SULIT

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

JABATAN KEJURUTERAAN ELEKTRIK

PENILAIAN ALTERNATIF

SESI 1 : 2021/2022

BEU40113 : NETWORK ANALYSIS

NAMA PENYELARAS KURSUS	**: YAAKUB BIN OMAR**
KAEDAH PENILAIAN	**: PEPERIKSAAN ATAS TALIAN**
JENIS PENILAIAN	**: *OPEN BOOKED ASSESSMENT*** **SOALAN BERSTRUKTUR (2 SOALAN)** **SOALAN ESEI (2 SOALAN)**
TARIKH PENILAIAN	**: 24 JANUARI 2022**
TEMPOH PENILAIAN	**: 2 JAM**

LARANGAN TERHADAP PLAGIARISM (AKTA 174)
PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.
(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Sarjana Muda) EDISI 2, 2020, KLAUSA 15&16)

SECTION A : 60 MARKS
BAHAGIAN A : 60 MARKAH

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

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab semua soalan.*

CLO1
C3

QUESTION 1
SOALAN 1

(a) Diagram A1(a) shows an alternating current circuit having a voltage source $E_1 = 20V\angle 0^\circ$ and current source $I = 5V\angle 20^\circ$. By using **Norton's Theorem**, **calculate** the total **Norton** impedance (Z_N) when a terminal a-b of the load Z_L is opened.

Rajah A1(a) menunjukkan litar arus ulangalik yang mempunyai punca voltan $E_1 = 20V\angle 0^\circ$ dan punca arus $I = 5V\angle 20^\circ$. Dengan menggunakan Teorem Norton, kirakan jumlah impedans Norton (ZN) apabila terminal a-b beban ZL dibuka.

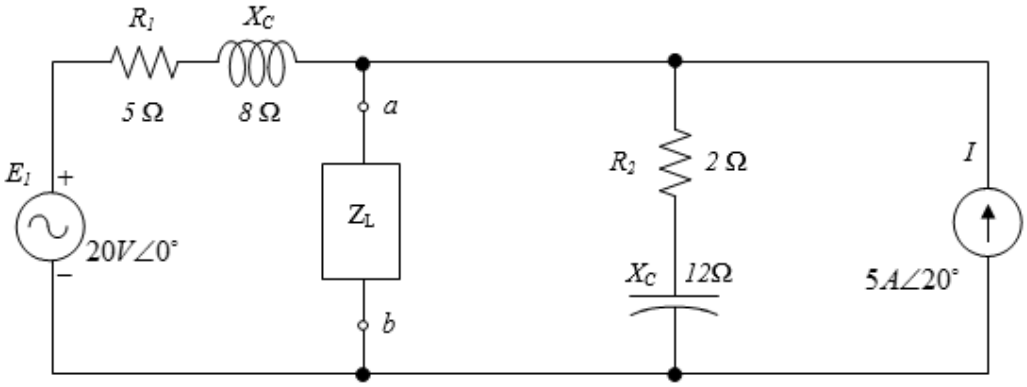

Diagram A1(a) / *Rajah A1(a)*

[6 marks]
[*6 markah*]

CLO1
C4

QUESTION 1
SOALAN 1

(b) i) Analyse the following Laplace Transform function, $f(t) = 2\sin 4t \cosh 3t$, by using the **first shift Theorem**

Analisiskan Jelmaan Laplace bagi fungsi berikut, $f(t) = 2\sin 4t \cosh 3t$, *dengan menggunakan* ***Teorem Anjakan Pertama***

[5 marks]
[*5 markah*]

ii) By using **completing the square**, transform the transformation of function $F(s) = \dfrac{5s+2}{(s^2+6s+13)^2}$ as **Inverse Laplace Transform**.

Dengan menggunakan ***kaedah melengkapkan kuasa dua****, ubahkankan fungsi* $F(s) = \dfrac{5s+2}{(s^2+6s+13)^2}$ *sebagai* ***Jelmaan Laplace Songsang.***

[7 marks]
[*7 markah*]

CLO1
C4

QUESTION 1
SOALAN 1

(c) Transform the first derivative and second derivative time domain equation below by using the Laplace Transform:

$$\frac{d^2v(t)}{dt^2} + 5\frac{dv(t)}{dt} + 6v(t) = 10e^{-t}$$

given at $v(0) = 2, \quad \frac{dv(0)}{dt} = 4$

Ubahsuaikan persamaan domain masa terbitan pertama dan terbitan kedua di bawah dengan menggunakan kaedah Jelmaan Laplace.

$$\frac{d^2v(t)}{dt^2} + 5\frac{dv(t)}{dt} + 6v(t) = 10e^{-t}$$

diberi pada $v(0) = 2, \quad \frac{dv(0)}{dt} = 4$

[12 marks]
[12 markah]

CLO1
C3

QUESTION 2
SOALAN 2

(a) Calculate the z parameters, for the two-port network shown in Diagram A2(a).

Kirakan parameter z, rangkaian two-port yang ditunjukkan dalam Rajah A2(a).

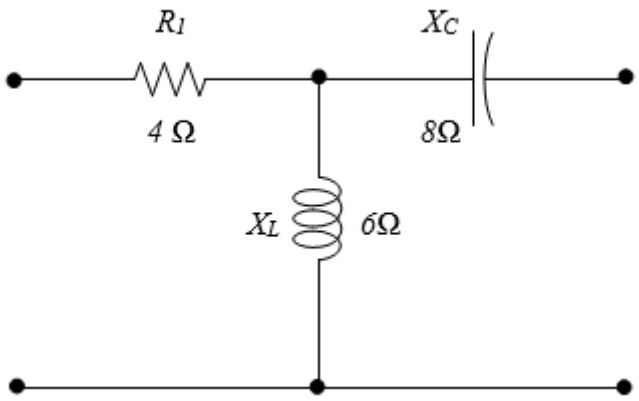

Diagram A2(a) / *Rajah A2(a)*

[6 marks]
[*6 markah*]

CLO1
C4

QUESTION 2
SOALAN 2

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

Dapatkan parameter h *sebagai fungsi sebutan s, rangkaian two-port yang ditunjukkan dalam Rajah A2(b).*

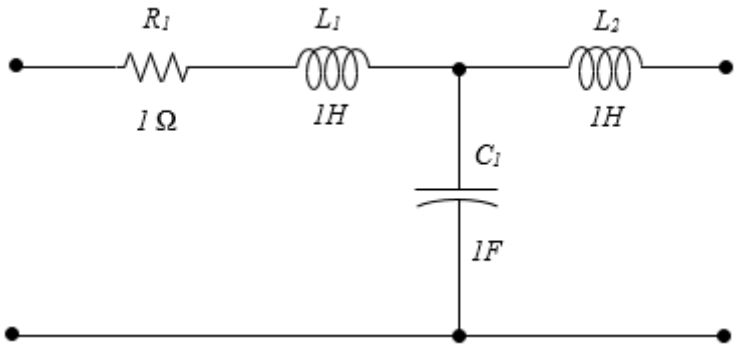

Diagram A2(b) / *Rajah A2(b)*

[12 marks]
[*12 markah*]

CLO1
C4

QUESTION 2
SOALAN 2

(c) i) Determine analytically the periodic function as shown in Diagram A2(c)(i)

Tentukan secara analitik fungsi berkala seperti ditunjukkan pada Rajah A2(c)(i)

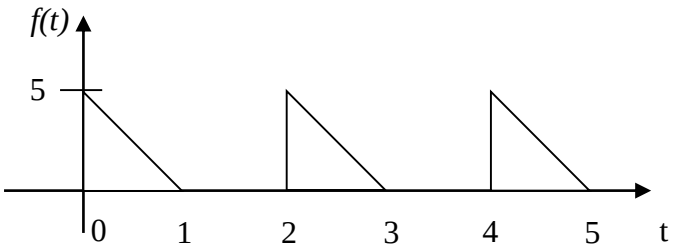

Diagram A2(c)(i) / *Rajah A2(c)(i)*

[4 marks]
[*4 markah*]

ii) Diagram A2(c)(ii) shows the waves in an even symmetry. Construct the trigonometry Fourier series of the wave. Find the equation *f(t)* at t=2 using the first three nonzero harmonics.

Gelombang dalam Rajah A2(c)(ii) menunjukkan fungsi genap simetri. Bina siri Fourier Trigonometri bagi gelombang tersebut. Dapatkan persamaan f(t) dengan menggunakan tiga harmonik nonzero pertama.

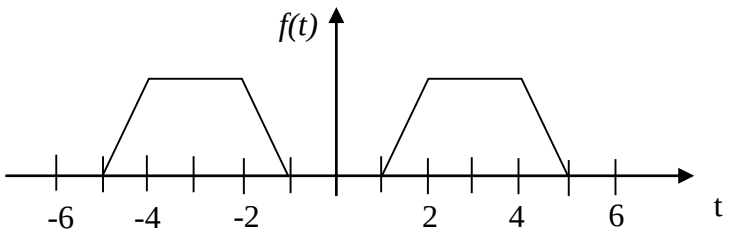

Diagram A2(c)(ii) / *Rajah A2(c)(ii)*

[8 marks]
[*8 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 showing the alternating current (AC) circuit. Using **Mesh analysis**, and **Nodal analysis. Analyze** the current I_1 passing through the 5Ω resistor.

Rajah B1 ditunjukkan dalam litar arus ulang alik (AC). Menggunakan Teorem Superposisi dan analisis mesh, analisa arus I_1 yang melalui perintang 5Ω.

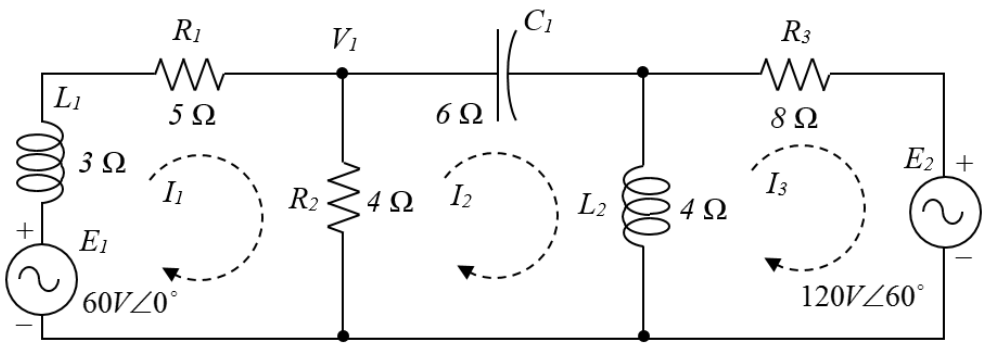

Diagram B1 / *Rajah B1*

[20 marks]
[20 *markah*]

CLO1
C5

QUESTION 2
SOALAN 2

Diagram B2, shows the connections of several electronic components. By using Mesh Analysis, evaluate the circuit to fine the voltage $V_O(t)$, using Laplace Transform. Assuming zero initial condition.

Rajah B2, menunjukkan sambungan beberapa komponen elektronik. Dengan menggunakan Analisis Mesh, nilaikan litar untuk mendapatkan voltan $V_O(t)$, menggunakan Laplace Transform. Dengan mengandaikan keadaan awal sifar.

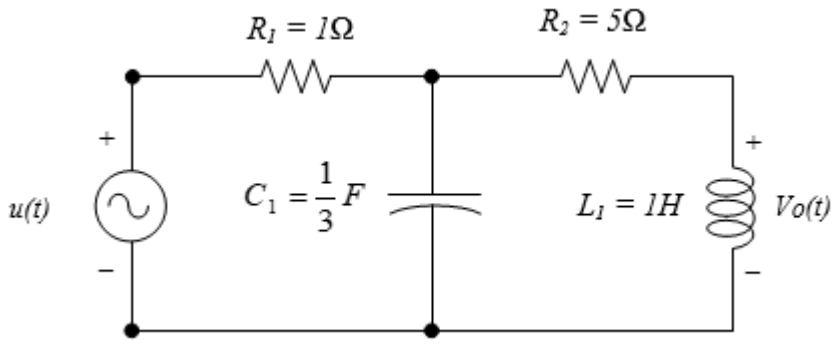

Diagram B2 / *Rajah B2*

[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	$\sinh at$	$\frac{a}{s^2-a^2}$; $s > \lvert a \rvert$
12	$\cosh at$	$\frac{s}{s^2-a^2}$; $s > \lvert a \rvert$
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	$s^nF(s) - s^{n-1}f(0) - s^{n-2}f'(0) \ldots - f^{n-1}(0)$
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	$\frac{t^{n-1}}{(n-1)!}$	$\frac{1}{s^n}$; $n = 1,2,3,\ldots$
24	$\frac{t^{n-1}}{(n-1)!}e^{at}$	$\frac{1}{(s+a)^n}$; $n = 1,2,3,\ldots$
25	$\frac{1}{a^2}[1 - \cos at]$	$\frac{1}{s(s^2+a^2)^2}$
26	$e^{-at} \sin \omega t$	$\frac{\omega}{(s+a)^2+\omega^2}$