UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang Akademik 2002/2003

Februari/Mac 2003

JEE 204 – Teori Litar

Masa : 3 Jam

ARAHAN KEPADA CALON:

Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEMBILAN** (9) muka surat bercetak dan **ENAM** (6) soalan sebelum anda memulakan peperiksaan ini.

Jawab **LIMA** (5) soalan.

Agihan markah diberikan di sut sebelah kanan soalan berkenaan.

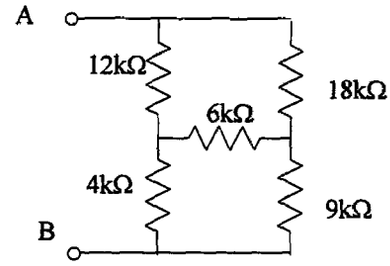
Semua soalan hendaklah dijawab di dalam Bahasa Malaysia.

...2/-

Soalan 1

(a) Dapatkan nilai rintangan pada terminal A dan B bagi litar di bawah.

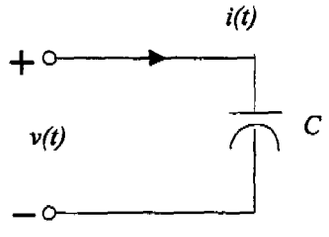
Determine the resistance value across terminal A and B for the circuit below;



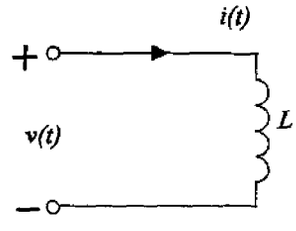
(5 markah/marks)

(b) Tuliskan persamaan arus dan voltan bagi Rajah 1.1 (a) dan 1.1(b).

Write the current and voltage equations for Figure 1.1(a) and 1.1(b).



Rajah 1.1(a)
Figure 1.1(a)

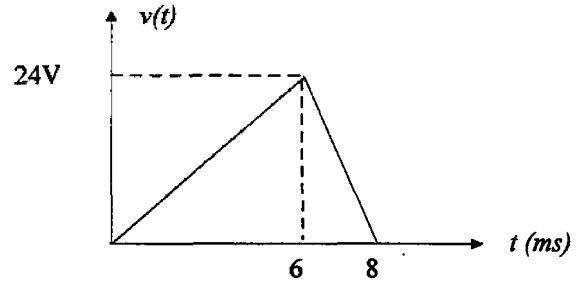


Rajah 1.1(b)
Figure 1.1(b)

(5 markah/marks)

(c) Dapatkan dan lakarkan gelombang arus *i(t)* yang melalui kapasitor bernilai 5 μF (pada Rajah 1.1(a)) jika gelombang voltan masukan *v(t)* seperti Rajah 1.2.

Find and draw current i(t) across the 5uF capacitor in Figure 1.1 (a) if the input voltage v(t) is shown in Figure 1.2 below.

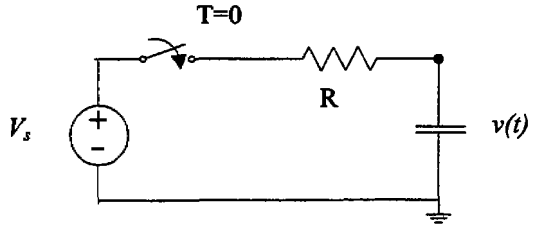


Rajah 1.2
Figure 1.2

(10 markah/marks)

Soalan 2

(a) Pada Rajah 2.1, dapatkan persamaan voltan pada rintangan R.
In Figure 2.1, determine the voltage equation across R.



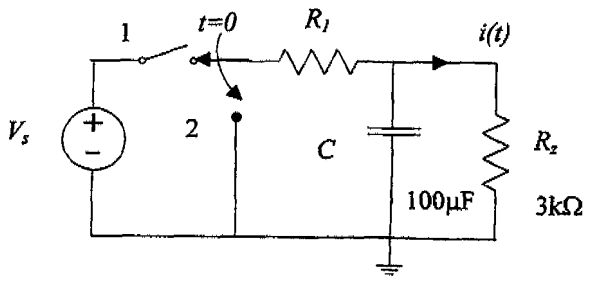
Rajah 2.1
Figure 2.1

(6 markah/marks)

...4/

(b) Pada Rajah 2.2 di bawah, suis adalah pada kedudukan 1 pada keadaan awal untuk satu jangkamasa yang lama. Pada masa t = 0, suis itu ditukarkan ke kedudukan 2. Dapatkan persamaan *i*(t) pada perintang R_2.

In Figure 2.2, the switch is at position 1 for period of time. At t = 0, the switch is changed at position 2. Determine the equation for i(t) flowing through R_2.

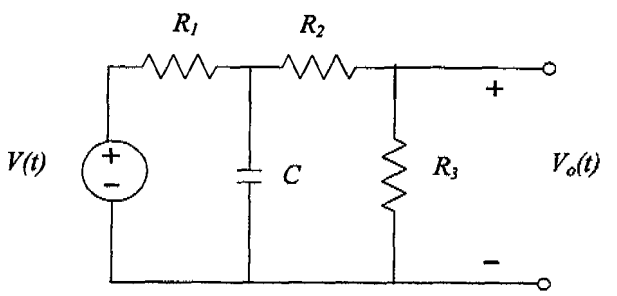


Rajah 2.2
Figure 2.2

(8 markah/marks)

(c) Dapatkan fungsi pindah bagi keluaran $V_o(t)$ untuk litar yang ditunjukkan dalam litar Rajah 2.3.

Find the transfer function of $V_o(t)$ for circuit shown in Figure 2.3.

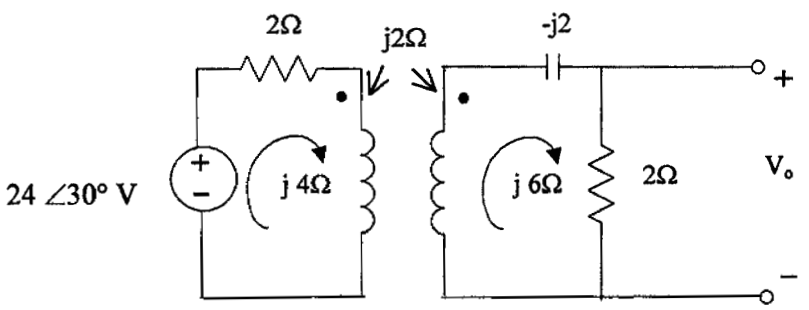


(6 markah/marks)

Rajah 2.3
Figure 2.3

Soalan 3

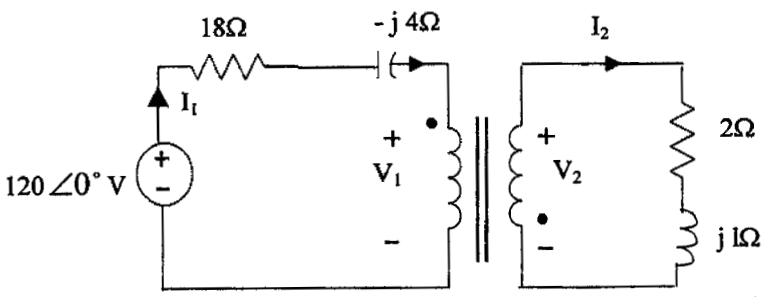
(a) Dapatkan nilai-nilai V_o, I_1 dan I_2 bagi litar dalam Rajah 3.1.
Find the values for V_o, I_1 and I_2 for circuit shown in Figure 3.1.



Rajah 3.1
Figure 3.1

(8 markah/marks)

(b) Dapatkan nilai-nilai bagi I_1, V_1, V_2 dan I_2 bagi litar dalam Rajah 3.2.
Determine the value for I_1, V_1, V_2 and I_2 for circuit shown in Figure 3.2.



(8 markah/marks)

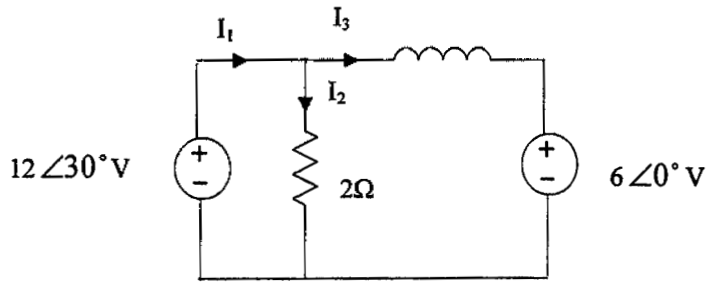
Rajah 3.2
Figure 3.2

(c) Dapatkan jumlah purata kuasa pada perintang 2Ω dan sumber kuasa $6\angle 0^\circ V$ utuk litar dalam Rajah 3.3.

Determine the average power across 2 ohm resistor and $6\angle 0^\circ V$ power supply for the circuit shown in Figure 3.3.

(4 markah/marks)

...6/-

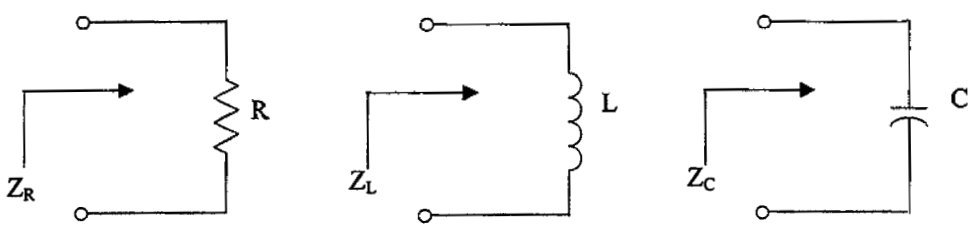


Rajah 3.3
Figure 3.3

Soalan 4

(a) Lakarkan graf frekuensi melawan fasa dan magnitud (z) bagi litar-litar berikut.

Plot graphs of frequency versus phase and magnitude (z) for circuits shown below;



(i) (ii) (iii)

(5 markah/marks)

(b) Lakarkan rajah Plot Bode bagi persamaan-persamaan berikut.
(Tunjukkan jalan kerja!)
Draw Bode Plot for the equations written below;

$$G(j\omega) = \frac{10^4(j\omega + 2)}{(j\omega + 10)(j\omega + 100)}$$

...7/-

$$G(j\omega) = \frac{100(0.02j\omega + 1)}{(j\omega)^2}$$

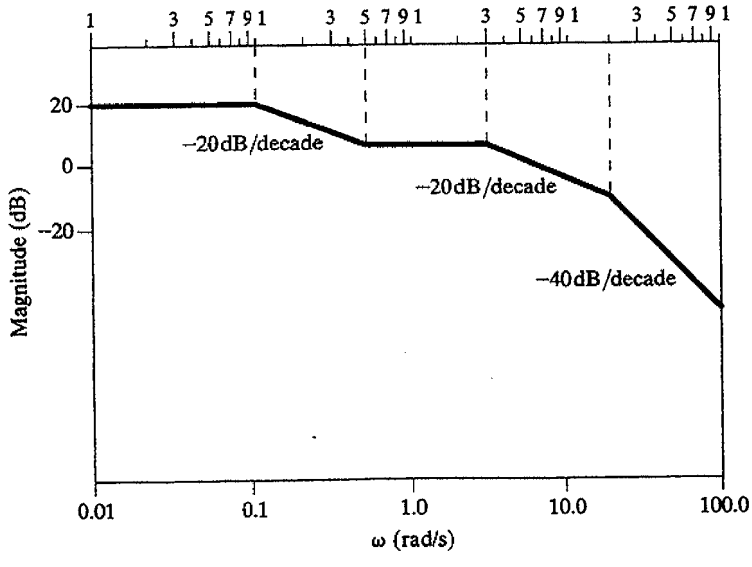
$$G(j\omega) = \frac{10(0.1j\omega + 1)}{(j\omega + 1)(0.02j\omega + 1)}$$

(15 markah/marks)

Soalan 5

(a) Diberi gambarajah Bode Plot di bawah, dapatkan fungsi pindah baginya.

Given below is a Bode Plot of a transfer function, determine the transfer function;

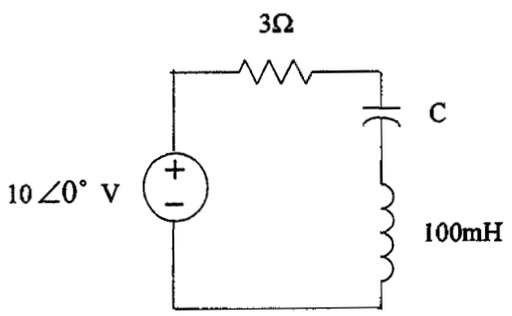


(10 markah/marks)

Rajah Bode Plot
Bode Plot Figure

(b) Dari Rajah 5.1, dapatkan nilai C bagi frekuensi resonan litar pada ω =1800 radian/s. Lakarkan gambarajah frekuensi melawan magnitud dan frekuensi melawan fasa;

From Figure 5.1, find the value of C if the resonance frequency of the circuit is ω =1800 radian/s. Plot frequency versus magnitudes and phase for the circuit;

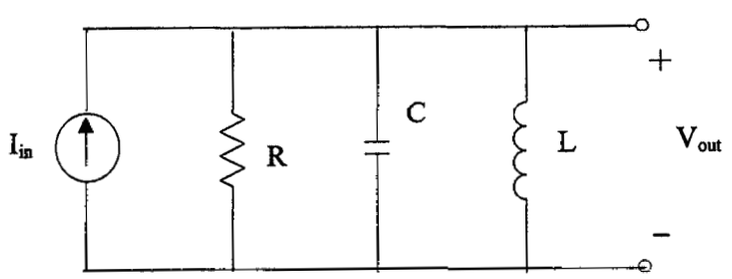


Rajah 5.1
Figure 5.1

(10 markah/marks)

Soalan 6

(a) Diberi litar RLC di bawah,
Given the RLC circuit below,



[i] Dapatkan persamaan frekuensi resonan (f_o), frekuensi-frekuensi 3dB dan Q bagi fungsi pindah $\frac{V_{out}}{I_{in}}$ dalam bentuk parameter-parameter yang mengandungi R, L dan C.

Find the equations for frequency resonants (f_0), 3dB frequencies and Q for transfer function of $\frac{V_{out}}{I_{in}}$ containing parameters R, L and C.

(10 markah/marks)

[ii] Kira nilai-nilai f_o, frekuensi-frekuensi 3dB dan Q menggunakan persamaan yang diperolehi di [i] jika nilai R = 1kΩ, L = 10mH dan C = 100μF.

Determine the values for f0, 3dB frequencies and Q using equations obtain from [ii] if R = 1kΩ, L = 10mH and C = 100μF.

(10 markah/marks)

- oo0oo -