UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	ELECTRICAL PRINCIPLES II
COURSE CODE	:	DAR 11103
PROGRAMME	:	1 DAR
EXAMINATION DATE	:	JUNE/ JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE(5)** QUESTIONS ONLY

THIS PAPER CONSISTS OF **TEN (10)** PAGES

Q1   (a)   For the network of **Figure Q1(a)**:

   (i)   Calculate current I_1 using the current divider rule.   (4 marks)

   (ii)   Repeat **Q1(a)(i)** for current I_2.   (4 marks)

   (iii)   Verify Kirchhoff's current law at one node.   (2 marks)

   (b)   For the network of **Figure Q1(b)**:

   (i)   Calculate the voltage V_C using the voltage divider rule.   (4 marks)

   (ii)   Calculate the current source I_S.   (6 marks)

Q2   (a)   For the circuit of **Figure Q2(a)**:

   (i)   Write the mesh equations for the network.   (4 marks)

   (ii)   Determine the current I_2.   (6 marks)

   (b)   For the circuit of **Figure Q2(b)**:

   (i)   Write the nodal equations for the network.   (4 marks)

   (ii)   Determine the voltage V_1.   (6 marks)

Q3   (a)   Determine the Thévenin equivalent circuit for the portions of the networks of **Figure Q3(a)** external to the elements between points a and a'.

   (10 marks)

   (b)   For the circuits of **Figure Q3(b)**, determine the Norton equivalent circuit for the network external to the 6 Ω resistor.

   (10 marks)

Q4   For the network of **Figure Q4**:

(a)   Determine the average power, reactive power, apparent power and power factor for each branch.

(8 marks)

(b)   Determine the total number of average power, reactive power, apparent power and power factor of the system.

(8 marks)

(c)   Sketch the power triangle.

(2 marks)

(d)   Calculate the source current I_S.

(2 marks)

Q5   For the series circuit of **Figure Q5**:

(a)   Determine the current I at resonance.

(4 marks)

(b)   Determine the voltages V_R, V_L, and V_C at resonance.

(6 marks)

(c)   Determine the quality factor Q_S of the circuit.

(2 marks)

(d)   If the resonant frequency is 5 kHz, determine the bandwidth.

(4 marks)

(e)   Calculate the power dissipated in the circuit at the half-power frequencies?

(4 marks)

Q6 (a) The source impedance for the supply in **Figure Q6(a)** is 512 Ω , which is a poor match with the 8 Ω input impedance of the speaker. You can expect only that the power delivered to the speaker will be significantly less than the maximum possible level. Determine the power to the speaker under the conditions in **Figure Q6(a)**.

(5 marks)

(b) In **Figure Q6(b)**, an audio impedance matching transformer was introduced between the speaker and the source, and it was designed to ensure maximum power to the 8 Ω speaker. Determine the input impedance of the transformer and the power delivered to the speaker.

(10 marks)

(c) Compare the power delivered to the speaker under the conditions of parts (a) and (b).

(5 marks)

Q7 The phase sequence for the Y-Y system of **Figure Q7** is ABC.

(a) Find the angles θ_2 and θ_3 for the specified phase sequence. (4 marks)

(b) Find the voltage across each phase impedance in phasor form. (6 marks)

(c) Calculate the current through each phase impedance in phasor form. (6 marks)

(d) Find the magnitude of the line currents. (2 marks)

(e) Calculate the magnitude of the line voltages. (2 marks)

- END OF QUESTION -

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SEMESTER / SESSION: SEM II/ 2015/2016   PROGRAMME: 1 DAR
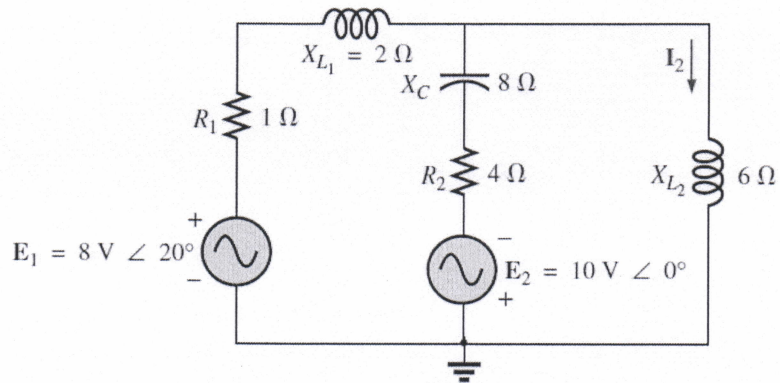COURSE: ELECTRICAL PRINCIPLES II   COURSE CODE: DAR 11103

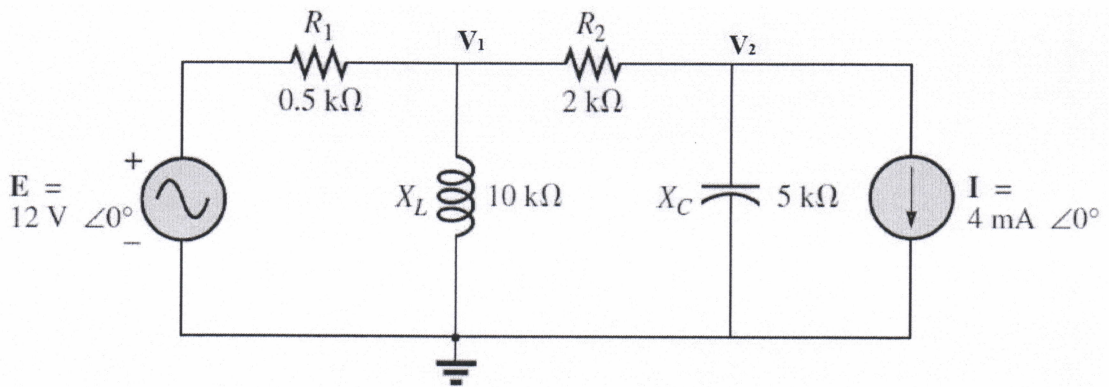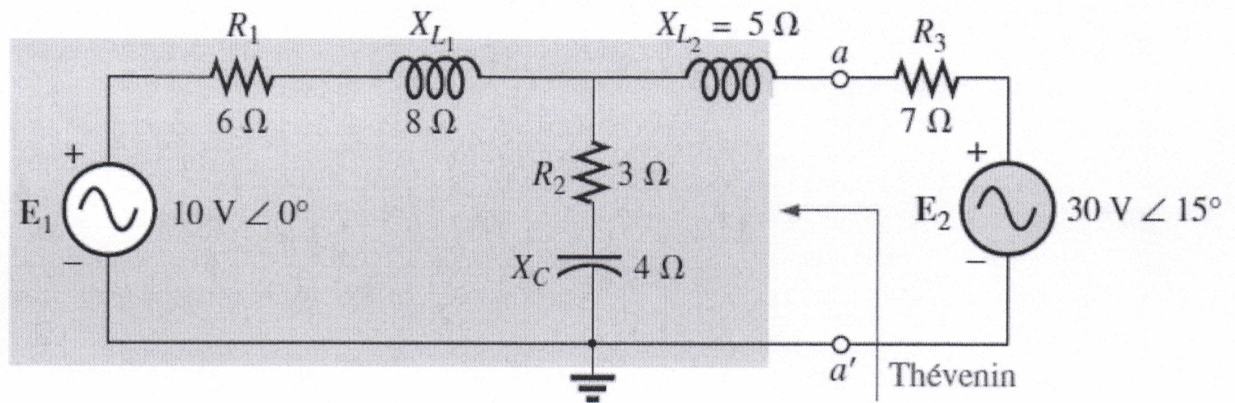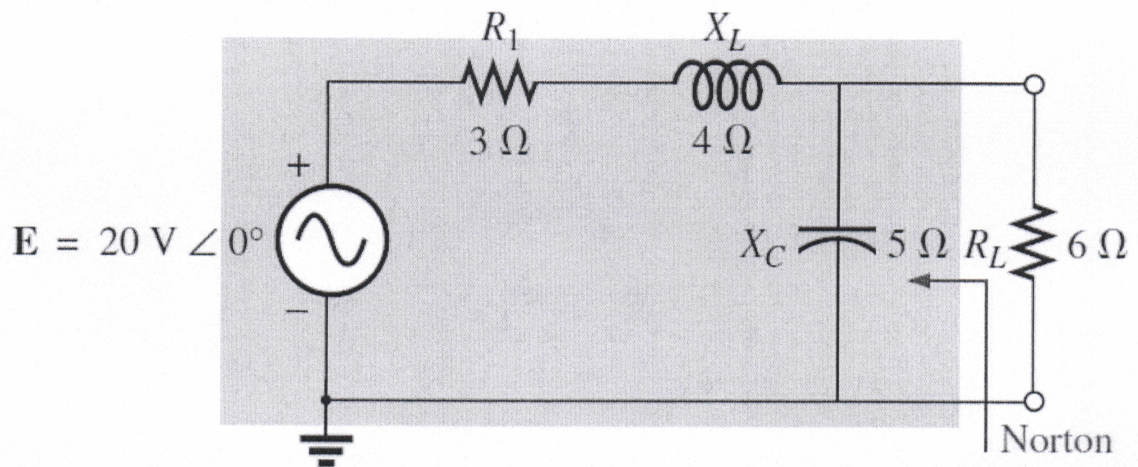**FIGURE Q2(a)**

FIGURE Q2(b)

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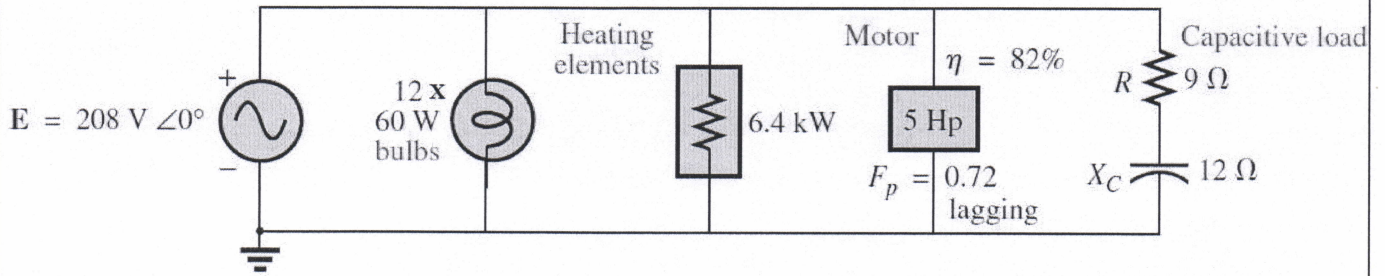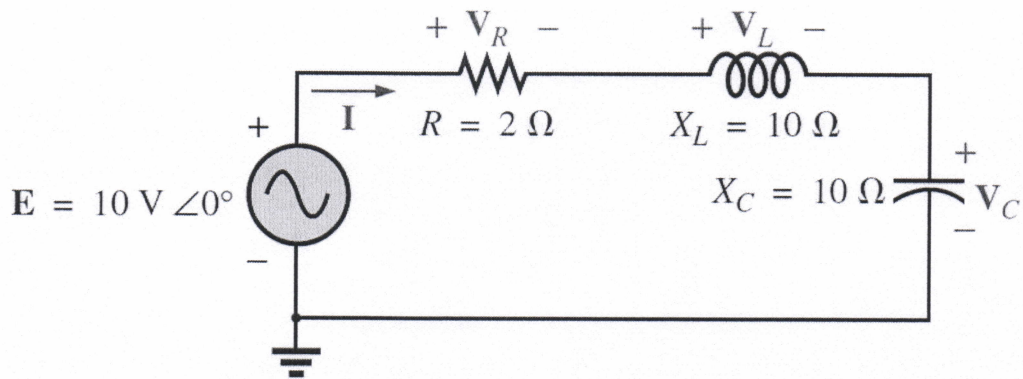COURSE: ELECTRICAL PRINCIPLES II   COURSE CODE: DAR 11103

FIGURE Q3(a)

FIGURE Q3(b)

FINAL EXAMINATION

SEMESTER / SESSION: SEM II/ 2015/2016   PROGRAMME: 1 DAR
COURSE: ELECTRICAL PRINCIPLES II   COURSE CODE: DAR 11103
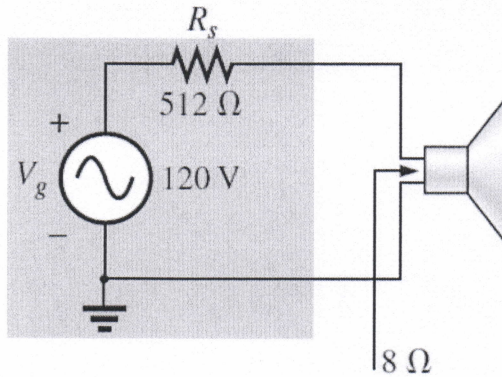

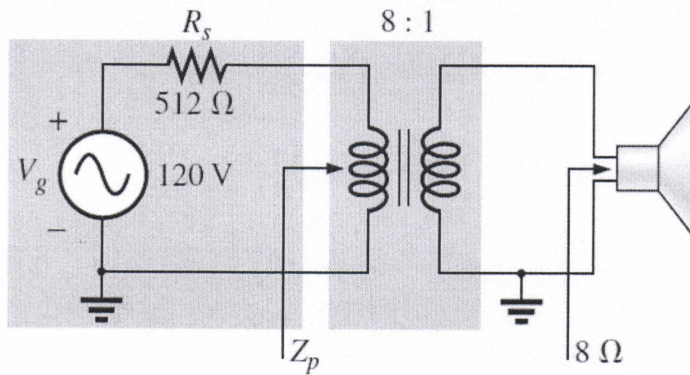
FIGURE Q4

FIGURE Q5

FINAL EXAMINATION

SEMESTER / SESSION: SEM II/ 2015/2016   PROGRAMME: 1 DAR
COURSE: ELECTRICAL PRINCIPLES II   COURSE CODE: DAR 11103

FIGURE Q6(a)

FIGURE Q6(b)

FIGURE Q7