

國立臺北科技大學九十八學年度碩士班招生考試

系所組別：1523 自動化科技研究所乙組

第二節 電路學 (選考) 試題

第一頁 共一頁

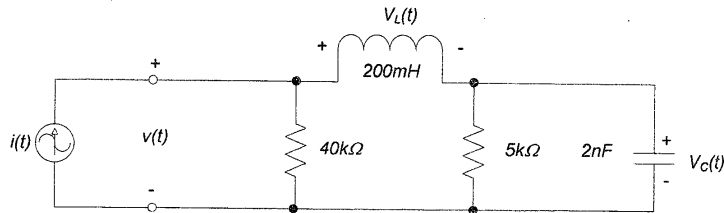
注意事項：

1. 本試題共 5 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. The current driving the ladder network shown below is

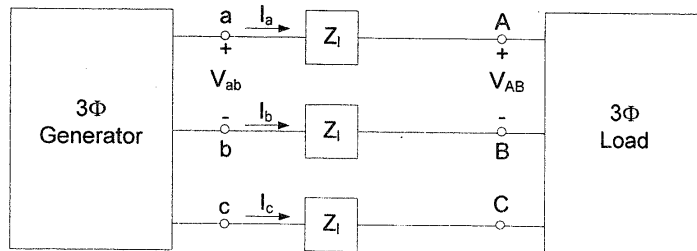
$$i(t) = 10 \cos(5000t) \text{ mA}$$

Identify the steady-state voltages $v(t)$, $v_L(t)$, and $v_C(t)$. (24%)

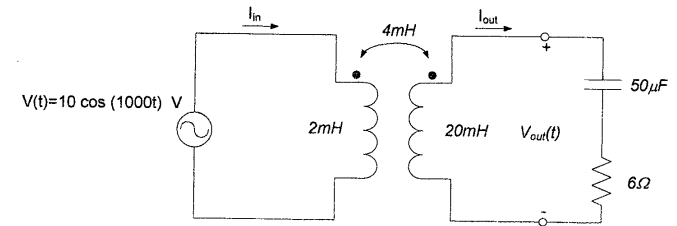


2. A three-phase transmission line connecting a generator to a load. Each phase of the line has impedance Z_l , and the load is a balanced wye with branch impedance Z .

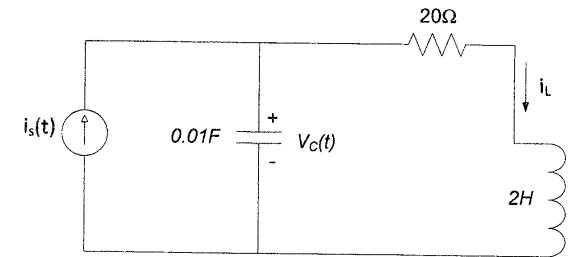
$|V_{ab}| = 45000\text{V}$, $Z_l = 0.5 + j3\Omega$, $Z = 4.5 + j9\Omega$. What is the efficiency of the system? (16%)



3. A circuit with magnetic coupling is shown below. The circuit operates under steady-state conditions. The dots show that the coils have the same winding sense. Identify I_{in} , I_{out} and V_{out} in phasor form. (24%)



4. The circuit shown below has $i_s(t) = 6\text{A}$ for all $t < 0$, and the input source is turned off at $t = 0$. Find the resulting zero-input response of i_L . (16%)



5. The two-port circuit shown below has a common ground, and v_1 and v_2 can be taken as the only node voltages. The z-parameter matrix has following form:

$$[Z] \triangleq \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix} = \begin{bmatrix} \frac{k_1 s + k_2}{k_4 s + 1} & \frac{k_1 s + k_3}{k_4 s + 1} \\ \frac{k_1 s + k_3}{k_4 s + 1} & \frac{k_1 s + k_2}{k_4 s + 1} \end{bmatrix}$$

Find the values of k_1 , k_2 , k_3 and k_4 in terms of C and R . (20%)

