

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI**

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI II : 2021/2022

BEU40113: NETWORK ANALYSIS

TARIKH : 4 JULAI 2022

MASA : 9.00 PAGI – 12.00 TENGAH HARI (3JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.

Bahagian A: Struktur (2 soalan)

Bahagian B: Esei (2 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 60 MARKS
BAHAGIAN A: 60 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer **ALL** the questions.

ARAHAN:

Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SEMUA** soalan.

QUESTION 1

SOALAN 1

CLO1
C3

- (a) Diagram A1(a) shows an alternating current circuit consist of two voltage sources $E_1 = 40V \angle 60^\circ$ and $E_2 = 20V \angle 0^\circ$. By using Mesh Analysis, calculate the current through the resistor R_1 .

Rajah A1(a) menunjukkan litar arus ulangalik yang mempunyai punca dua voltan $E_1 = 40V \angle 60^\circ$ dan $E_2 = 20V \angle 0^\circ$. Dengan menggunakan Analisa Mash nilai arus yang mengalir pada perintang R_1 .

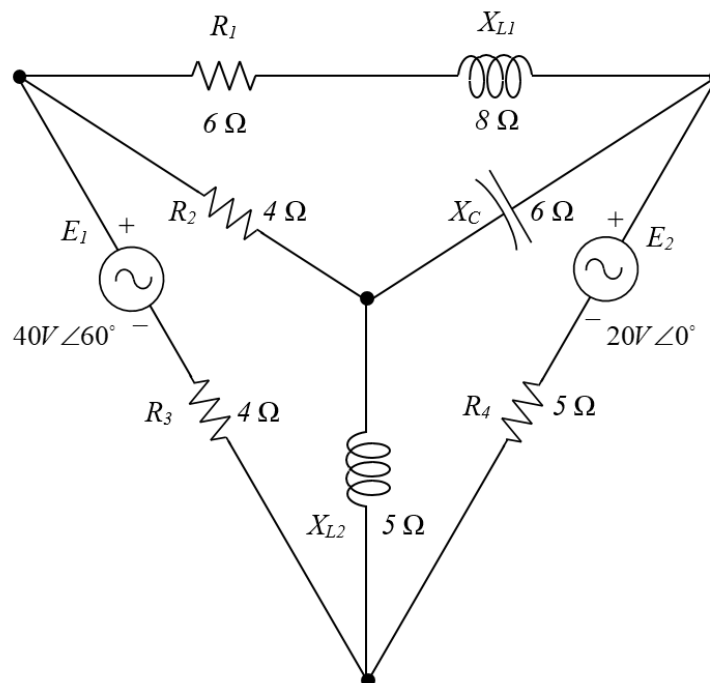


Diagram A1(a) / Rajah A1(a)

[8 marks]

[8 markah]

CLO1
C3

- (b) Diagram A1(b) shows an alternating current circuit consist of a voltage source $E_1 = 20V \angle 0^\circ$ and current source $I_1 = 4A \angle 50^\circ$. Calculate the total value of Norton impedance (Z_N) and Norton current (I_N), when the elements between points a and b are removed.

Rajah A1(b) menunjukkan litar arus ulangalik yang mempunyai sebuah punca voltan $E_1 = 20V \angle 0^\circ$ dan sebuah punca arus $I_1 = 4A \angle 50^\circ$. Kirakan nilai galangan Norton (Z_N) dan arus Norton (I_N), apabila galangan beban dibuka pada terminal a dan b.

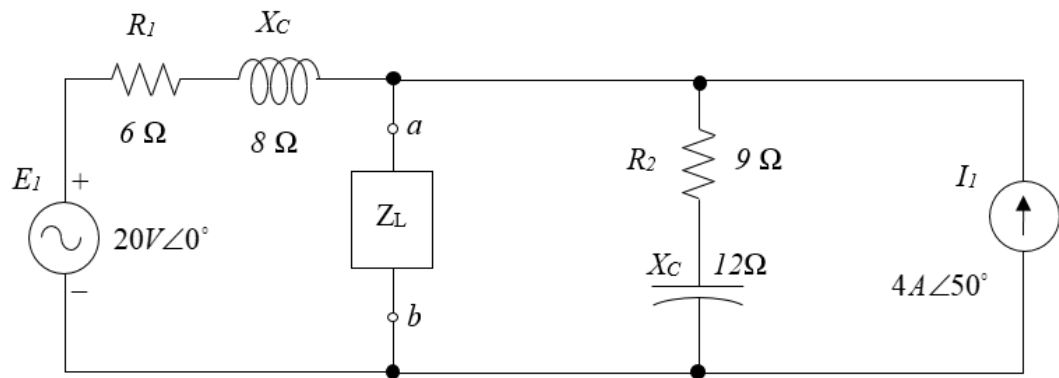


Diagram A1(b) / Rajah A1(b)

[8 marks]

[8 markah]

CLO1
C4

- (c) Determine the first derivative time domain equation below by using the Laplace Transform:

Tentukan persamaan domain masa terbitan pertama dengan menggunakan kaedah Jelmaan Laplace

$$\frac{dv(t)}{dt} + 4v(t) + 8 \int_0^t v dt = 4e^{-2t}$$

given at $v(0) = 1$,

diberi pada $v(0) = 1$,

[14 marks]

[14 markah]

QUESTION 2

SOALAN 2

CLO1
C3

- (a) i) Construct the analytically periodic function shown in Diagram A2(a)(i)

Tentukan persamaan analitik bagi fungsi berkala yang ditunjukkan pada Rajah A2(a)(i)

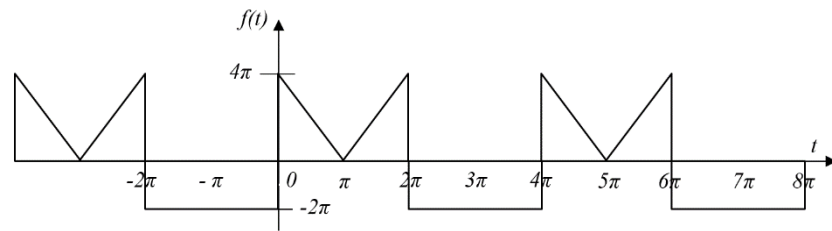


Diagram A2(a)(i) / Rajah A2(a)(i)

[4 marks]

[4 markah]

- ii) Draw the waveform for 3 cycles for the given following equation:

Lukis gelombang 3 kitar seperti persamaan berikut:

$$f(t) = \begin{cases} 5 & 0 < t < \pi \\ 3t & \pi < t < 2\pi \\ -t + 3 & 2\pi < t < 3\pi \end{cases}$$

$$f(t) = f(t + 3\pi)$$

[4 marks]

[4 markah]

CLO1
C3

- (b) Diagram A2(b) shows the waves in an even symmetry. Construct the Fourier coefficients series of the wave.

Gelombang dalam Rajah A2(b) menunjukkan fungsi genap simetri. Bina sebutan Fourier bagi gelombang tersebut.

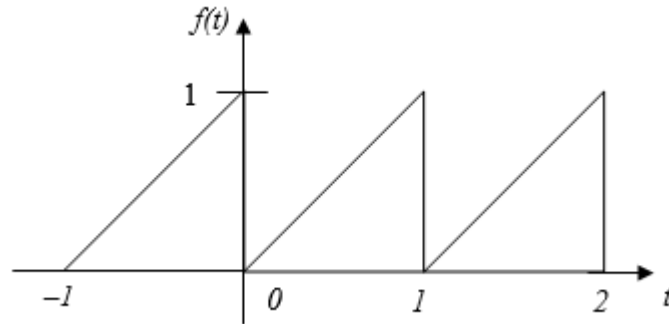


Diagram A2(b) / Rajah A2(b)

[8 marks]

[8 markah]

CLO1
C4

- (c) Determine the y parameters as function of s parameter, for the two-port network shown in Diagram A2(c).

Dapatkan parameter y sebagai fungsi sebutan s, rangkaian two-port yang ditunjukkan dalam Rajah A2(c).

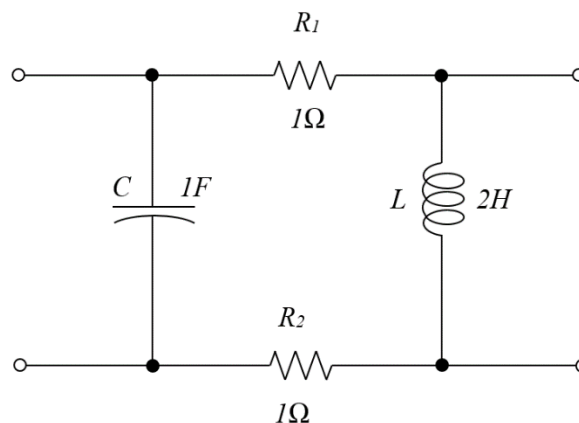


Diagram A2(c) / Rajah A2(c)

[14 marks]

[14 markah]

SECTION B : 40 MARKS
BAHAGIAN B : 40 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** essay questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **DUA (2)** soalan esei. Jawab **SEMUA** soalan.*

CLO1
C4

QUESTION 1
SOALAN 1

Diagram B1, shows the connections of several electronic components. By using Mesh Analysis and superposition, analyze the circuit to find the $i(t)$ current, using Laplace Transform. Assuming zero initial condition.

Rajah B1, menunjukkan sambungan beberapa komponen elektronik. Dengan menggunakan Analisis Mesh dan superposisi, analisis litar untuk mencari arus $i(t)$, menggunakan Laplace Transform. Dengan mengandaikan keadaan awal sifar.

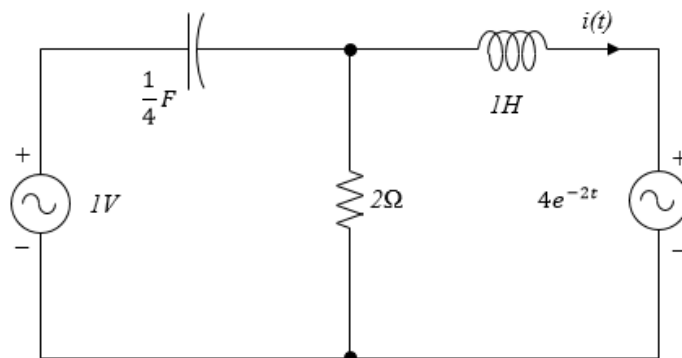


Diagram B1 / Rajah B1

[20 marks]

[20 markah]

CLO1
C5**QUESTION 2**
SOALAN 2

Diagram B2, shows the waves in an even symmetry. Value the Fourier coefficients series of the wave.

Gelombang dalam Rajah B2, menunjukkan fungsi genap simetri. Nilaikan sebutan Fourier bagi gelombang tersebut.

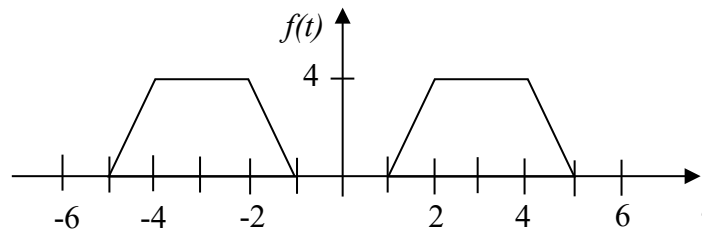


Diagram B2 / Rajah B2

[20 marks]

[20 markah]

SOALAN TAMAT

Sl. No.	Time Domain $f(t)$	S Domain $F(s)$
$F(s) = \int_0^{\infty} e^{-st} f(t) dt$		
1	Unit impulse $\delta(t)$	1
2	Unit step	$\frac{1}{s}$
3	t	$\frac{1}{s^2}$
4	t^n	$\frac{n!}{s^{n+1}}$
5	$f'(t)$	$sF(s) - f(0)$
6	$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
7	e^{at}	$\frac{1}{s-a}; s > a$
8	$t^n e^{at}$	$\frac{n!}{(s-a)^{n+1}}$
9	$\sin at$	$\frac{a}{s^2 + a^2}; s > 0$
10	$\cos at$	$\frac{s}{s^2 + a^2}; s > 0$
11	$\sinh at$	$\frac{a}{s^2 - a^2}; s > a $
12	$\cosh at$	$\frac{s}{s^2 - a^2}; s > a $
13	$e^{at} \sin bt$	$\frac{b}{(s-a)^2 + b^2}$
14	$e^{at} \cos bt$	$\frac{(s-a)}{(s-a)^2 + b^2}$
15	$e^{at} \sinh bt$	$\frac{b}{(s-a)^2 - b^2}$
16	$e^{at} \cosh bt$	$\frac{(s-a)}{(s-a)^2 - b^2}$
17	n^{th} derivative	$s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) \dots - f^{n-1}(0)$
18	$\int_0^t f(\tau) d\tau$	$\frac{1}{s} F(s)$
19	$\int_0^t f(t-\tau) g(\tau) d\tau$	$F(s)G(s)$
20	$f(at)$	$\frac{1}{a} F\left(\frac{s}{a}\right)$
21	$e^{at} f(t)$	$F(s-a)$
22	$\delta(t-a)$	$\frac{1}{s} e^{-as}$
23	$\frac{t^{n-1}}{(n-1)!}$	$\frac{1}{s^n}; n = 1, 2, 3, \dots$
24	$\frac{t^{n-1}}{(n-1)!} e^{at}$	$\frac{1}{(s+a)^n}; n = 1, 2, 3, \dots$
25	$\frac{1}{a^2} [1 - \cos at]$	$\frac{1}{s(s^2 + a^2)^2}$
26	$e^{-at} \sin \omega t$	$\frac{\omega}{(s+a)^2 + \omega^2}$