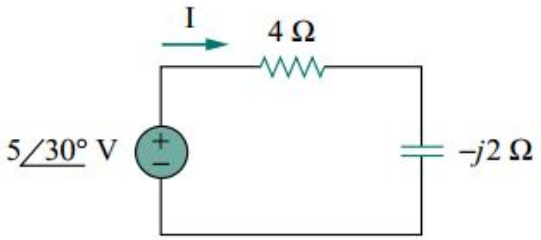
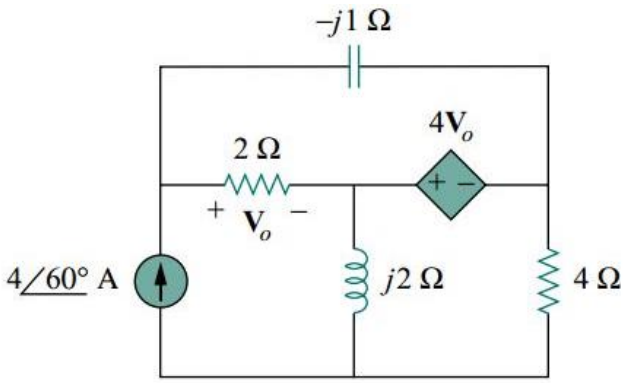
SHEET NO (10)

Q1) Calculate the instantaneous power and average power if v(t) = 80 cos(10t + 20◦) V and i(t) = 15 sin(10t + 60◦) A.

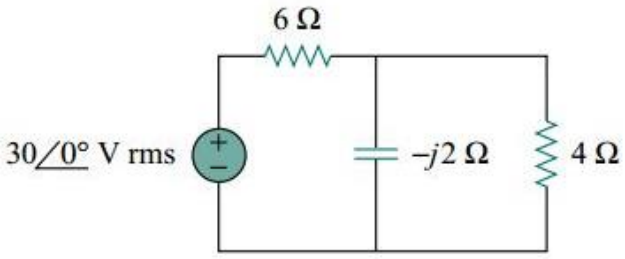
Q2) For the circuit shown find the average power supplied by the source and the average power absorbed by the resistor.



Q3) Compute the average power absorbed by the 4-Ω resistor in the circuit shown below.



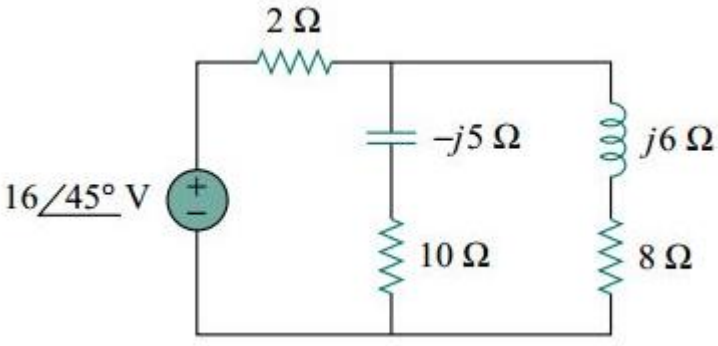
Q7) Determine the power factor of the entire circuit by the source. Calculate the average power delivered by the source.



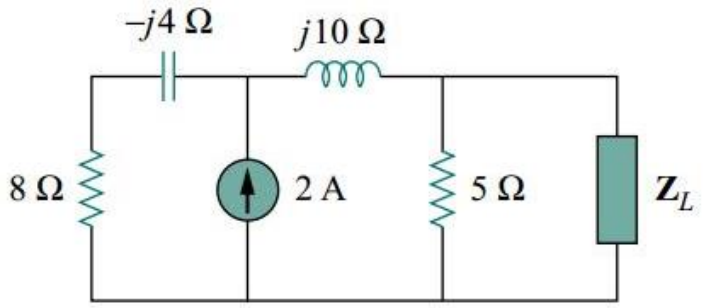
Q8) For a load, Vrms = 110 ‹85◦ V, Irms = 0.4 ‹15◦ A. Determine: (a) the complex and apparent powers, (b) the real and reactive powers, and (c)the power factor and the load impedance.

Q9) For the circuit shown calculate: -

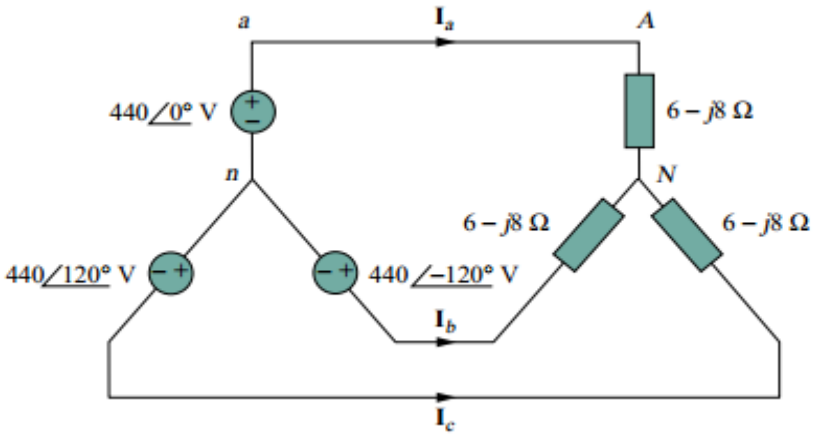
(a) the power factor
(b) the average power delivered by the source
(c) the reactive power
(d) the apparent power
(e) the complex power



Q10) For the circuit shown find the load impedance ZL that absorbs the maximum average power. And calculate that maximum average power.



Q11) For the circuits shown fellow, Find The line currents.



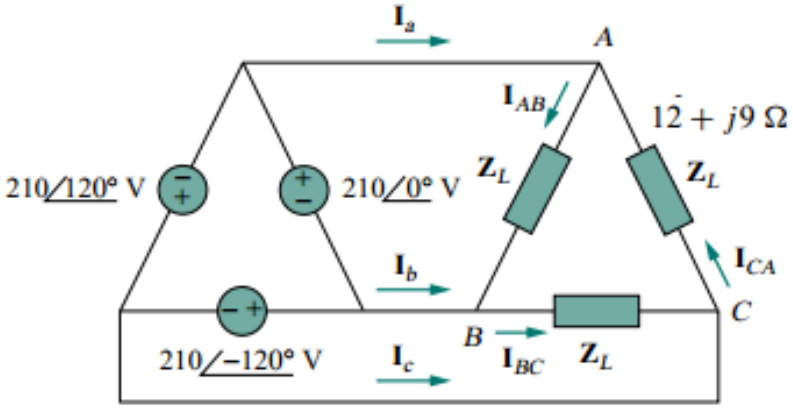


TABLE 12.1 Summary of phase and line voltages/currents for balanced three-phase systems[1].

Connection	Phase voltages/currents	Line voltages/currents
Y-Y	$\mathbf{V}_{an} = V_p \angle 0°$	$\mathbf{V}_{ab} = \sqrt{3}V_p \angle 30°$
	$\mathbf{V}_{bn} = V_p \angle -120°$	$\mathbf{V}_{bc} = \mathbf{V}_{ab} \angle -120°$
	$\mathbf{V}_{cn} = V_p \angle +120°$	$\mathbf{V}_{ca} = \mathbf{V}_{ab} \angle +120°$
	Same as line currents	$\mathbf{I}_a = \mathbf{V}_{an}/\mathbf{Z}_Y$
		$\mathbf{I}_b = \mathbf{I}_a \angle -120°$
		$\mathbf{I}_c = \mathbf{I}_a \angle +120°$
Y-Δ	$\mathbf{V}_{an} = V_p \angle 0°$	$\mathbf{V}_{ab} = \mathbf{V}_{AB} = \sqrt{3}V_p \angle 30°$
	$\mathbf{V}_{bn} = V_p \angle -120°$	$\mathbf{V}_{bc} = \mathbf{V}_{BC} = \mathbf{V}_{ab} \angle -120°$
	$\mathbf{V}_{cn} = V_p \angle +120°$	$\mathbf{V}_{ca} = \mathbf{V}_{CA} = \mathbf{V}_{ab} \angle +120°$
	$\mathbf{I}_{AB} = \mathbf{V}_{AB}/\mathbf{Z}_\Delta$	$\mathbf{I}_a = \mathbf{I}_{AB}\sqrt{3} \angle -30°$
	$\mathbf{I}_{BC} = \mathbf{V}_{BC}/\mathbf{Z}_\Delta$	$\mathbf{I}_b = \mathbf{I}_a \angle -120°$
	$\mathbf{I}_{CA} = \mathbf{V}_{CA}/\mathbf{Z}_\Delta$	$\mathbf{I}_c = \mathbf{I}_a \angle +120°$

[1] *Positive or abc sequence is assumed.*

TABLE 12.1 (*continued*)

Connection	Phase voltages/currents	Line voltages/currents
Δ-Δ	$\mathbf{V}_{ab} = V_p \angle 0°$	Same as phase voltages
	$\mathbf{V}_{bc} = V_p \angle -120°$	
	$\mathbf{V}_{ca} = V_p \angle +120°$	
	$\mathbf{I}_{AB} = \mathbf{V}_{ab}/\mathbf{Z}_\Delta$	$\mathbf{I}_a = \mathbf{I}_{AB}\sqrt{3} \angle -30°$
	$\mathbf{I}_{BC} = \mathbf{V}_{bc}/\mathbf{Z}_\Delta$	$\mathbf{I}_b = \mathbf{I}_a \angle -120°$
	$\mathbf{I}_{CA} = \mathbf{V}_{ca}/\mathbf{Z}_\Delta$	$\mathbf{I}_c = \mathbf{I}_a \angle +120°$
Δ-Y	$\mathbf{V}_{ab} = V_p \angle 0°$	Same as phase voltages
	$\mathbf{V}_{bc} = V_p \angle -120°$	
	$\mathbf{V}_{ca} = V_p \angle +120°$	
	Same as line currents	$\mathbf{I}_a = \dfrac{V_p \angle -30°}{\sqrt{3}\mathbf{Z}_Y}$
		$\mathbf{I}_b = \mathbf{I}_a \angle -120°$
		$\mathbf{I}_c = \mathbf{I}_a \angle +120°$