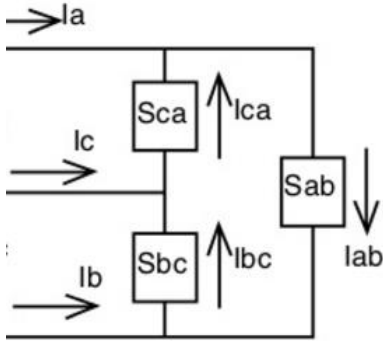


### 3-Phase Circuits – Practice Problems

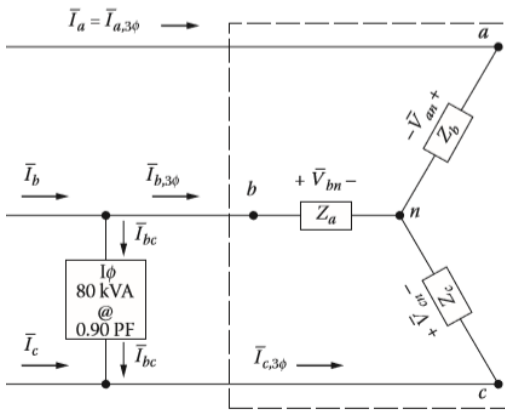
**Problem 1:** Consider the circuit below: The load be unbalanced with  $S_{ab} = 100 \text{ kVA} @ .9 \text{ PF lag}$ , and  $S_{bc} = S_{ca} = 50 \text{ kVA} @ 0.8 \text{ PF lag}$ . The voltage supply is balanced and the line voltage is  $240 \text{ V}$  (i.e., phase voltage is  $138.6 \text{ V}$ ). Compute the magnitude and phase of each source current, then determine the active and reactive power supplied by each phase of the supply.



Ans:

$$[I_{abc}] := \begin{bmatrix} 522.9 / -47.97 \\ 575.3 / -119.06 \\ 360.8 / 53.13 \end{bmatrix} \text{ A}$$

**Problem 2:** Consider the circuit below where the 3-phase load is balanced (i.e.,  $Z_a = Z_b = Z_c$ ) with a total rating of  $200 \text{ kVA} @ .8 \text{ PF lag}$ , while the single-phase load is rated at  $80 \text{ kVA} @ 0.9 \text{ PF lag}$ . The voltage at the load is balanced and equal to  $240 \text{ V}$  (line-to-line). Compute the magnitude and phase of each source current, then determine the active and reactive power supplied by each phase of the supply.



Ans:

$$I_a = 481.7 \angle -36.9^\circ \text{ A}$$

$$I_b = 765.05 \angle 219.7^\circ \text{ A}$$

$$I_c = 198.5 \angle -63.8^\circ \text{ A}$$