UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan Pendidikan Berterusan
(UTMSPACE)

FINAL EXAMINATION */ PEPERIKSAAN AKHIR*
SEMESTER 2 – SESSION 2016 / 2017
PROGRAM KERJASAMA

COURSE CODE *KOD KURSUS*	:	DDPE 2173
COURSE NAME *NAMA KURSUS*	:	CIRCUIT THEORY / *TEORI LITAR*
YEAR / PROGRAMME *TAHUN / PROGRAM*	:	2DDPB/E/K/P
DURATION *TEMPOH*	:	2 HOURS 30 MINUTES / *2 JAM 30 MINIT*
DATE *TARIKH*	:	MARCH/APRIL 2017

INSTRUCTION *ARAHAN*	:	ANSWER **ALL** QUESTIONS / *JAWAB **SEMUA** SOALAN*

(You are required to write your name and your lecturer's name on your answer script)
(Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan)

NAME / *NAMA PELAJAR*	:	.....
I.C NO. / *NO. K/PENGENALAN*	:	.....
YEAR / PROGRAMME *TAHUN / PROGRAM*	:	.....
COLLEGE'S NAME *NAMA KOLEJ*	:	.....
LECTURER'S NAME *NAMA PENSYARAH*	:	.....

This examination paper consists of **7** pages including the cover
*Kertas soalan ini mengandungi **7** muka surat termasuk kulit hadapan*

Q1. For the circuit in Figure Q1, determine the node voltages V_1, V_2 dan V_3 using node analysis. What is the value of the current I_o?

Untuk litar dalam Rajah Q1, tentukan nilai voltan nod V_1, V_2 dan V_3 dengan menggunakan analisis nod. Apakah nilai arus I_o ?

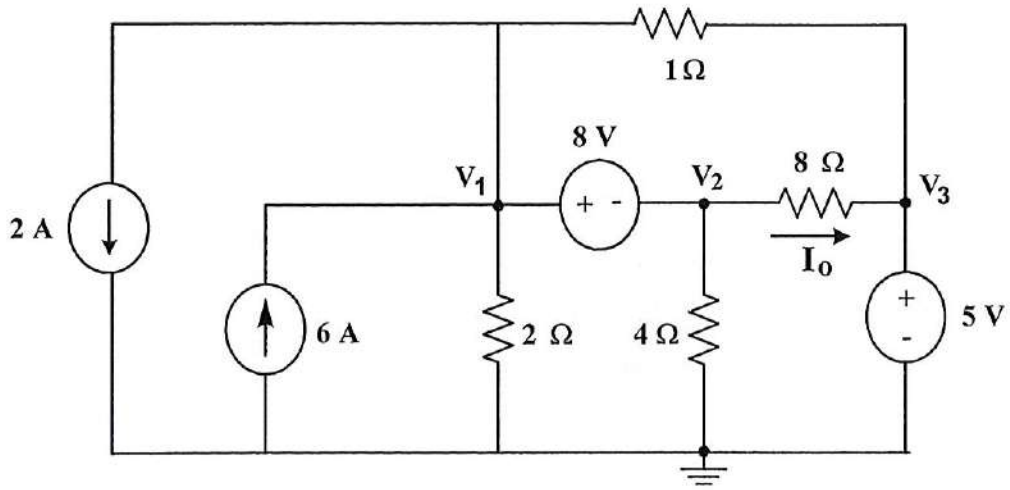

Figure Q1/*Rajah Q1*

(15 marks/*markah*)

Q2. Referring to Figure Q2, find the the power dissipated by the 2 Ω resistor using Thevenin's theorem. Solve for Thevenin's voltage, V_{TH} using mesh analysis.

Merujuk kepada Rajah Q2, dapatkan nilai kuasa yang dilesap oleh resistor 2 Ω menggunakan teorem Thevenin. Selesaikan untuk voltan Thevenin, V_{TH} menggunakan analisis jejaring.

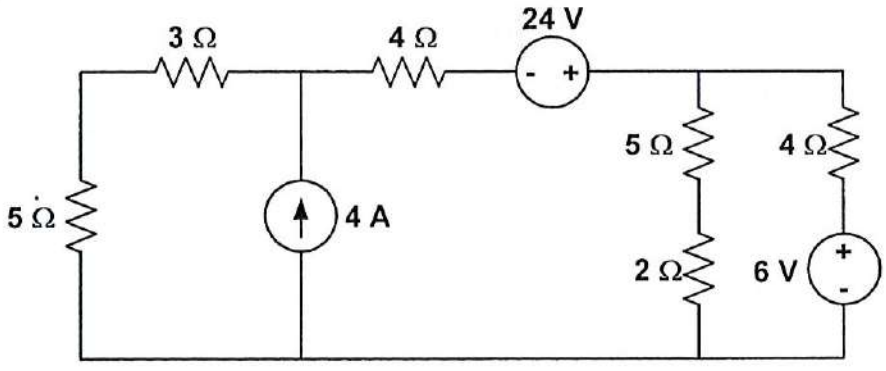

Figure Q2/*Rajah Q2*

(15 marks/*markah*)

Q3. Referring to Figure Q3, given that the voltage, $v_S(t) = 15\sqrt{2}\sin(1000t + 90°)$ V.

(a) Draw the phasor circuit.

(b) Find the total impedance, Z_T.

(c) Draw the impedance triangle.

(d) Determine the source current, I_S.

(e) Find the voltage, $v_L(t)$.

(f) Find the current, I_C.

Merujuk kepada Rajah Q3, diberi voltan, $v_S(t) = 15\sqrt{2}\sin(1000t + 90°)$ V.

(a) Lukiskan litar pemfasa.

(b) Dapatkan jumlah galangan, Z_T.

(c) Lukiskan segitiga galangan.

(d) Tentukan arus yang dibekalkan, I_S.

(e) Dapatkan voltan, $v_L(t)$.

(f) Dapatkan arus, I_C.

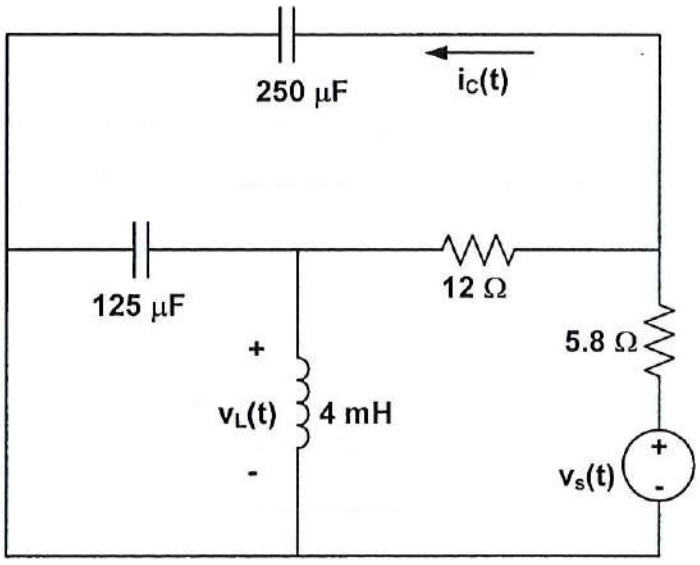

Figure Q3 / *Rajah Q3*

(18 marks/*markah*)

Q4. Referring to Figure Q4, find the current I_o using superposition theorem.

Merujuk kepada Rajah Q4, dapatkan arus I_o menggunakan teorem tindihan.

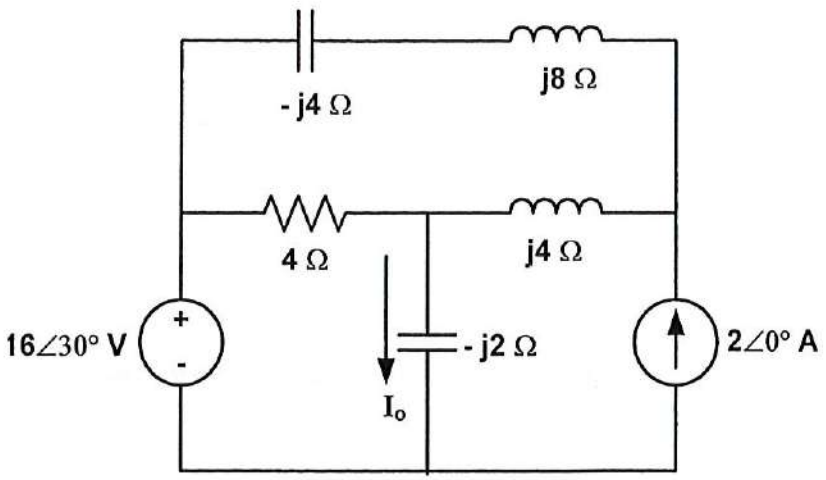

Figure Q4 / *Rajah Q4*

(15 marks/*markah*)

Q5. Referring to the circuit in Figure Q5.

(a) Determine the Norton's equivalent circuit as seen from the load impedance Z_L.

(b) The value of the load impedance, Z_L for maximum power to be transferred to it.

(c) Calculate the maximum power.

Merujuk kepada litar dalam Rajah Q5.

(a) Tentukan litar setara Norton seperti yang dilihat daripada galangan beban Z_L.

(b) Nilai galangan beban, Z_L untuk kuasa maksima dipindahkan kepadanya.

(c) Kirakan nilai kuasa maksima tersebut.

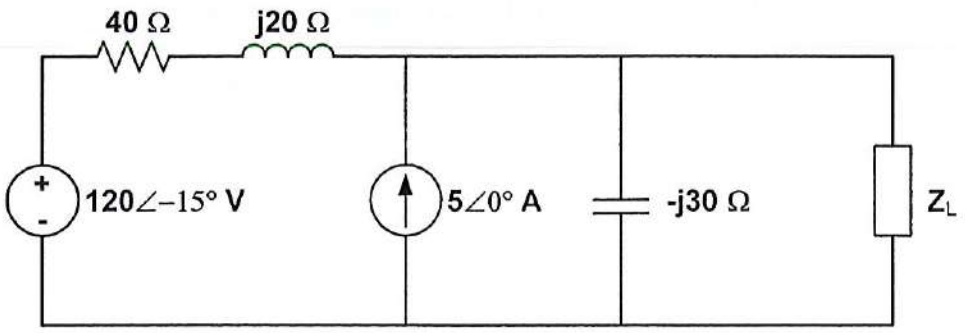

Figure Q5/*Rajah Q5*

(14 marks/*markah*)

Q6. a) A complete response of a capacitor voltage in a first order circuit comprises of two different types of response. State the two types of response.

Sambutan lengkap bagi voltan melintangi kapasitor dalam suatu litar tertib pertama terdiri daripada dua jenis sambutan yang berbeza. Nyatakan dua jenis sambutan tersebut.

(2 marks/*markah*)

b) The switch in the circuit of Figure Q6 is at position 1 for a long time before it is moved to position 2 at time t = 0 second. Find:

i) the initial value for the current through the inductor, $i_L(0^-)$.

ii) the complete response for the current through the inductor, $i_L(t)$ for $t \geq 0$.

Suis dalam litar Rajah Q6 berada dalam kedudukan 1 untuk jangka masa yang lama sebelum diubah ke kedudukan 2 pada ketika t = 0 saat. Dapatkan:

i) nilai awal arus melalui induktor, $i_L(0^-)$.

ii) sambutan lengkap bagi arus melalui induktor, $i_L(t)$ untuk $t \geq 0$.

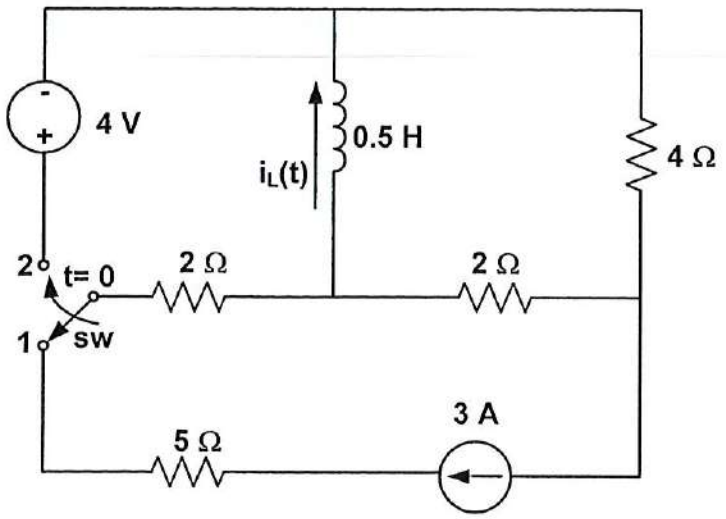

Figure Q6 / *Rajah Q6*

(21 marks/*markah*)

Forcing functions and their assumed solutions

Forcing function			Assumed solution
Constant		$f(t) = A$	$x_f(t) = K_2$
Exponential		$f(t) = M\, e^{-st}$	$x_f(t) = K_2\, e^{-st}$
Variable	Ramp	$f(t) = mt$	$x_f(t) = K_2\, t + K_3$
	Parabolic	$f(t) = t^2$	$x_f(t) = K_2\, t^2 + K_3\, t + K_4$
Sinusoidal		$f(t) = M\, sin\,(\omega t + \theta)$	$x_f(t) = K_2\, sin\,\omega t + K_3\, cos\,\omega t$
		$f(t) = M\, cos\,(\omega t + \theta)$	
Exponential Sinusoidal		$f(t) = M\, e^{-st}\, sin\,(\omega t + \theta)$	$x_f(t) = e^{-st}\,(K_2\, sin\,\omega t + K_3\, cos\,\omega t)$