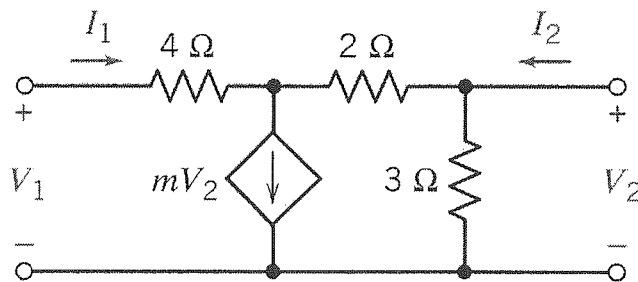


計算題(計算題應詳列計算過程，無計算過程者不予計分)

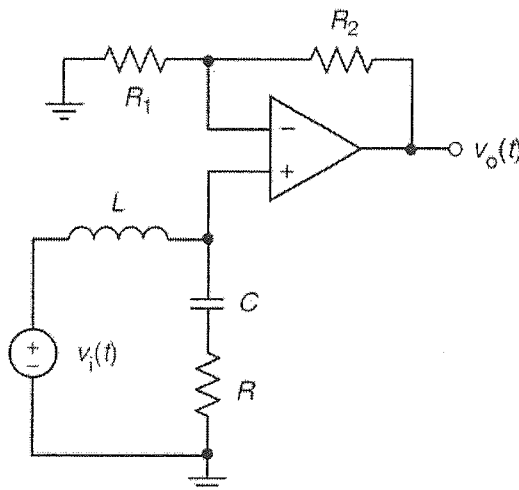
1. (20%) A balanced three-phase Y-connected generator with positive sequence has an impedance of $0.2 + j0.5$ ohm per phase and an internal voltage of 120 volt per phase. The generator feeds a balanced three-phase Y-connected load having an impedance of $39 + j28$ ohm per phase. The impedance of the line connecting the generator to the load is $0.8 + j1.5$ ohm per phase. The a-phase internal voltage of the generator is specified as the reference phasor.
 - a. (4%) Construct the a-phase equivalent circuit of the system.
 - b. (3%) Calculate the line voltage phasor V_{BC} at the terminals of the load.
 - c. (4%) Find the instantaneous power per phase and the average power per phase delivered to the Y-connected load.
 - d. (3%) Calculate the total number of magnetizing vars absorbed by the load.
 - e. (3%) Calculate the total complex power delivered by the source.
 - f. (3%) Calculate the power factor at the sending end of the line.

2. (15%) Determine the Z parameters for the circuit shown below when $m=2/3$.

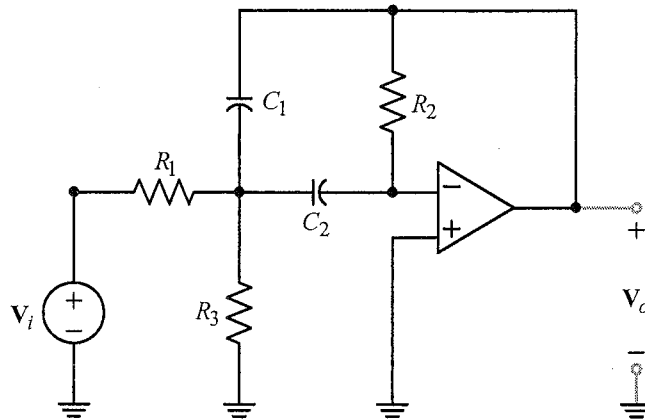


3. (15%) In the circuit below, the input and output voltages are $v_i(t)$ and $v_o(t)$, respectively. Design the circuit so that it has the step response

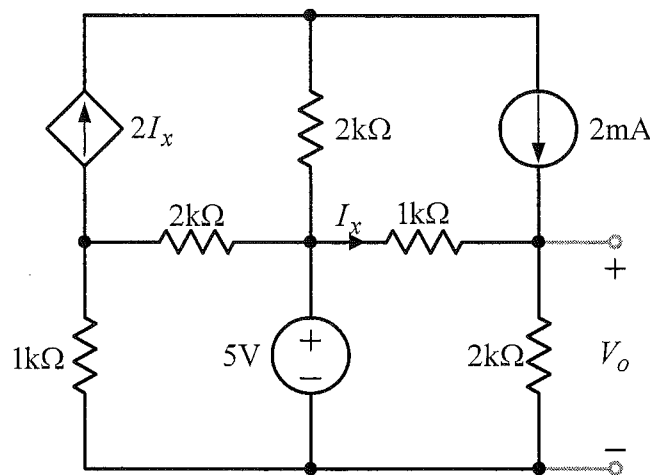
$$v_o(t) = [4 - e^{-2t} (4 \cos(4t) - 2 \sin(4t))] u(t)$$



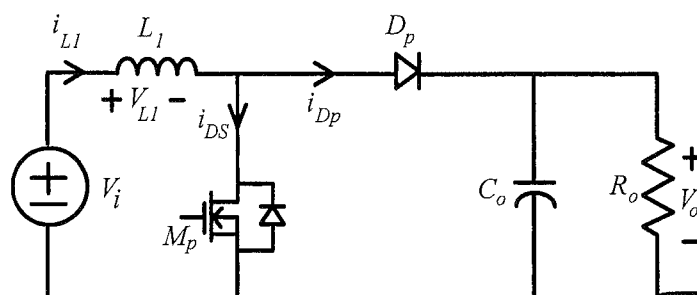
4. (15%) Given the circuit below, design a second-order band-pass filter with a center frequency gain of -5, $\omega_0 = 10$ k rad/s, and a BW = 2 k rad/s. Let $C_1 = C_2 = C$ and $R_1 = 1$ k Ω , find (a) C ; (b) R_2 ; (c) R_3 ; and (d) Q of this filter, assuming that the op-amp is ideal.



5. (15%) Use Thévenin's theorem to find V_o in the following figure.



6. (10%) Given a boost converter operated in discontinuous conduction mode, derive its input-to-output voltage transfer ratio (V_o/V_i), in terms of duty ratios d_1 and d_2 where d_1 is the M_p on-time and d_2 is the D_p on-time, and with volt-second balance principle.



注意:背面有試題

7. (10%) A forward converter is shown as follows and operated in discontinuous conduction mode. Determine:
- (A) (7%) the voltage stresses imposed on diodes D_M , D_{P2} and D_{P3} .
 - (B) (3%) the voltage stress imposed on switch M_P .

