$ V. If the total energy stored in C and L is 5 mJ with $L = 10$ mH, then what is value of capacitance C?
(15 points)

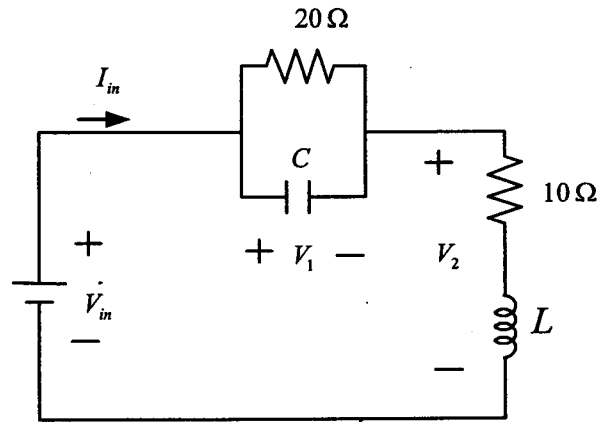


Fig.P1

2. A source is connected to a remote load by a transmission line with transformers at each end, as shown in Fig.P2. By referring the source and load into the middle section, find \hat{I}_1 , \hat{I}_2 and \hat{V}_o when $N_a = 2$, $\hat{Z}_1 = 4\Omega$, $\hat{Z}_2 = 30 + j30\Omega$, $N_b = 4$, and $\hat{Z}_o = 800 - j32\Omega$.
(15 points)

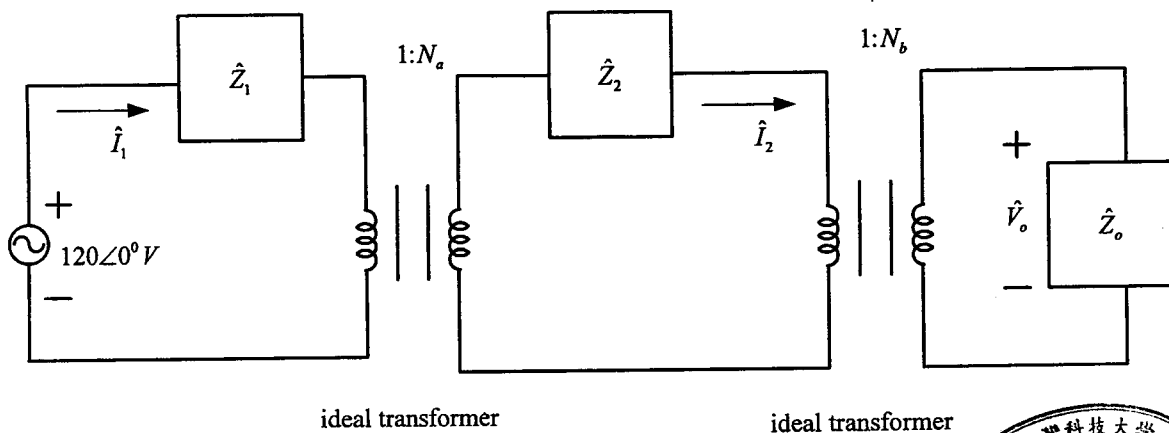


Fig.P2

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3. Let Fig.P3 have $R_1 = R_2 = 2 \text{ k}\Omega$, $L = 50 \text{ mH}$, and $C = 0.5 \mu\text{F}$. Find current $i_S(t)$, $i_1(t)$ and $i_2(t)$ for $t > 0$ when there is no initial stored energy.

(20 points)

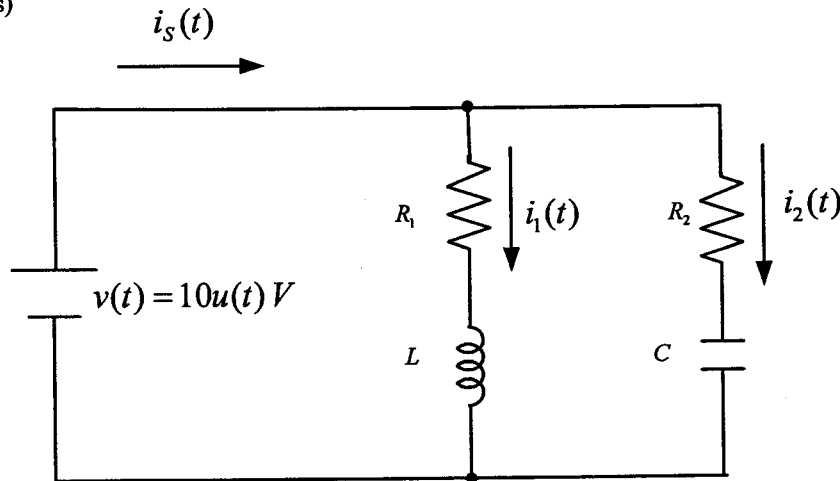


Fig.P3

4. Consider three-phase balanced system in Fig.P4 with the generator output voltage $\hat{V}_{ab} = 2600 \angle 0^\circ$ V (line-to-line, rms) and a delta-connected load. Find line current \hat{I}_a , load voltage \hat{V}_{AB} and the total real and reactive powers supplied by the generator when $\hat{Z}_l = 0 + j6 \Omega$ and $\hat{Z}_\Delta = 45 + j60 \Omega$.

(20 points)

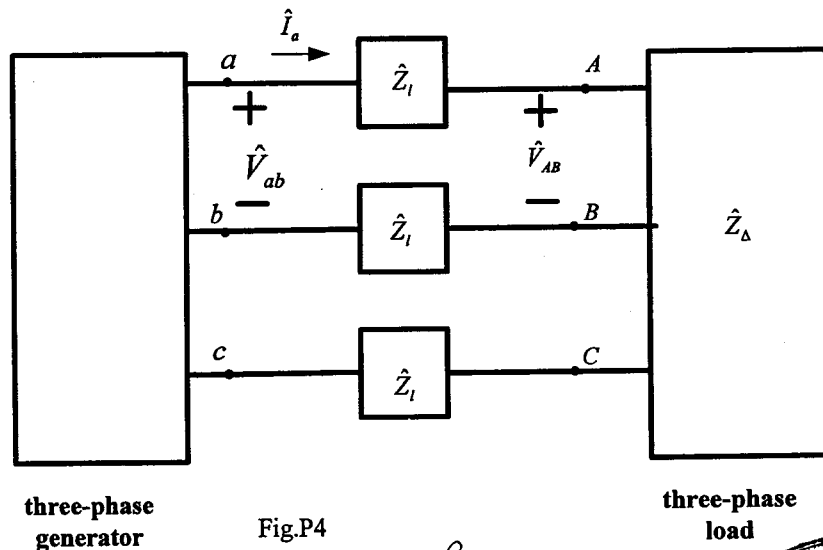


Fig.P4

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5. The two sources in Fig.P3 operate at different frequencies. Find the steady-state voltage $v_c(t)$ and $i_c(t)$. (20 points)

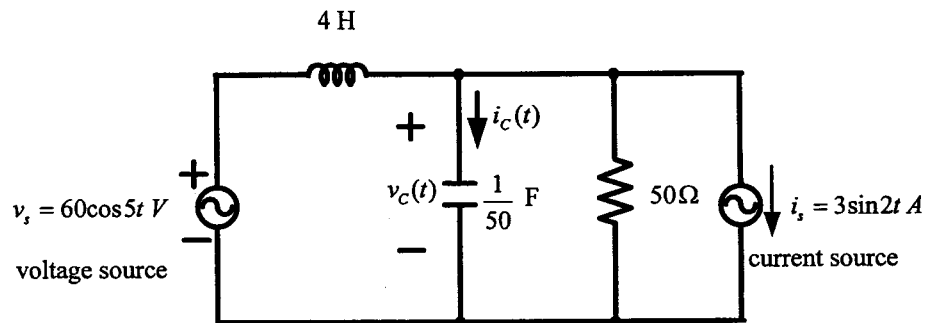


Fig.P5

6. Compute the input impedance $\hat{Z}_{in}(j\omega) = \frac{\hat{V}_{in}}{\hat{I}_{in}}$ of the ideal operational amplifier circuit of

Fig.P6. (10 points)

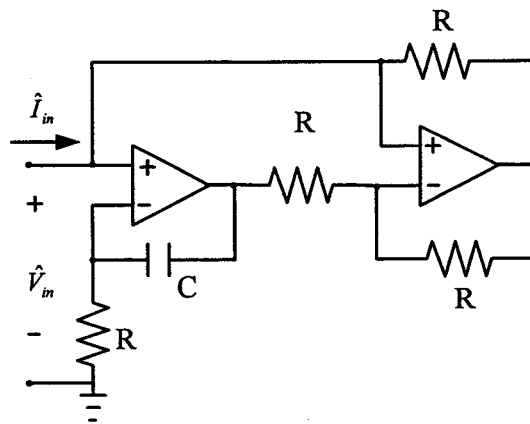


Fig.P6

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