



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
SEPTEMBER 2016 SEMESTER

COURSE CODE : LEB 10503
COURSE NAME : ELECTRIC CIRCUITS
PROGRAMME NAME : BACHELOR OF ENGINEERING TECHNOLOGY (HONS)
(FOR MPU: PROGRAMME LEVEL) IN MARINE ELECTRICAL & ELECTRONIC
DATE : 20TH JANUARY 2017
TIME : 9.00 AM – 12.00 PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
 2. This question paper has information printed on both sides of the paper.
 3. Answer FOUR (4) questions ONLY.
 4. Please write your answers on the answer booklet provided.
 5. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 6. Answer all questions in English language ONLY.
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THERE ARE 6 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

INSTRUCTION: Answer only FOUR questions.

Please use the answer booklet provided.

Question 1 (CLO2)

- (a) Analyze the circuit in Figure 1 to determine the value of I_o by using mesh analysis. Determine the power dissipated at 8Ω and 2Ω resistors.

(13 marks)

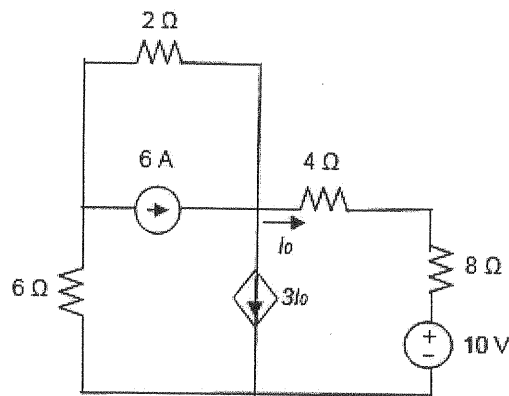


Figure 1

- (b) Analyze the circuit shown in Figure 2 to determine the Thevenin equivalent at a-b terminal. Calculate the maximum power transfer by the circuit.

(12 marks)

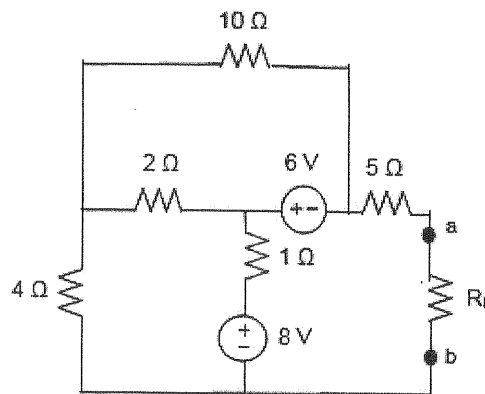


Figure 2

Question 2 (CLO2)

- (a) Calculate the power factor of the entire circuit of Figure 3 as seen by the source. What is the average power supplied by the source?

(7 marks)

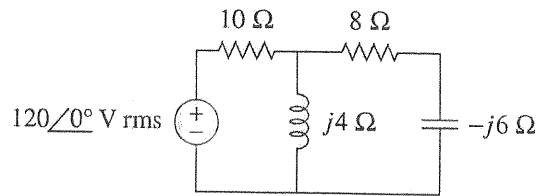


Figure 3

- (b) Two loads connected in parallel are respectively 2 kW at a pf of 0.75 leading and 4 kW at a pf of 0.95 lagging. Calculate the pf of the two loads. Find the complex power supplied by the source.

(18 marks)

Question 3 (CLO2)

(a) Solve for $V_o(t)$ in the circuit of Figure 4 using the superposition principle.

(18 marks)

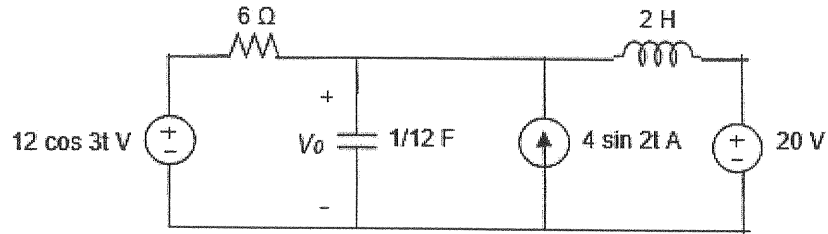


Figure 4

(b) Using source transformation, find i_o in the circuit of Figure 5.

(7 marks)

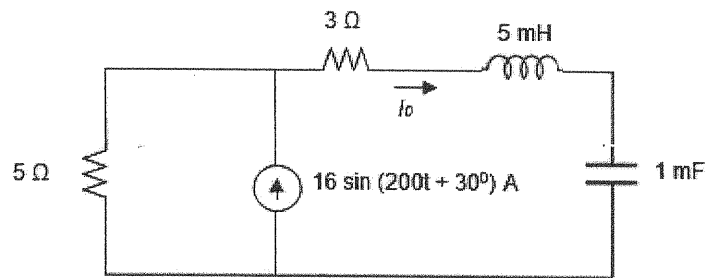


Figure 5

Question 4 (CLO2)

(a) Calculate the value of I_o in the circuit of Figure 6.

(10 marks)

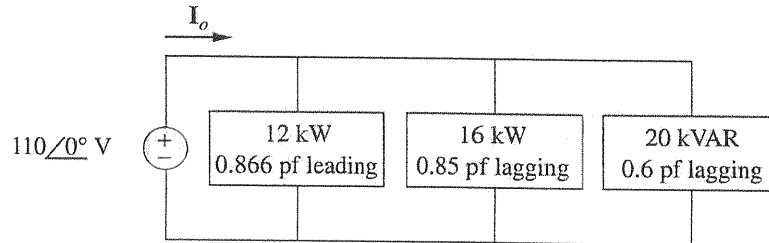


Figure 6

(b) A 240-V rms 60-Hz source supplies two loads connected in parallel, as shown in Figure 7.

i. Find the power factor of the parallel combination.

(11 marks)

ii. Calculate the value of the capacitance connected in parallel that will raise the power factor to unity.

(4 marks)

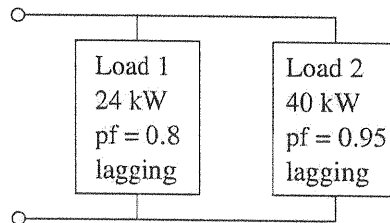


Figure 7

Question 5 (CLO2)

- (a) Assume that the two balanced loads in Figure 8 are supplied by an 840- V rms and 60-Hz line. Load 1 is Y-connected with $30 + j40 \Omega$ per phase, while load 2 is a balanced three-phase motor drawing 48 kW at a power factor of 0.8 lagging. Assuming the *abc* sequence, calculate:
- i. The complex power absorbed by the combined load (11 marks)
 - ii. The kVAR rating of each of the three capacitors Δ -connected in parallel with the load to raise the power factor to unity (3 marks)
 - iii. The current drawn from the supply at unity power factor condition (1 mark)

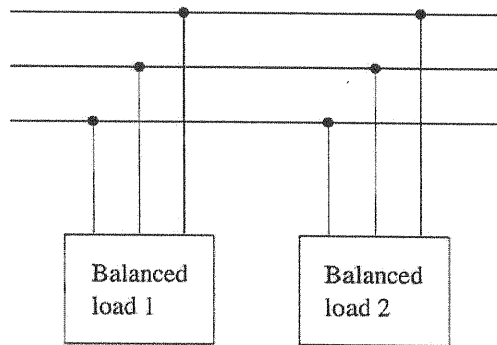


Figure 8

- (b) A balanced delta-connected source has phase voltage $V_{ab} = 440 \angle 30^\circ \text{V}$ and a positive phase sequence. If this is connected to a balance delta-connected load, find the line and phase currents. Take the load impedance per phase a $60 \angle 30^\circ \Omega$ and line impedance per phase as $1 + j1 \Omega$. (10 marks)

END OF QUESTIONS