UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

SUBJECT CODE	:	IBB12304
SUBJECT TITLE	:	ELECTRIC CIRCUIT ANALYSIS
LEVEL	:	BACHELOR
TIME / DURATION	:	9.00AM – 11.30AM (2 ½ HOURS)
DATE	:	22 MAY 2016

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of ONE (1) section. Section A.
4. Answer any FOUR questions in Section A.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

Section A (Total: 100 marks)

INSTRUCTION: Answer FOUR (4) questions only.

Please use the answer booklet given.

Question 1

(a) Give the definition of:

i. Nodal analysis

(2 marks)

ii. Mesh Analysis

(2 marks)

(b) Obtain v_0 in the below circuit:

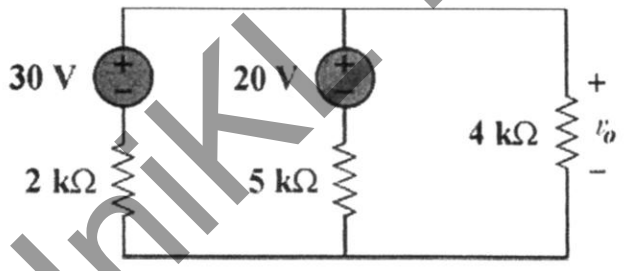


Figure 1

(9 marks)

(c) Determine R_{Th} and V_{Th} at terminals 1-2 of each of the circuits of Figure 2.

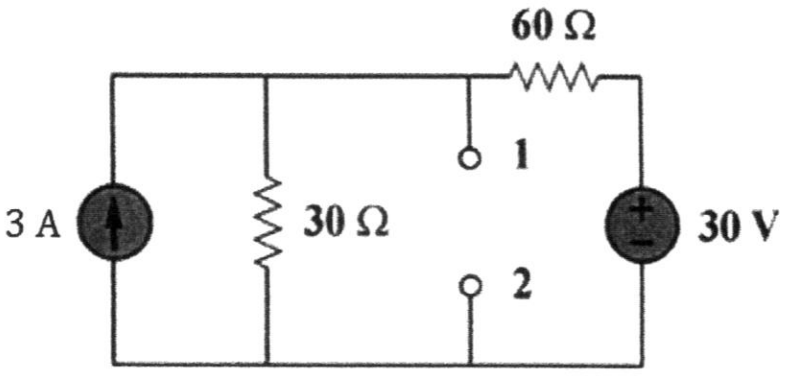
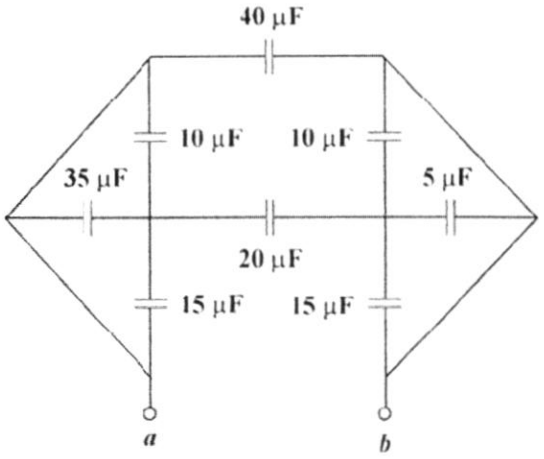


Figure 2

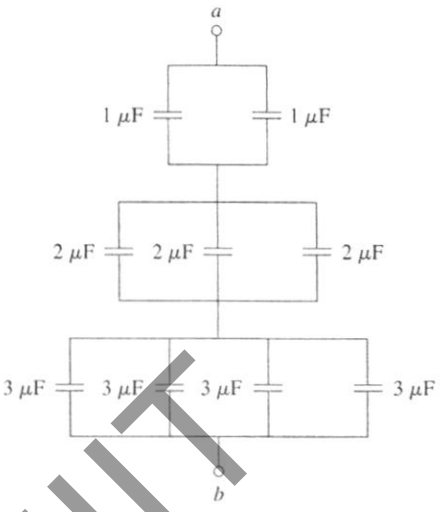
(12 marks)

Question 2

(a) Find the equivalent capacitance between terminals *a* and *b* in the circuits of Figure 3. (all capacitances are in ***μF***).



(3a)



(3b)

Figure 3

(8 marks)

(b) A 100-mH inductor is connected in parallel with a 2-kΩ resistor. The current through the inductor is $i(t) = 50e^{-400t} mA$, determine

i. The voltage V_L across the inductor.
ii. The voltage V_R across resistor
iii. Is V_R (t) + V_L (t) = 0?
iv. Calculate the energy in the inductor at t=0.

(7 marks)

(c) Find L_{eq} of Figure 4

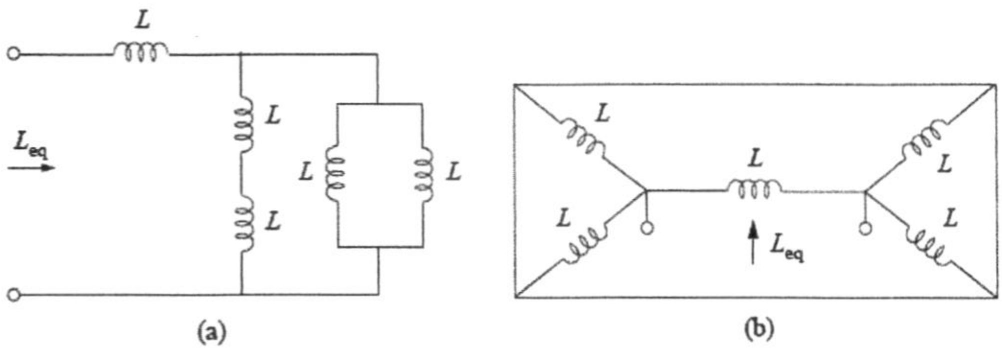


Figure 4

(10 marks)

Question 3

(a) Define the term:

i. Step response (2 marks)

ii. Capacitance (2 marks)

iii. Time constant, τ (2 marks)

(b) Find the time constant for the *RC* circuit in Figure 5.

(9 marks)

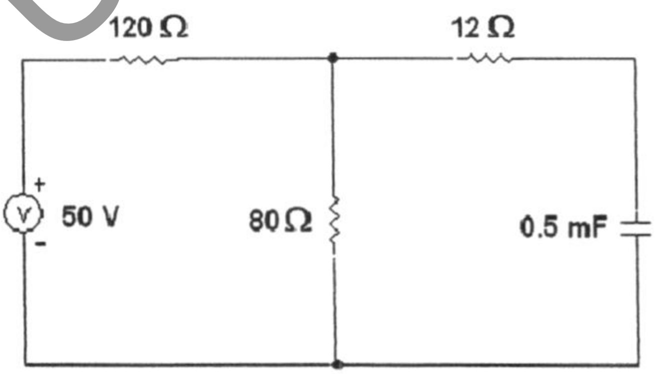


Figure 5

(c) For the circuit in Figure 6, find i(t) for t > 0.

(10 marks)

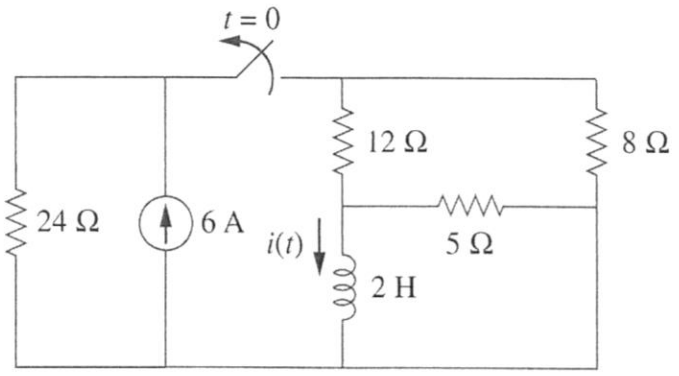


Figure 6

Question 4

(a) Describe phasor in details.

(4 marks)

(b) Find the phase angle between $i_1 = -4\sin(377t + 25^\circ)$ and $i_2 = 5\cos(377t - 40^\circ)$ does i_1 lead or lag i_2?

(6 marks)

(c) Transform the following sinusoids to phasors:

i. $i = 6\cos(50t - 40^\circ)$ A

ii. $v = -4\sin(30t + 50^\circ)$ V

(6 marks)

(d) Write the voltage-current relationship in Table 1.

(3 marks)

Element	*Time domain*	*Frequency domain*
R	$v = Ri$	
L	$v = L\frac{di}{dt}$	
C	$i = C\frac{dv}{dt}$	

Table 1

(e) Evaluate the following complex numbers: (6 marks)

$$\frac{10+j5+3\angle 40^\circ}{-3+j4}+10\angle 30^\circ$$

Question 5

(a) Explain the condition of the component below: (5 marks)

i. At dc

ii. At high frequencies

Figure 7

(b) The switch in Figure 8 has been in position ***a*** for a long time. At t=0, it moves to position ***b***. Calculate *i(t)* for all *t>0*.

(10 marks)

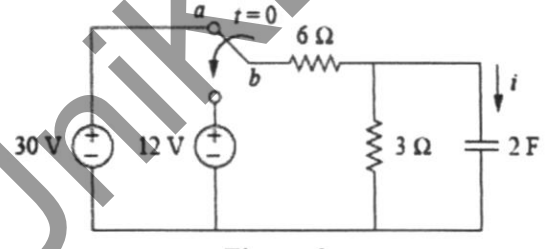


Figure 8.

(c) Find $i_1(t)$ and $i_2(t)$ for $t > 0$ in the circuit of Figure 9.

(10 marks)

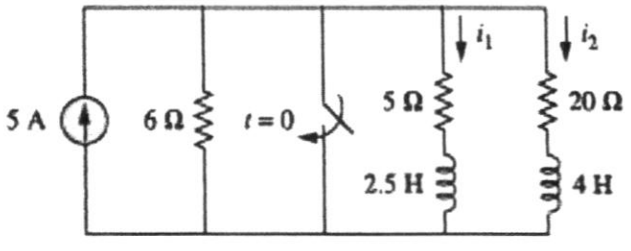


Figure 9

END OF QUESTIONS