



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN KEJURUTERAAN ELEKTRIK

**PEPERIKSAAN AKHIR
SESI DISEMBER 2018**

DEE6142: CIRCUIT ANALYSIS

**TARIKH : 17 APRIL 2019
MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)**

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Struktur (4 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 **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1

SOALAN 1

CLO1
C1

- (a) State **THREE (3)** main steps to solve a circuit using Mesh Analysis method.

Nyatakan TIGA (3) langkah utama untuk menyelesaikan litar elektrik menggunakan kaedah Analisis Mesh.

[3 marks]

[3 markah]

CLO1
C3

- (b) Calculate the value of I_1 by using Mesh Analysis, referring to Figure 1(b).

Kirakan nilai I_1 menggunakan Analisis Mesh merujuk kepada Rajah 1(b).

[6 marks]

[6 markah]

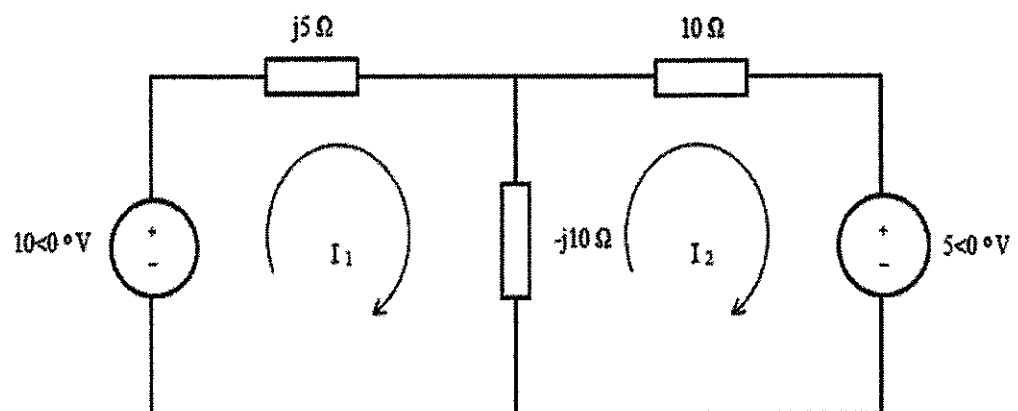


Figure 1(b) / Rajah 1(b)

CLO1
C3

(c) Calculate the value of voltage V by using Nodal Analysis, referring to Figure 1(c).

Kirakan nilai V menggunakan Analisis Nodal merujuk kepada Rajah 1(c).

[6 marks]

[6 markah]

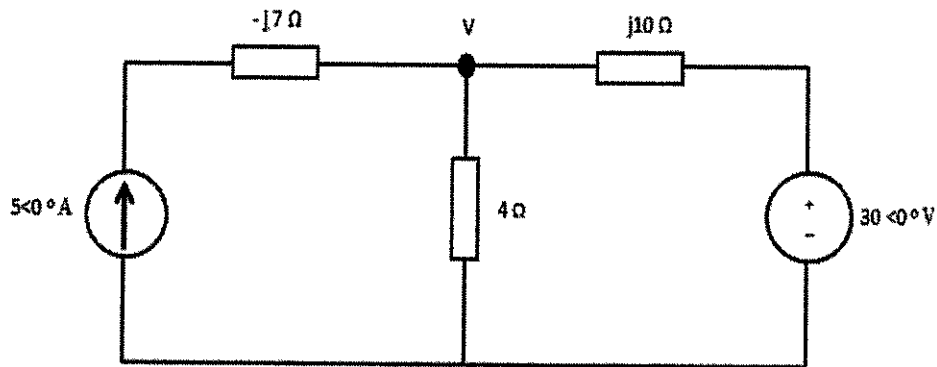


Figure A1(c) / Rajah A1(c)

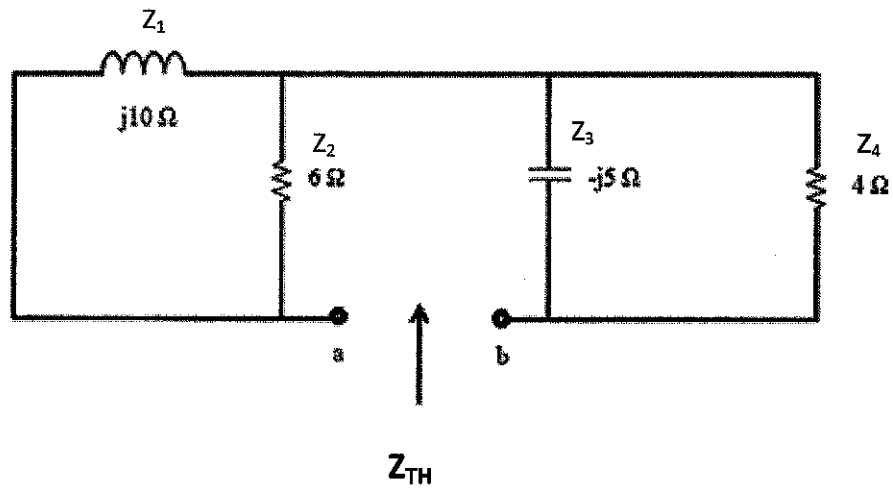
CLO1
C1**QUESTION2****SOALAN 2**

(a) List **FOUR (4)** steps in analyzing a circuit by using Thevenin's Theorem.

Senaraikan EMPAT(4) langkah untuk menganalisis litar elektrik menggunakan Teorem Thevenin.

[4 marks]

[4 markah]

CLO1
C2(b) Determine the Thevenin impedance, Z_{TH} at the terminal a-b in Figure 2(b).*Tentukan nilai rintangan Thevenin, Z_{TH} pada terminal a-b pada rajah 2(b).*

[5 marks]

[5 markah]

Figure 2(b) / Rajah 2(b)

CLO1
C3(c) Calculate Z_N and I_N by using Norton Theorem, referring to Figure 2(c),*Kirakan Z_N dan I_N dengan menggunakan Theorem Norton dengan merujuk kepada Rajah 2(c),*

[6 marks]

[6 markah]

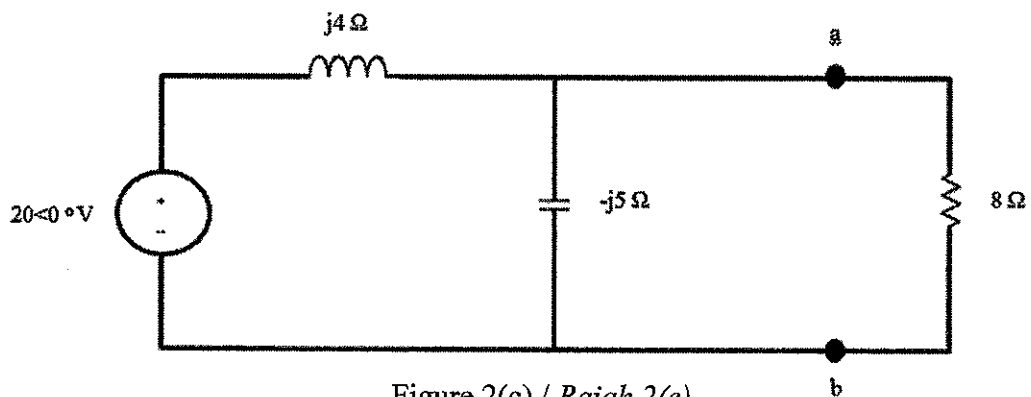


Figure 2(c) / Rajah 2(c)

QUESTION 3

SOALAN 3

CLO2
C2

- (a) Identify the graph for the analytical function below and explain whether the function is even or odd.

Kenalpasti graf untuk fungsi analitikal di bawah dan terangkan samada fungsi tersebut adalah genap atau ganjil.

$$f(t) = \begin{cases} -3, & -3 < t < -1 \\ 3, & -1 < t < 1 \end{cases}$$

[3 marks]

[3 markah]

CLO2
C3

- (b) Interpret the analytical equation for the function $g(t)$ shown in Figure A3(b).

Tafsirkan persamaan analitik bagi fungsi $g(t)$ yang ditunjukkan dalam Rajah 3(b).

[5 marks]

[5 markah]

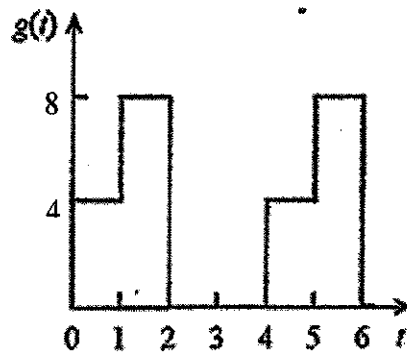


Figure 3(b) / Rajah 3(b)

CLO2
C4(c) Based on Figure 3(c), analyse the analytical function to find the a_0 *Berdasarkan Rajah 3(c) analisis fungsi analitikal untuk mencari a_0 .*

[7 marks]

[7 markah]

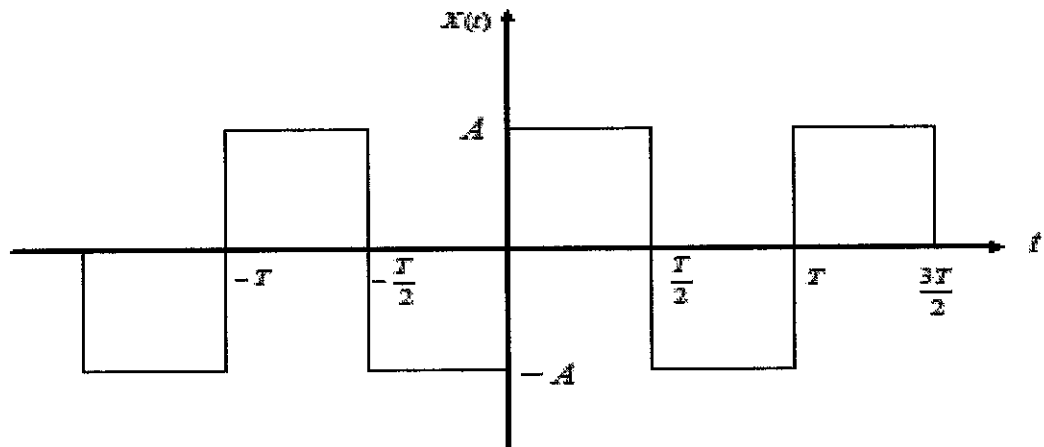


Figure 3 (c) / Rajah 3(c)

QUESTION4**SOALAN 4**CLO3
C1

(a) Based on RLC circuit in Figure 4(a), state the voltage in t-domain.

Berdasarkan litar RLC pada rajah 4(a), nyatakan voltan dalam t-domain.

[3 marks]

[3 markah]

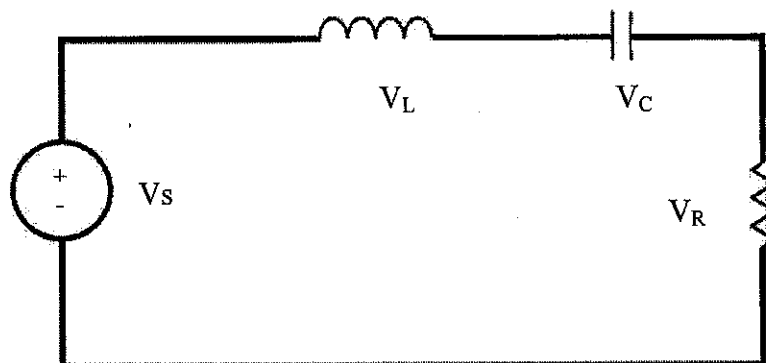


Figure 4(a) / Rajah 4(a)

CLO3
C2

- (b) Determine $I(s)$ for the circuit in Figure 4(b) when S_1 is closed. Assume initial condition is zero.

Tentukan $I(s)$ berdasarkan litar pada rajah 4(b) apabila S_1 ditutup. Diberi nilai awal adalah kosong.

[6 marks]

[6 markah]

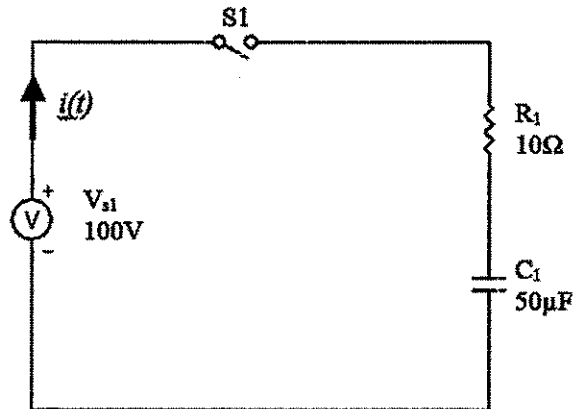


Figure 4(b) / Rajah 4(b)

CLO3
C2

- (c) Determine the value of current $i(t)$ at $t = 3s$ for the Figure 4(c) by using Laplace Transformation when S_1 is closed. Assume at $t = 0$, $i(0) = 4A$.

Tentukan nilai arus $i(t)$ pada $t = 3s$ pada Rajah 4(c) dengan menggunakan Laplace transformasi apabila S_1 ditutup. Diberi pada $t = 0$, $i(0) = 4A$

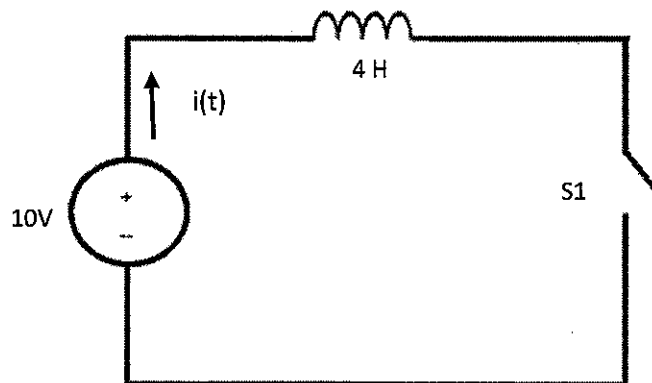


Figure 4(c) / Rajah 4(c)

[6 marks]

[6 markah]

SULIT

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.

QUESTION 1

SOALAN 1

CLO2
C3

Carry out the trigonometric Fourier Series expression for $f(t)$, a_0 , a_n , b_n , and referring to Figure B1, write the analytical equation for the function $f(t)$ and calculate the value of b_n .

Hasilkan ungkapan trigonometri Fourier Series bagi $f(t)$, a_0 , a_n , b_n , dan merujuk kepada Rajah B1, tuliskan persamaan analitik bagi fungsi $f(t)$ dan kirakan nilai b_n .

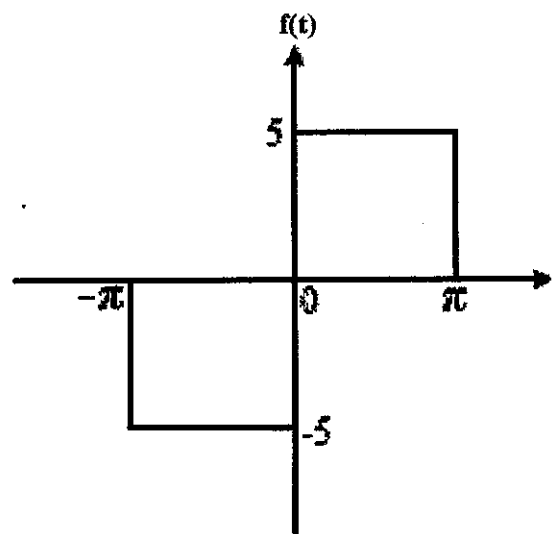


Figure B1 / Rajah B1

[20 marks]
[20 markah]

CLO3
C4**QUESTION 2****SOALAN 2**

A series LC circuit with $C = \frac{1}{60}$ F and $L = 10$ H are connected in series with $120t$ V source. At $t = 0$, the switch is closed. Assume initial current is zero. Construct the circuit in t-domain and reconstruct the circuit into s-domain, then analyze LC circuit by using Laplace Transform to get the steady state total current flowing through the circuit, $i(t)$.

Satu litar siri LC dengan $C = \frac{1}{60}$ F and $L = 10$ H disambung secara siri dengan sumber bekalan $120t$ V. Pada $t = 0$, suis ditutup. Andaikan arus permulaan adalah sifar. Bina litar dalam t- domain dan bina semula litar ke dalam s-domain, kemudian analisis litar LC dengan menggunakan Jelmaan Laplace untuk mendapatkan keadaan mantap jumlah arus yang mengalir melalui litar, $i(t)$.

[20 marks]

[20 markah]

END OF QUESTIONS**SOALAN TAMAT**

FORMULA FOR DEE6142 CIRCUIT ANALYSIS

LAPLACE TRANSFORMS AND THE INVERSES

$f(t) = L^{-1}\{F(s)\}$	$F(s) = L\{f(t)\}$
$u(t)$	1
a	$\frac{a}{s}$
$t^n, n = 1, 2, 3, \dots$	$\frac{n!}{s^{n+1}}$
e^{at}	$\frac{1}{s - a}$
$\sin at$	$\frac{a}{s^2 + a^2}$
$\cos at$	$\frac{s}{s^2 + a^2}$
$\sinh at$	$\frac{a}{s^2 - a^2}$
$\cosh at$	$\frac{s}{s^2 - a^2}$
$e^{at} \sin bt$	$\frac{b}{(s - a)^2 + b^2}$
$e^{at} \cos bt$	$\frac{s - a}{(s - a)^2 + b^2}$
$t^n e^{at}$	$\frac{n!}{(s - a)^{n+1}}$
$t^n f(t)$	$(-1)^n \frac{d^n}{ds^n} [F(s)]$
$e^{at} f(t)$	$F(s - a)$
$y'(t)$	$sY(s) - y(0)$
$y''(t)$	$s^2 Y(s) - sy(0) - y'(0)$
$\int_0^t f(t) dt$	$\frac{F(s)}{s}$

FORMULA FOR DEE6142 CIRCUIT ANALYSIS

OTHER RELATED FORMULA

Integration by Parts $\int_a^b u dv$	$uv - \int_a^b v du$
V_R	$Ri(t)$
V_L	$L \frac{di(t)}{dt}$
V_C	$\frac{1}{C} \int_0^t i(t) dt + V_C(0)$
I_R	$\frac{v(t)}{R}$
I_C	$C \frac{dv(t)}{dt}$
I_L	$\frac{1}{L} \int_0^t v(t) dt$

