Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	ELECTRIC CIRCUIT ANALYSIS II
COURSE CODE	:	BEF 12503
PROGRAMME CODE	:	BEV
EXAMINATION DATE	:	JUNE / JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) Define the basic of capacitor and inductor elements in electrical circuit. Describe the definitions with a proper figure and equations.

(8 marks)

(b) A 24V DC supply is connected to a passives element in the circuit as shown in **Figure Q1(b)**,

(i) determine the current i_T and i_L,

(4 marks)

(ii) determine the voltage across 10Ω resistor,

(2 marks)

(iii) determine the energy stored in the capacitor and the inductor.,

(4 marks)

(iv) conclude the relationship of the energy stored in capacitor and the inductor based on the results obtained in **Q1(b)(iii)**.

(2 marks)

Q2 (a) **Figure Q2(a)** shows a capacitor, C= 0.5μF is being charged through a 10kΩ resistor from a 100V DC source.

(i) Rewrite an expression of the current, i_C the capacitor voltage, V_C and the resistor voltage, V_R when switch S is changed from A to B.

(6 marks)

(ii) Calculate the current flowing and the current drop rate at $t=0^+$.

(4 marks)

(iii) Determine the capacitor voltage rise rate and the resistor voltage drop rate at $t=0^+$.

(4 marks)

(iv) Analyze the energy stored by the capacitor when it is fully charged.

(2 marks)

(v) Based on the results in **Q2(a)(i)**, describe an expression of i_C, V_C and V_R when switch S is changed from B to C.

(4 marks)

Q3 (a) A series circuit consists of 50 Ω resistor, an inductor of 0.5 H, and a capacitor of 250μF are connected to a 240 V, 50 Hz single-phase supply.

(i) Sketch the phasor domain circuit.

(4 marks)

(ii) Calculate the impedance, Z of the circuit.

(3 marks)

(iii) Analyze the voltage source, Vs, voltage drop across resistor V_R, V_L and V_C of the circuit.

(8 marks)

(iv) Construct the phase angle of the circuit.

(3 marks)

(v) Conclude the relationship of phasor current and the voltage supply based on the result obtained in **Q3(a)(iv)**.

(2 marks)

Q4 (a) A single-phase sinusoidal AC voltage supply is defined as $v_s(t) = 10 \sin(1000t)$ as shown in **Figure Q4(a)** connected to the linear circuit.

(i) Find the complex impedance of the inductor and the capacitor.

(2 marks)

(ii) Draw the phasor domain circuit.

(3 marks)

(iii) Use the Voltage Divider Rule, to determine the capacitor voltage, V_C (t).

(2 marks)

(iv) Use the Ohms Law, calculate the i_R(t), i_C(t) and i(t).

(3 marks)

(b) A single-phase sinusoidal current supply is defined as $i_s(t) = 125 \sin(100t)$ shown in **Figure Q4(b)** is connected to passive elements.

(i) Determine the complex impedance of the inductor and the capacitor.

(2 marks)

(ii) Construct the phasor domain circuit.

(2 marks)

(iii) Use the Current Divider Rule, find the output current i_O(t).

(2 marks)

(iv) Calculate the i_1(t) of the circuit.

(2 marks)

(v) Illustrate the phasor angle of the circuit.

(2 marks)

Q5 (a) The purely inductor circuit as shown in **Figure Q5(a).**

(i) Describe an expression of i(t), v(t) and p(t) of the circuit

(3 marks)

(ii) Illustrate the power triangle for purely inductive load.

(2 marks)

(b) The AC voltage supply is defined as v_s(t) = 100 cos (1000t) V as shown in **Figure Q5(b)** is connected to R-L-C loads.

(i) Calculate the load current, I(ω).

(2 marks)

(ii) Use the Ohms Law, find the voltage phasors, V_R(ω), V_L(ω) and V_C(ω).

(3 marks)

(iii) Compute the complex power of each elements, the source S_V, the resistor S_R, the inductor S_L and the capacitor S_C.

(4 marks)

(iv) Determine the average power for the resistor, inductor, capacitor and source, P_V.

(4 marks)

(v) Conclude the relationship of total power absorbed by all elements based on the results obtained in **Q5(b)(iii)**.

(2 marks)

- END OF QUESTIONS

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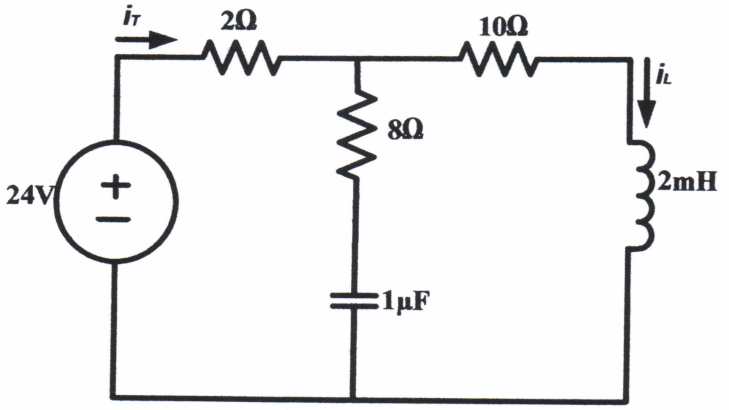

FIGURE Q1(b)

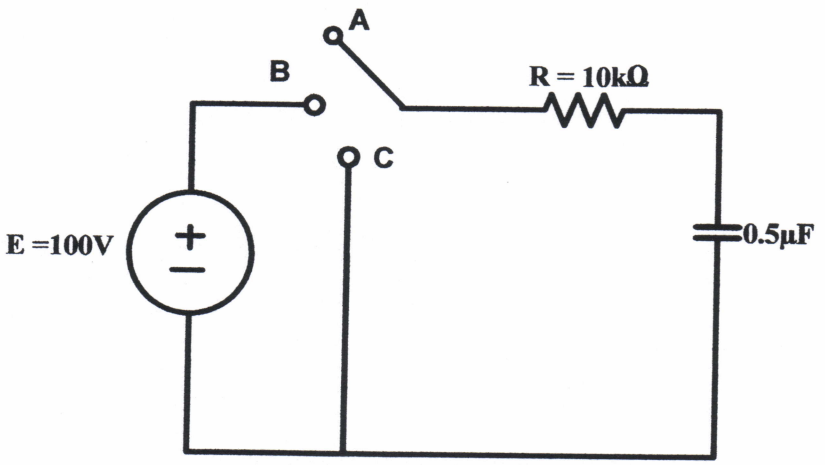

FIGURE Q2(a)

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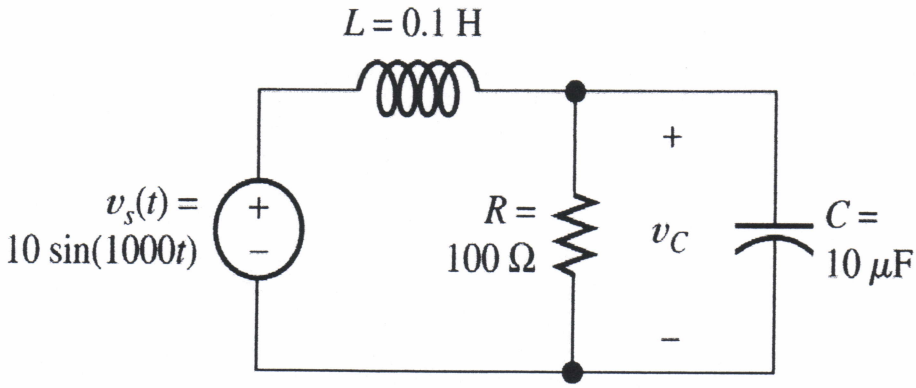

FIGURE Q4(a)

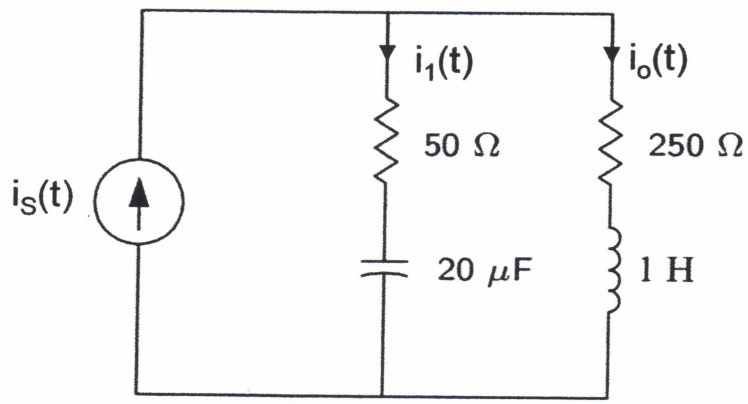

FIGURE Q4(b)

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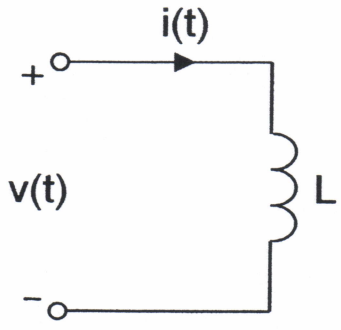

FIGURE Q5(a)

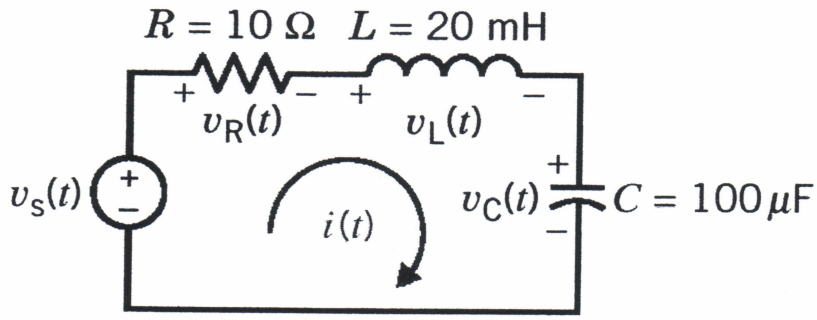

FIGURE Q5(b)