

計算題應詳列計算過程，無計算過程者不予計分

- In a three-phase balanced delta-delta system, the source has an abc -sequence and supplies power to a delta-connected load through the transmission line. The transmission line and the load impedances are $0.5 + j0.2\Omega$ and $6 + j3\Omega$, respectively. If the load current in the delta is $I_{AB} = 10\angle 30^\circ$ Arms. Find the line voltages at the load and the phase voltages at the source. (15%)
- Find C in the circuit in Fig. 2 such that the total load has a power factor of **0.98 leading**. (15%)

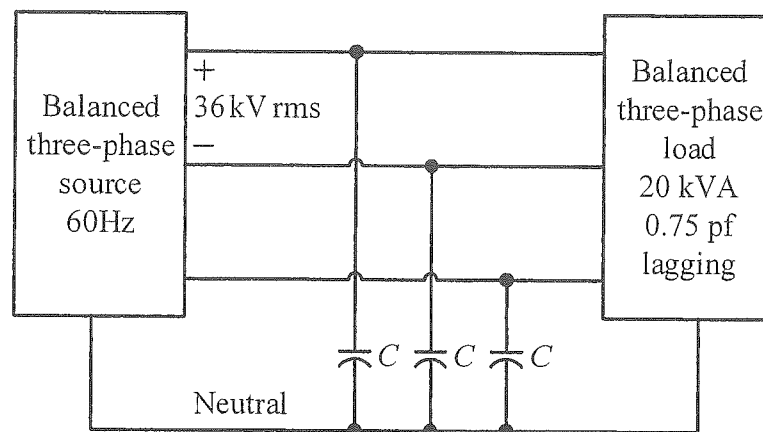
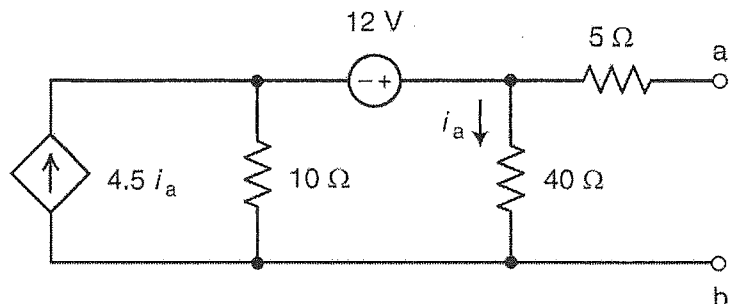


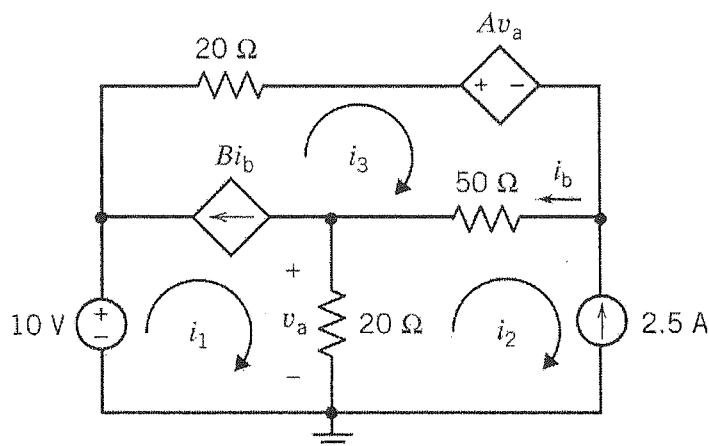
Fig. 2

- A laboratory power source employs a non-linear circuit known as a rectifier to transform the sinusoidal AC input voltage into a DC voltage. This setup assumes that the rectifier operates as an ideal switch, free from turn-on voltage thresholds and resistors. The sinusoidal input $v_{in}(t) = A \sin \omega_0 t$ comes from the wall plug, where $A = 160$ V and $\omega_0 = 377$ rad/s.
 - Find the output voltage of the rectifier $v_s(t)$. (4%)
 - Find the average value of $v_s(t)$. (4%)
 - Find the fundamental frequency of $v_s(t)$. (4%)
- Consider a linear time-invariant two-port network, its impedance matrix can be represented by $Z = \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix}$. Show the T circuit representation of this two-port network in terms of entries shown in the impedance matrix Z . (8%)

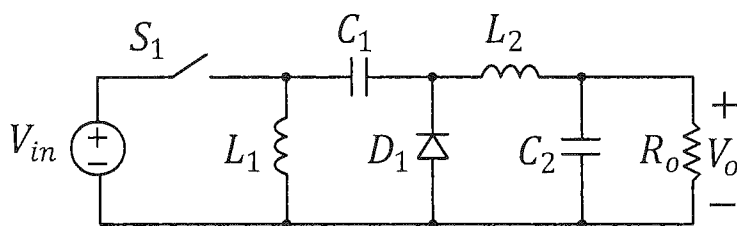
5. Determine the Thévenin equivalent circuit for the circuit below. (15%)



6. You know that the currents in the circuit below are $i_1 = -1.375$ A and $i_3 = -3.25$ A. Determine the values of A and B . (15%)



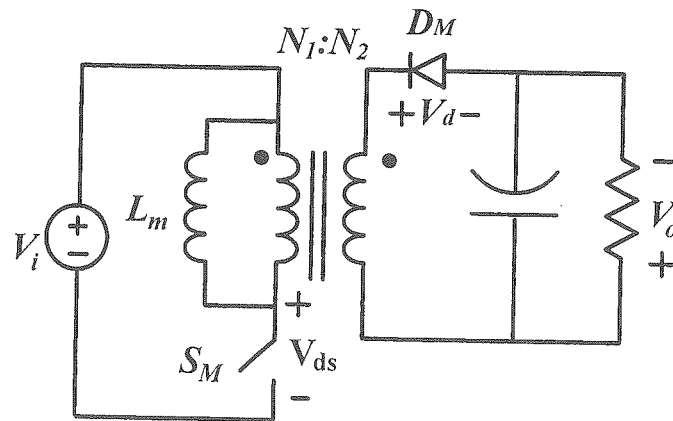
7. Given a Zeta converter which is operated in continuous conduction mode, derive its input-to-output voltage transfer ratio (V_o/V_{in}) in terms of duty ratio d with volt-second balance principle. (10%)



Zeta Converter

注意：背面有試題

8. A flyback converter with magnetizing inductance L_m is shown as follows. When it is operated in discontinuous conduction mode and with a duty ratio of d ,
- determine the voltage stresses (V_{ds} and V_d) imposed on switches S_M and D_M , (5%), and
 - determine the input-to-output voltage transfer ratio (V_o/V_i) in terms of d with volt-second balance principle. (5%)



Flyback Converter