

SULIT



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

JABATAN KEJURUTERAAN ELEKTRIKAL

PEPERIKSAAN AKHIR

SESI II : 2021/2022

BEU10013: ELECTRICAL TECHNOLOGY

TARIKH : 6 JULAI 2022

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

Kertas ini mengandungi **DUA BELAS (12)** halaman bercetak.

Bahagian A: Struktur (3 soalan)

Bahagian B: Esei (1 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 75 MARKS
BAHAGIAN A: 75 MARKAH

INSTRUCTION:

This section consists of **THREE (3)** structured questions. Answer **ALL** the questions.

ARAHAN:

Bahagian ini mengandungi TIGA (3) soalan berstruktur. Jawab SEMUA soalan.

CLO1
C3

QUESTION 1
SOALAN 1

- (a) i) Calculate the L length of copper wire required to produce a 4mW resistor? Assume the diameter of the wire is 1 mm and that resistivity r of copper is $1.72 \times 10^{-8} \text{ Wm}$.
- ii) Calculate the resistance of a 5m long conductor if it has cross sectional area is 10 mm^2 and resistivity is and resistivity $0.3 \times 10^{-5} \Omega \text{ m}$.
- i) *Kira panjang L dawai kuprum yang diperlukan untuk menghasilkan perintang 4mW? Andaikan diameter wayar ialah 1 mm dan kerintangan r kuprum ialah $1.72 \times 10^{-8} \text{ Wm}$.*
- ii) *Kira rintangan konduktor sepanjang 5m jika ia mempunyai luas keratan rentas 10 mm^2 dan kerintangan $0.3 \times 10^{-5} \Omega \text{ m}$.*

[8 marks]

[8 markah]

CLO1
C3

- (b) Diagram A1(b) shows some resistor is connected in series and parallel. Calculate :
- The value of the total resistance.
 - Total value of current.

Rajah A1(b) menunjukkan beberapa perintang yang disambung secara siri dan selari. Kirakan:

- Jumlah rintangan.*
- Jumlah Arus.*

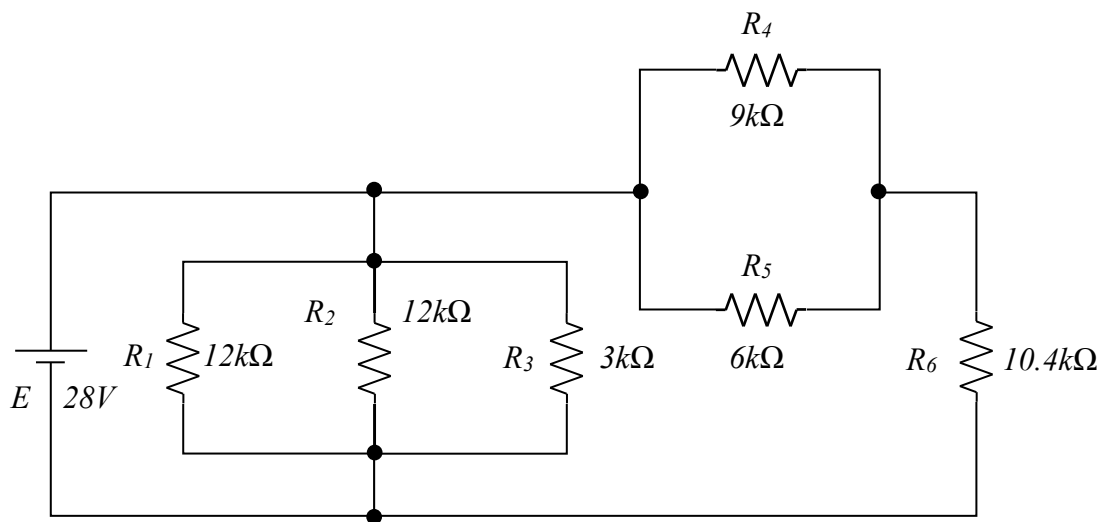


Diagram A1(b) / *Rajah A1(b)*

[8 marks]

[8 markah]

CLO1
C3

(c) Diagram A1(c) shows direct current circuit with the connection of several resistors. This circuit has 24V voltage source. By using wye-delta transformation. Calculate :

- i) Value of the total resistance (R_T)
- ii) Current I_o

Rajah A1(c) menunjukkan litar arus terus yang disambung dengan beberapa perintang. Litar ini mempunyai voltan bekalan 24V. Dengan menggunakan transformasi wye-delta. Kirakan :

- i) Nilai rintangan jumlah (R_T)*
- ii) Arus I_o*

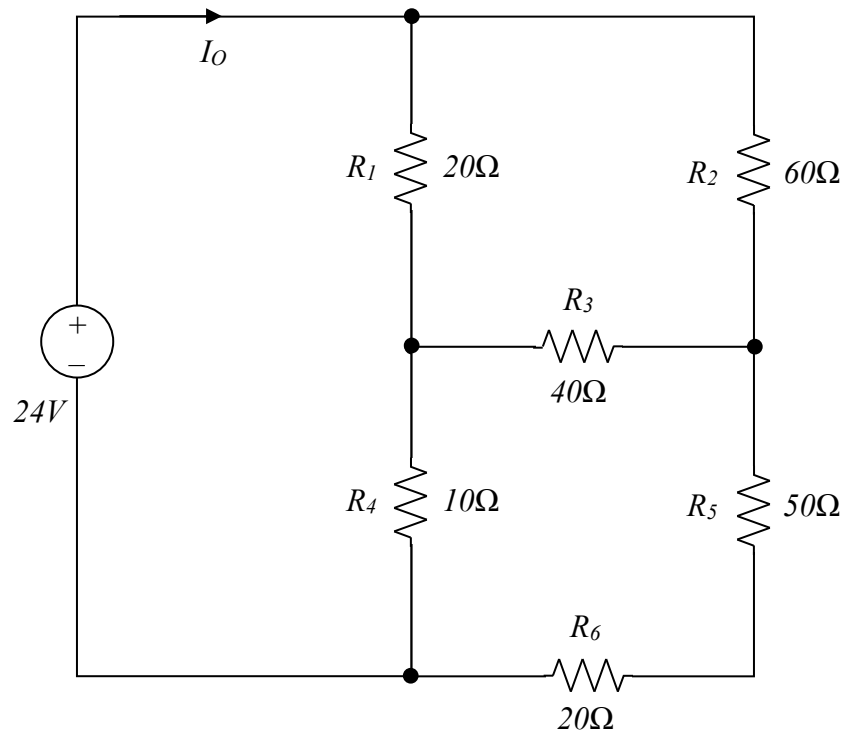


Diagram A1(c) / Rajah A1(c)

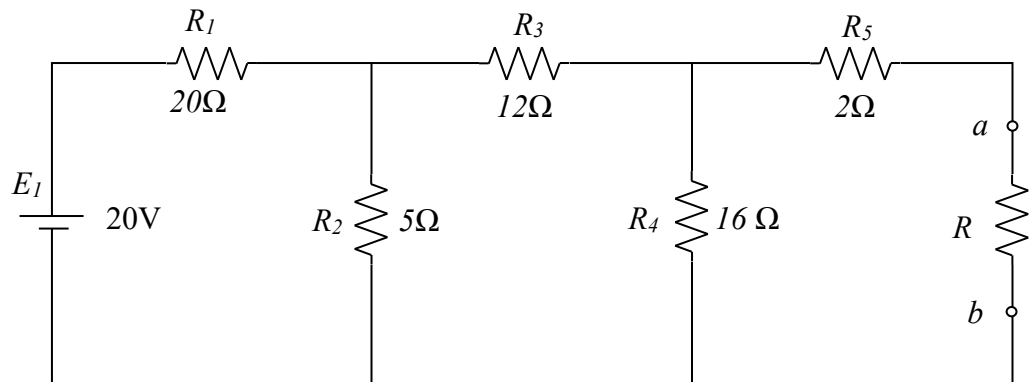
[9 marks]

[9 markah]

CLO1
C3**QUESTION 2**
SOALAN 2

- (a) Diagram A2(a) shows direct current circuit having a voltage source $E_1 = 20\text{V}$ and, is connected with resistor which is connected in series and parallel. Using **Thevenin Theorem** calculate the total Thevenin Resistance R_{TH} , when the a-b terminal of the load Z_L is opened.

*Rajah A2(a) menunjukkan litar arus terus yang mempunyai punca voltan $E_1 = 20\text{V}$ disambung dengan beberapa perintang. Dengan menggunakan **Theorem Thevenin** kirakan nilai rintangan Thevenin R_{TH} , apabila terminal a-b pada beban Z_L dibuka.*

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

[8 marks]

[8 markah]

CLO1
C3

- (b) The A2(b) circuit diagram has a current supply of 6mA and a supply voltage of 24V . Using the **Superposition Theorem**, calculate voltage drops at R_1 .

*Litar dalam Rajah A2(b) mempunyai satu bekalan arus 6mA dan satu bekalan voltan 24V . Dengan menggunakan **Teorem Tindihan**, kirakan nilai voltan yang susut pada perintang R_1 .*

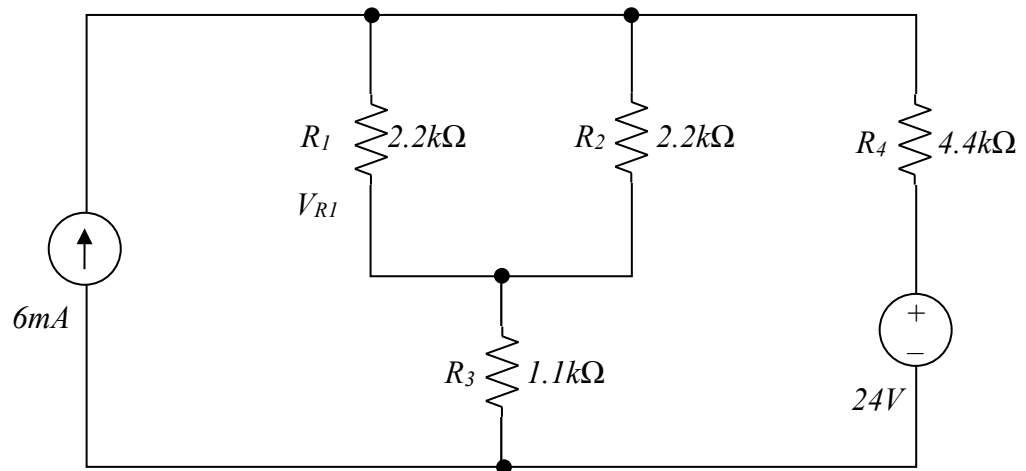


Diagram A2(b) / Rajah A2(b)

[8 marks]

[8 markah]

CLO1
C3

- (c) Figure A2 (c) shows an electrical circuit. Calculate the Norton resistance (R_N) and Norton current (I_N) values when terminals a-b are opened.

Rajah A2(c) menunjukkan satu litar elektrik. Kirakan nilai rintangan setara Norton (R_N) dan arus Norton (I_N) apabila terminal a-b pada dibuka.

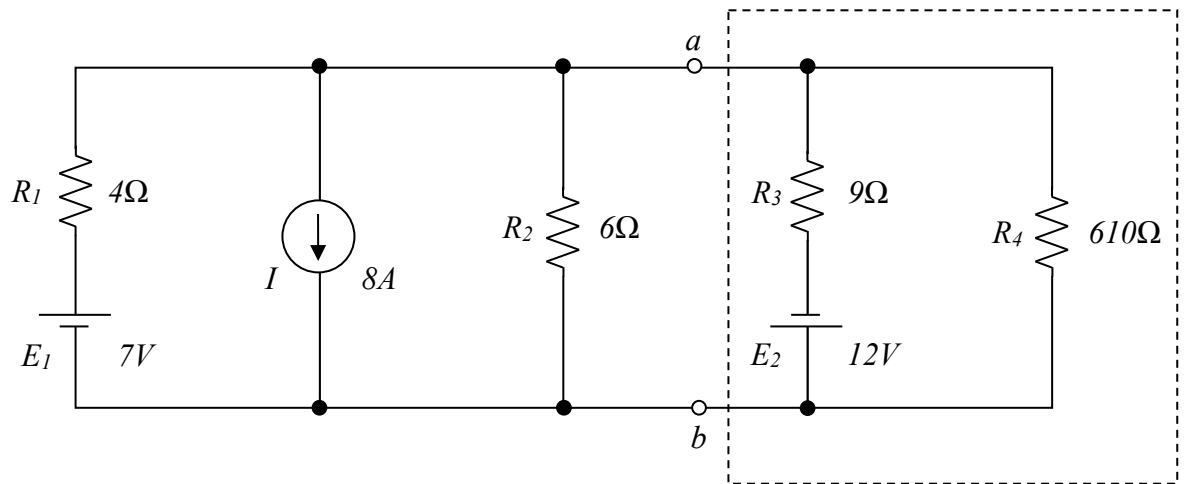


Diagram A2(c) / *Rajah A2(c)*

[9 marks]

[9 markah]

QUESTION 3**SOALAN 3**CLO1
C3

- (a) Diagram A3(a), shows the inductance circuit connection, Calculate
- Calculate voltage and current across the inductance if the switch is thrown into position 1 at $t = 0s$.
 - The mathematical expressions for the response of v_c and i_c if the switch is thrown into position 2 at $t = 48ms$.

Rajah A3(b), menunjukkan sambungan litar indukten:

- Kirakan voltan dan arus melintasi indukten jika suis digerakkan ke kedudukan 1 pada $t = 0s$.*
- Ungkapan matematik untuk v_c dan i_c jika suis digerakkan ke kedudukan 2 pada $t = 48ms$.*

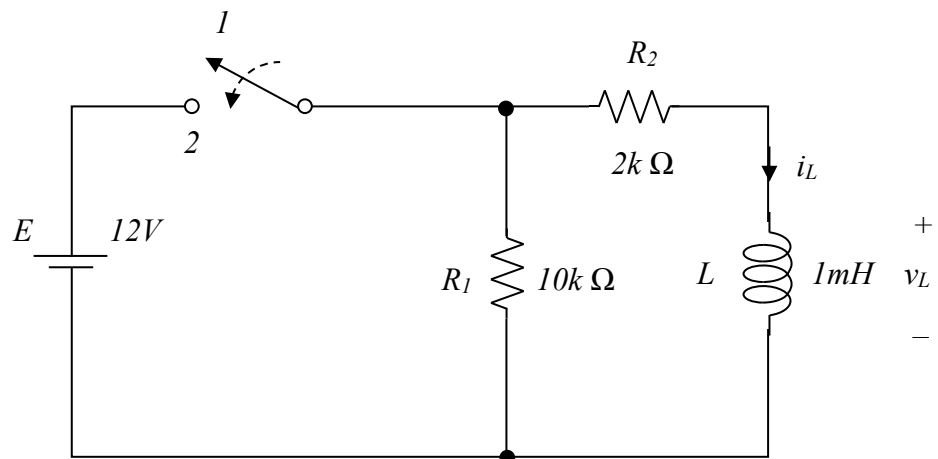


Diagram A3(a) / Rajah A3(b)

[8 marks]

[8 markah]

CLO1
C3

- (b) Diagram A3(b), shows the capacitor circuit connection:
- Calculate the voltage and current across the capacitor if the switch is thrown into position 1 at $t = 0$ s.
 - Write the mathematical expressions for the response of v_c and i_c if the switch is thrown into position 2 at $30\mu\text{s}$.

Rajah A3(b), menunjukkan sambungan litar kapasitor :

- Kirakan nilai voltan dan arus melintasi kapasitor jika suis digerakkan ke kedudukan 1 pada $t = 0$ s.*
- Tuliskan ungkapan matematik untuk v_c dan i_c jika suis digerakkan ke kedudukan 2 pada $t = 30\mu\text{s}$.*

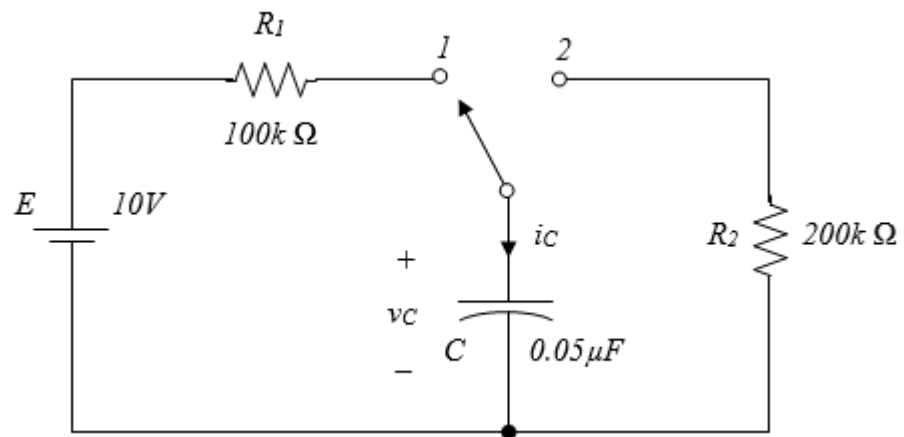


Diagram A3(b) / Rajah A3(b)

[8 marks]

[8 markah]

CLO1
C3

- (c) (i) Compute the magnetic flux Φ established in the series magnetic circuit of Diagram A3(c)(i).

Hitungkan fluks magnet Φ yang terbentuk dalam litar siri magnet seperti dalam Rajah A3(c)(i).

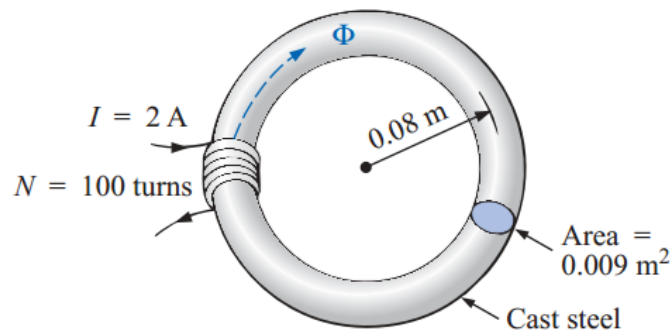


Diagram A3(c)(i) / Rajah A3(c)(i)

[4 marks]
[4 markah]

- (ii) Calculate the secondary current I_2 for the transformer of Diagram A3(c)(ii) if the resultant clockwise flux in the core is 1.5×10^{-5} Wb.

Kirakan arus sekunder I_2 untuk pengubah Rajah A3(c)(ii) jika fluks arah jam yang dihasilkan dalam teras ialah 1.5×10^{-5} Wb.

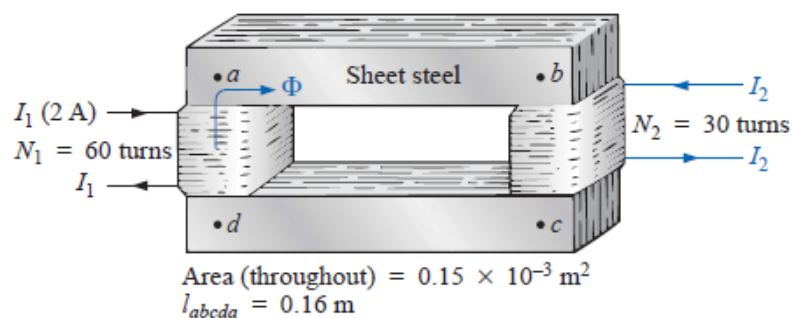


Diagram A3(c)(ii) / Rajah A3(c)(ii)

[5 marks]
[5 markah]

SECTION B: 25 MARKS
BAHAGIAN B: 25 MARKAH

INSTRUCTION:

This section consists of **ONE (1)** essay questions. Answer the questions.

ARAHAN:

*Bahagian ini mengandungi **SATU (1)** soalan esei. Jawab semua soalan.*

CLO1
C3

QUESTION 1
SOALAN 1

- (a) Diagram B1(a) shows the transformer, Calculate:
- the equivalent resistance R_e .
 - the equivalent reactance X_e .
 - the equivalent circuit reflected to the primary.
 - the load voltage V_L .

Rajah B1(a) menunjukkan pengubah, Kirakan:

- rintangan setara R_e .*
- reaktan setara X_e .*
- litar setara dipantulkan ke primer.*
- voltan beban V_L .*

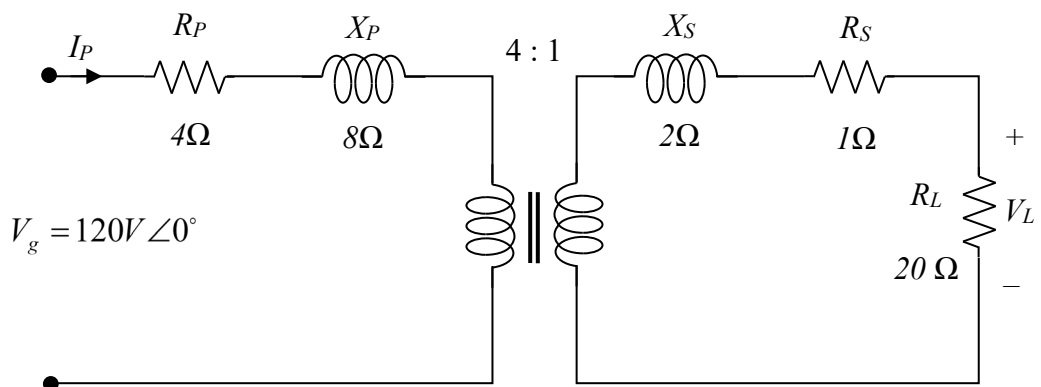


Diagram B1(a) / Rajah B1(a)

[10 marks]

[10 markah]

- (b) Diagram B1(b), shows a circuit with the source's voltage of 8V and 1V is connected with a number of resistors. Calculate the current I_1 using Mesh Analysis.

Rajah B1(b), menunjukkan litar yang mempunyai voltan bekalan 8V dan 1V, dihubungkan dengan sejumlah perintang. Kirakan nilai arus I_1 dengan menggunakan Mesh Analysis.

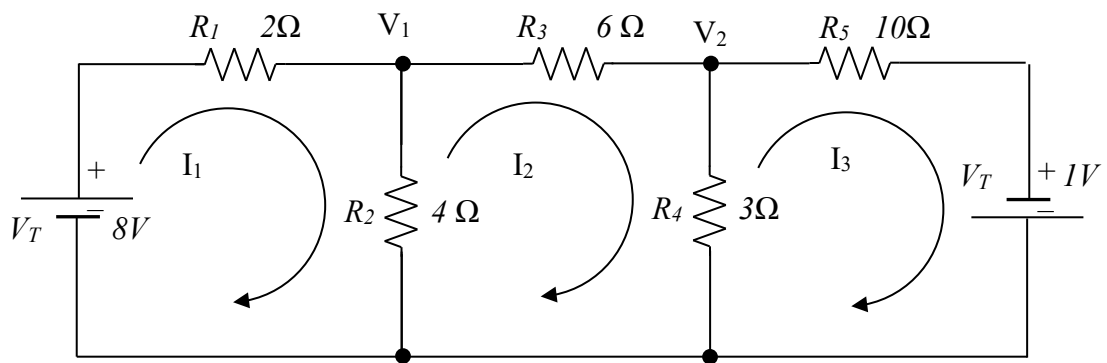


Diagram B1(b) / *Rajah B1(b)*

[15 marks]

[15 markah]

SOALAN TAMAT