Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014

COURSE NAME	:	ELECTRICAL PRINCIPLES II
COURSE CODE	:	DAR 11103
PROGRAMME	:	1 DAR
EXAMINATION DATE	:	JUNE 2014
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE(5)** QUESTIONS ONLY

THIS PAPER CONSISTS OF **NINE (9)** PAGES

Q1 (a) Determine the nodal voltages $\mathbf{V_1}$ and $\mathbf{V_2}$ for the networks of Figure Q1(a).

(10 marks)

(b) Using the Δ-Y or Y-Δ conversion, determine the current **I** for the network of Figure Q1(b).

(10 marks)

Q2 (a) Using superposition, determine the current through the inductance X_L for the network of Figure Q2(a).

(10 marks)

(b) For the network of Figure Q2(b):

(i) Determine the Norton equivalent circuit for the network external to the impedance X_L.

(6 marks)

(ii) Using the results of Q2(b)(i), determine the current *i* of the same figure.

(4 marks)

Q3 For the system of Figure Q3:

(a) Determine the total average power ($\mathbf{P_T}$), total reactive power ($\mathbf{Q_T}$), total apparent power ($\mathbf{S_T}$).

(6 marks)

(b) Calculate the power factor (F_P).

(4 marks)

(c) Draw the power triangle.

(6 marks)

(d) Calculate current $\mathbf{I_S}$.

(4 marks)

Q4 For the network of Figure Q4:

(a) Calculate resonance frequency (f_P).

(4 marks)

(b) Calculate the magnitude of voltage $\mathbf{V}_C$ at resonance (f_P).

(7 marks)

(c) Determine the power absorbed (P) at resonance.

(3 marks)

(d) Determine the the bandwidth (BW).

(6 marks)

Q5 For the transformer of Figure Q5:

(a) Determine the total reflected primary impedance ($\mathbf{Z}_P$).

(8 marks)

(b) Calculate the primary current ($\mathbf{I}_P$).

(3 marks)

(c) Determine the:

(i) voltage across impedance R_e ($\mathbf{V}_{Re}$).

(3 marks)

(ii) voltage across impedance X_e ($\mathbf{V}_{Xe}$).

(3 marks)

(iii) voltage across reflected load ($\mathbf{V}_{XL}$).

(3 marks)

Q6 The phase sequence for the Y-Y system of Figure Q6 is ABC.

(a) Identify the angles θ_2 and θ_3 for the specified phase sequence.

(2 marks)

(b) Determine the voltage across each phase impedance in phasor form.

(3 marks)

(c) Calculate the current through each phase impedance in phasor form.

(9 marks)

(d) Calculate the magnitude of the line currents (I_L).

(3 marks)

(e) Determine the magnitude of the line voltages (V_L).

(3 marks)

Q7 The lighting and motor loads of a small factory establish a 10 kVA power demand at a 0.7 lagging power factor on a 208 V, 60 Hz supply.

(a) Establish the power triangle for the load.

(6 marks)

(b) Determine the power-factor capacitor that must be placed in parallel with the load to raise the power factor to 0.9.

(10 marks)

(c) Determine the change in supply current from the uncompensated to the compensated system.

(4 marks)

- END OF QUESTION -

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FORMULA

Δ-Y and Y-Δ Conversion

$$Z_1 = \frac{Z_B Z_C}{Z_A + Z_B + Z_C}$$

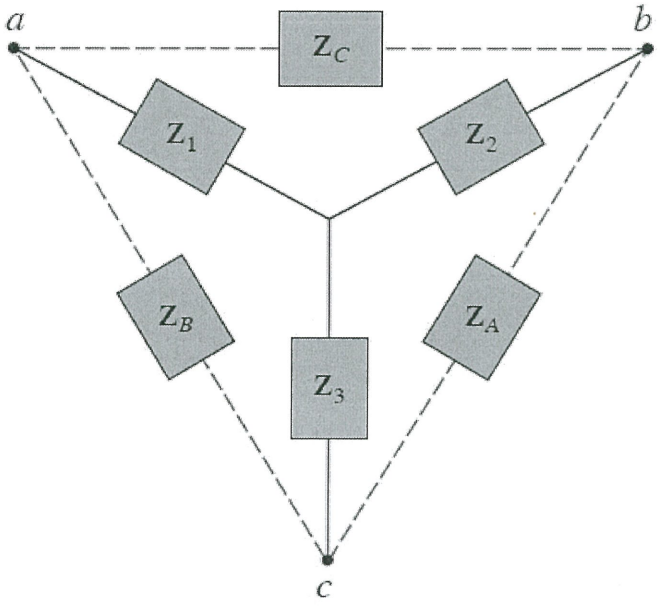
$$Z_2 = \frac{Z_A Z_C}{Z_A + Z_B + Z_C}$$

$$Z_3 = \frac{Z_A Z_B}{Z_A + Z_B + Z_C}$$

$$Z_B = \frac{Z_1 Z_2 + Z_1 Z_3 + Z_2 Z_3}{Z_2}$$

$$Z_A = \frac{Z_1 Z_2 + Z_1 Z_3 + Z_2 Z_3}{Z_1}$$

$$Z_C = \frac{Z_1 Z_2 + Z_1 Z_3 + Z_2 Z_3}{Z_3}$$



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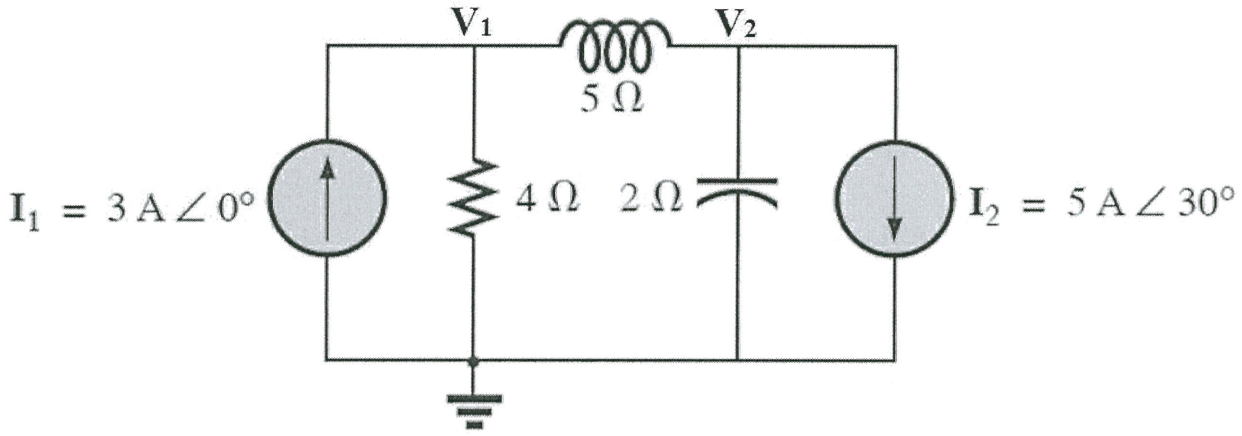

FIGURE Q1(a)

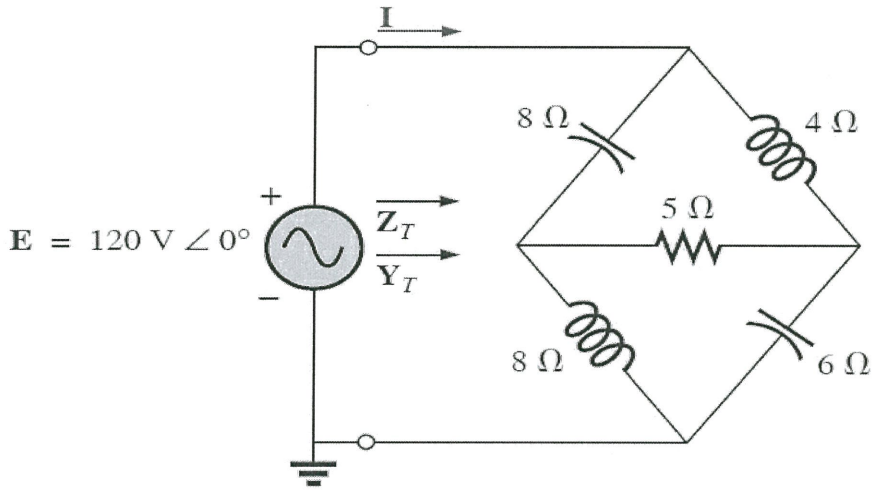

FIGURE Q1(b)

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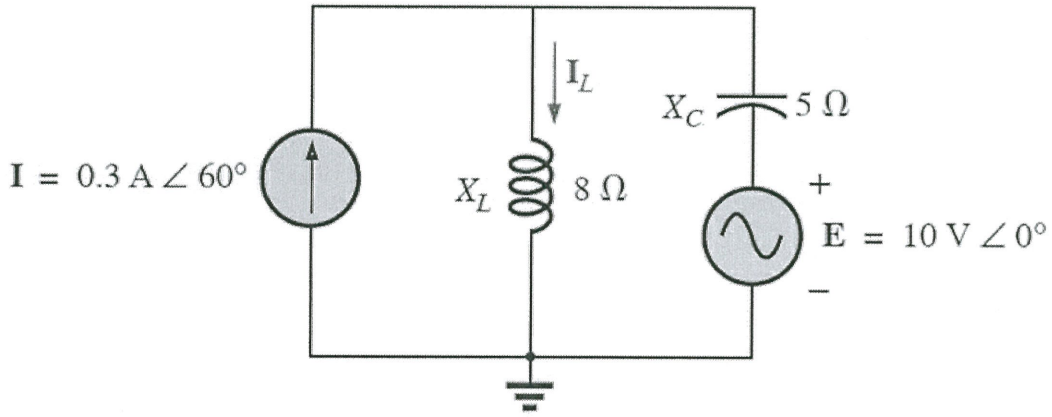

FIGURE Q2(a)

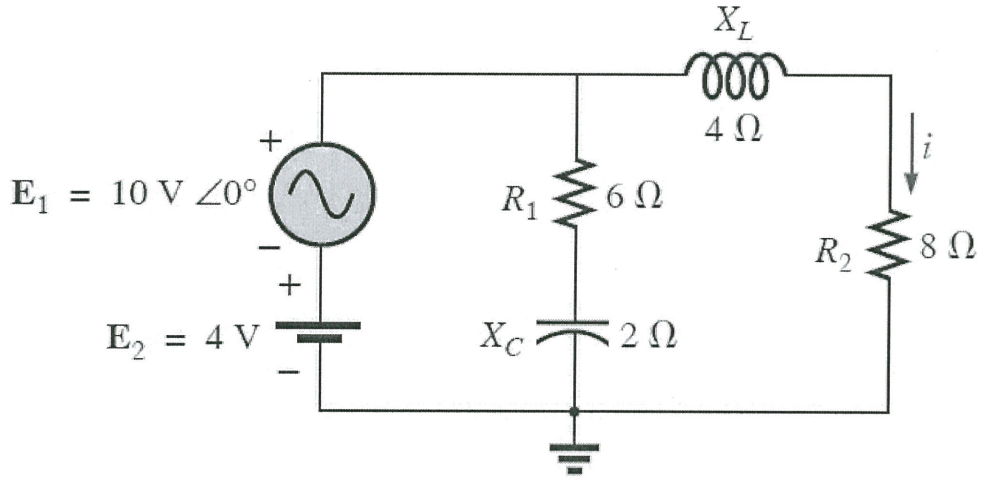

FIGURE Q2(b)

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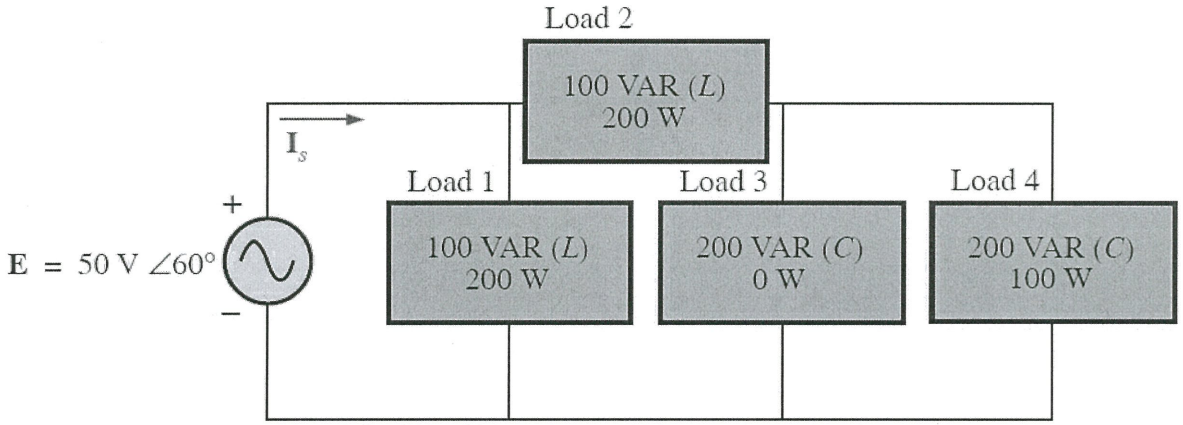

FIGURE Q3

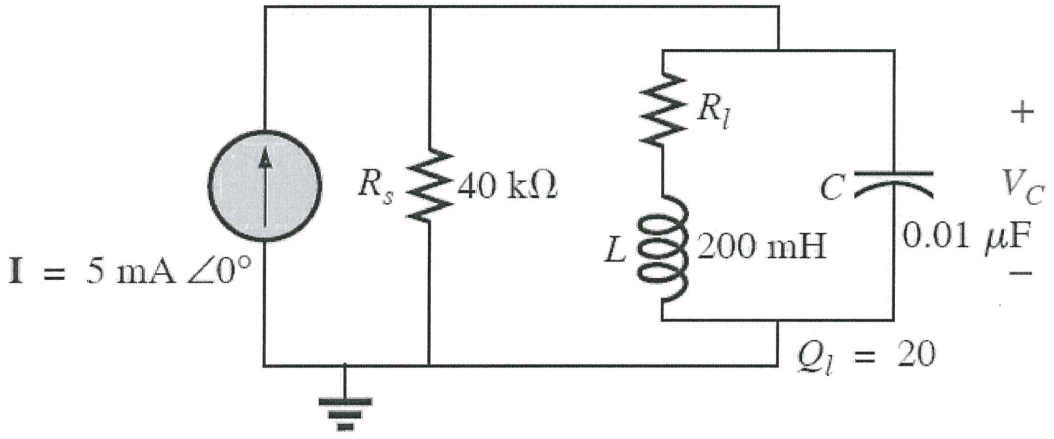

FIGURE Q4

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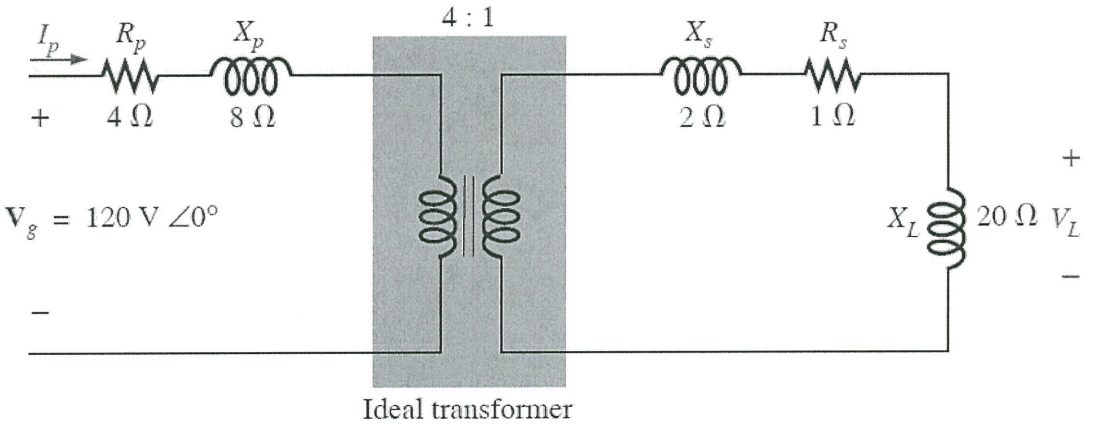

FIGURE Q5

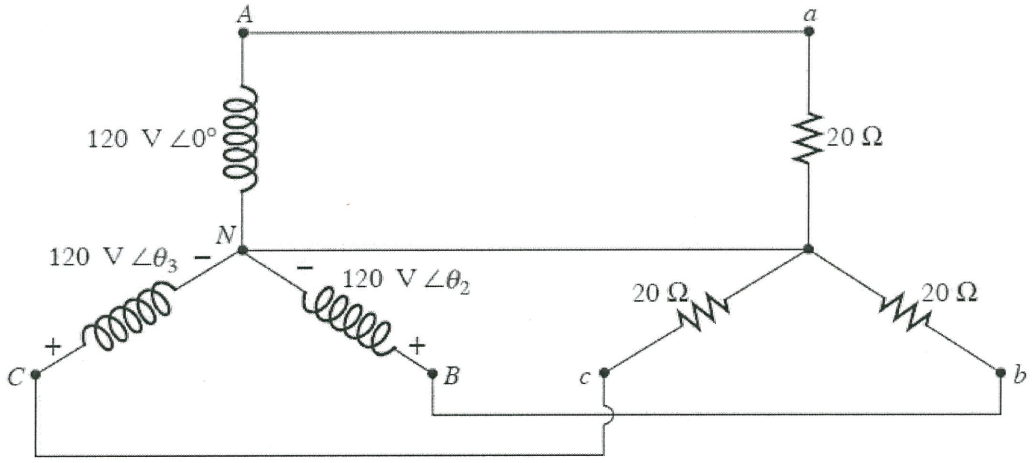

FIGURE Q6