

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENGAJIAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR
SESI JUN 2014

DET1013: ELECTRICAL TECHNOLOGY

TARIKH : 06 NOVEMBER 2014
MASA : 08.30 AM – 10.30 AM (2 JAM)

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Objektif (10 soalan)

Bahagian B: Struktur (4 soalan)

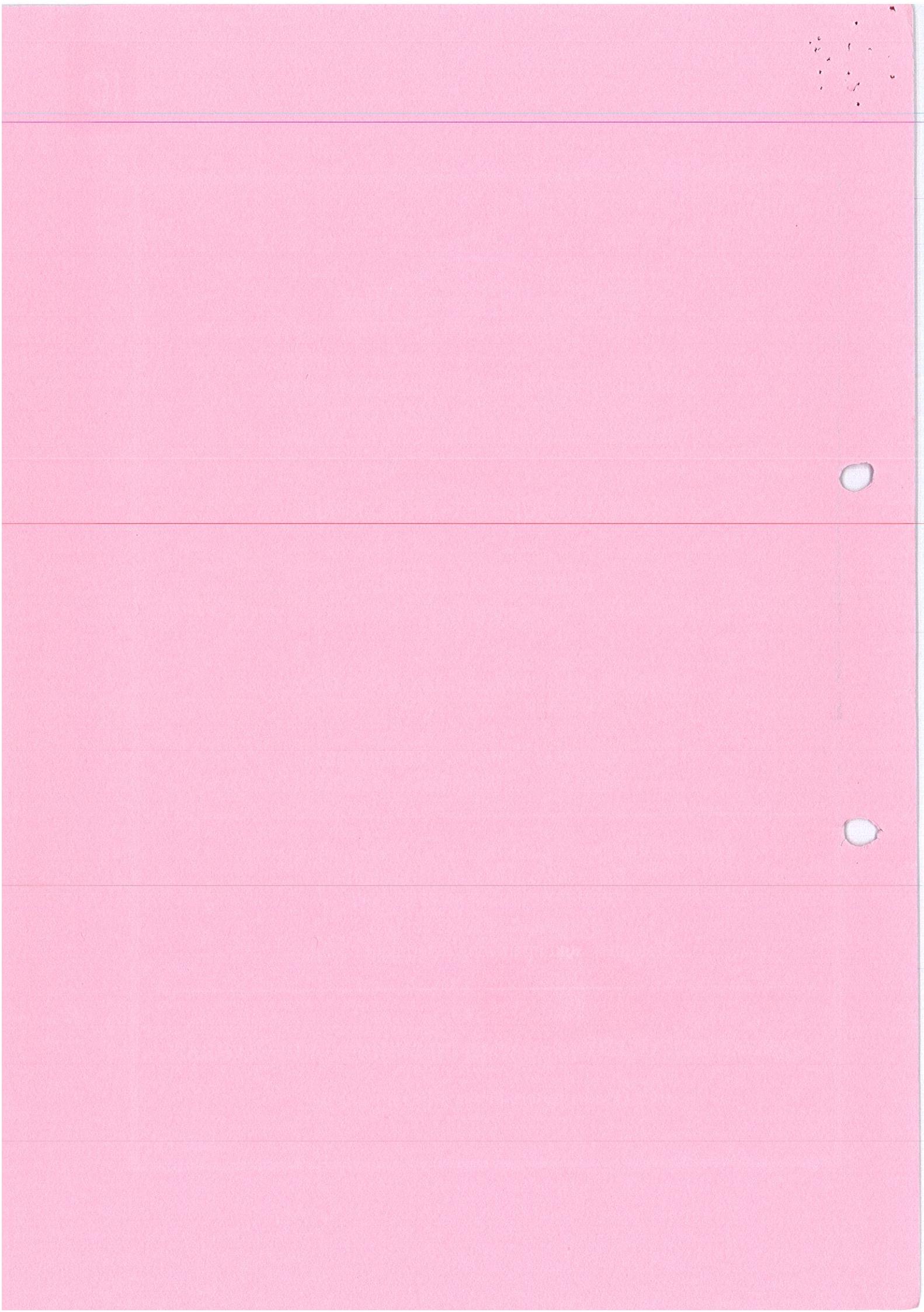
Bahagian C: Esei (2 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A : 10 MARKS**BAHAGIAN A : 10 MARKAH****INSTRUCTION:**

This section consists of TEN (10) objective questions. Mark your answers in the OMR form provided.

ARAHAN :

Bahagian ini mengandungi **SEPULUH (10)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.

CLO 1
C1

1. State the basic unit of power?
Apakah unit asas bagi kuasa?

- A. Ohm
Ohm
- B. Volt
Volt
- C. Watt
Watt
- D. Ampere
Ampere

CLO 1
C2

2. Which of the following statement does not represent Ohm's Law?
Yang manakah diantara pernyataan berikut tidak menunjukkan Hukum Ohm?

- A. current / voltage = constant
Arus / voltan = pemalar
- B. voltage / current = constant
Voltan / arus = pemalar
- C. voltage = current x resistance
Voltan = arus x rintangan
- D. current = resistance x voltage
Arus = rintangan x voltan

- CLO 1 3. Based on Figure A3, determine the current I_3
 C2 Berdasarkan rajah A3, tentukan arus I_3

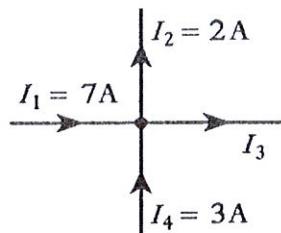


Figure A3 / Rajah A3

- A. -8A
- B. -2A
- C. 2A
- D. 8A

- CLO 2 4. Based on Figure A4 , if $R1 = 18k\Omega$, $R2 = 12k\Omega$ and $R3 = 6k\Omega$, calculate the value of RA
 C3 Berpandukan Rajah A4, jika $R1 = 18k\Omega$, $R2 = 12k\Omega$ and $R3 = 6k\Omega$, kirakan nilai bagi RA

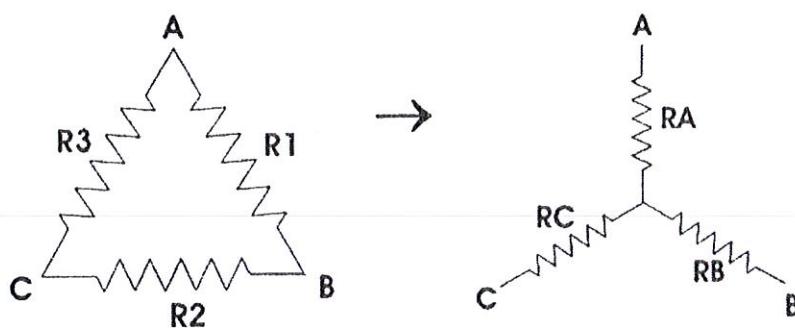


Figure A4 / Rajah A4

- A. $4k\Omega$
- B. $3 k\Omega$
- C. $6 k\Omega$
- D. $2 k\Omega$

CLO 1 5. State the measurement unit for a capacitor?
Apakah unit pengukuran bagi pemuat?

- A. Farad
- B. Ohm
- C. Ampere
- D. Volt

The ability of capacitor to store energy
Kebolehan kapasitor untuk menyimpan tenaga

LO 1 6. The statement above is referring to:
Kenyataan di atas merujuk kepada:

- A. Electric flux
Fluks elektrik
- B. Electric flux density
Ketumpatan fluks elektrik
- C. Electric field strength
Kekuatan medan elektrik
- D. Absolute permittivity
Kebolehtelapan mutlak

CLO 1 7. State the time constant symbol for an inductor
Nyatakan simbol pemalar masa bagi pearuh

- A. Δ
- B. τ
- C. t
- D. \emptyset

CLO 1

C2

8. Calculate the total inductance in Figure A8 if $L_1 = 20H$, $L_2 = 25mH$ and $L_3 = 25H$

Kirakan jumlah kemuatan dalam Rajah A8 sekiranya $L_1 = 20H$, $L_2 = 25mH$ dan $L_3 = 25H$

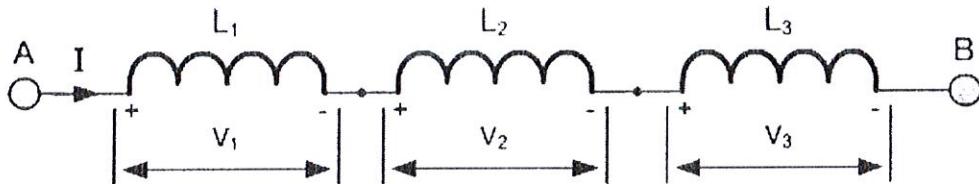


Figure A8 / RajahA8

- A. 70H
- B. 45.025H
- C. 0.025H
- D. 7.69H

CLO1

C2

9. Which of the following is NOT the common way of determining the direction of the magnetic field?

Antara yang berikut, yang manakah BUKAN cara yang biasa untuk menentukan arah medan magnet?

- A. Compass.
Kompas.
- B. Screw Rule.
Peraturan Skru.
- C. Right Hand Rule.
Peraturan Tangan Kanan.
- D. Left Hand Rule.
Peraturan Tangan Kiri.

CLO2

C3

10. Calculate the magnetomotive force in a 75 turn coil of wire when a current of 4A flows through it

Kirakan daya gerak magnet pada 75 lilitan gegelung dawai apabila arus sebanyak 4A mengalir melaluinya

- A. 18.75 At
- C. 187 At
- B. 30 At
- D. 300 At

SECTION B : 60 MARKS**BAHAGIAN B : 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) advantages of secondary cell
Nyatakan TIGA (3) kelebihan sel sekunder

[3 marks]
[3 markah]

CLO1
C2

- b) List **FOUR (4)** factors of Electrical resistance
Senaraikan EMPAT (4) faktor yang mempengaruhi rintangan

[4 marks]
[4 markah]

CLO2
C3

- c) Calculate the current flow and voltage drop at each resistor in Figure B1 (c) using Ohm's Law and Current Divider Rule
Kirakan arus yang mengalir dan susutan voltan pada setiap perintang dalam Rajah B4 dengan menggunakan Hukum Ohm dan Hukum Pembahagi Arus

[8 marks]
[8 markah]

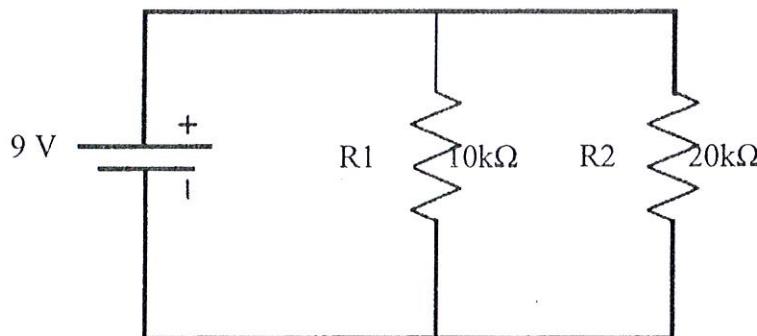


Figure B1 (c) / Rajah B1 (c)

QUESTION 2**SOALAN 2**CLO 1
C1

- a) Define Superposition Theorem

Definiskan Teorem Tindihan[3 marks]
[3 markah]CLO 1
C2

- b) By referring to Figure B2 (b), express the mesh equations for
- I_1
- and
- I_2

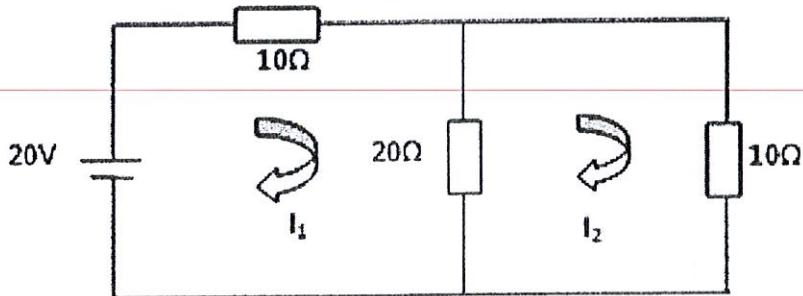
Merujuk kepada Rajah B2(b), nyatakan persamaan arus gelung I_1 dan I_2 

Figure B2 (b) / Rajah B2 (b)

[5 marks]
[5 markah]CLO 2
C3

- c) By referring to Figure B2 (c), calculate the value of
- (R_L)
- to achieve maximum power transfer, current (
- I_L
-) and power maximum (
- P_L
-)

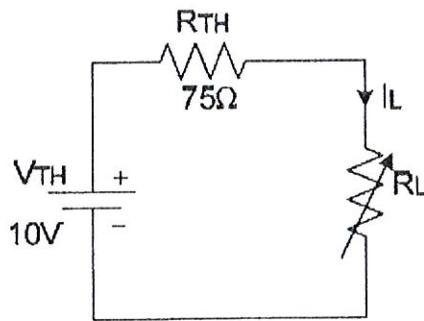
Dengan merujuk pada Rajah B2 (c), kirakan nilai (R_L) untuk mencapai tahap pemindahan kuasa maksimum, nilai arus (I_L) dan nilai kuasa maksimum (P_L) 

Figure B2 (c) / Rajah B2 (c)

[7 marks]
[7 markah]

QUESTION 3**SOALAN 3**

CLO 1

C1

- a) Define a capacitor and state its basic formula.

Takrifkan pemuat dan tuliskan formula asas bagi pemuat

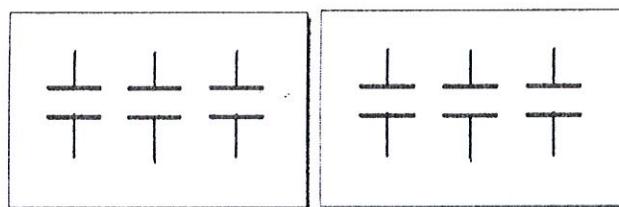
[3 marks]
[3 markah]

CLO 1

C2

- b) Connect each set of capacitor in Figure B3 (b) in series and parallel

Sambungkan setiap set pemuat di dalam Rajah B3 (b) secara siri dan selari



Series/Siri

Parallel/Selari

Figure B3 (b) / Rajah B3 (b)

CLO 2

C3

- c) Based on Figure B3 (c), calculate C_5 when $C_T = 2\mu F$

Berdasarkan Rajah B3 (c), kirakan C_5 apabila $C_T = 2\mu F$

[5 marks]
[5 markah]

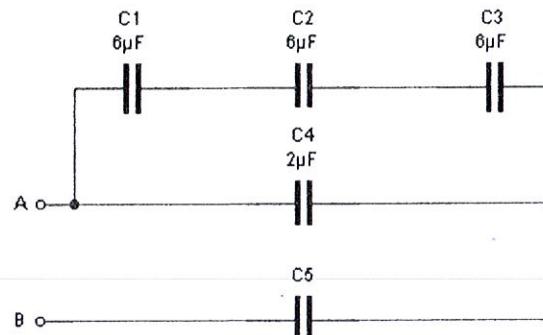


Figure B3 (c) / Rajah B3 (c)

[7 marks]
[7 markah]

QUESTION 4**SOALAN 4**CLO 1
C1

- a) State **THREE (3)** factors that influenced the inductances
Nyatakan TIGA (3) faktor yang mempengaruhi kearuan

[3 marks]
[3 markah]

CLO 1
C2

- b) Express formula for total inductance, L_T and draw connection if **THREE (3)** inductors L1, L2 and L3 are connected in series and parallel

Nyatakan persamaan jumlah aruhan, L_T dan lukiskan sambungan jika TIGA (3) pearuh L1, L2 dan L3 disambung secara siri dan selari

[5 marks]
[5 markah]

CLO 2
C3

- c) By referring to Figure B4 (c), calculate the inductor current after the switch is closed for $30 \mu\text{s}$
Dengan merujuk kepada Rajah B4 (c), kirakan arus peraruh selepas $30 \mu\text{s}$ suis ditutup

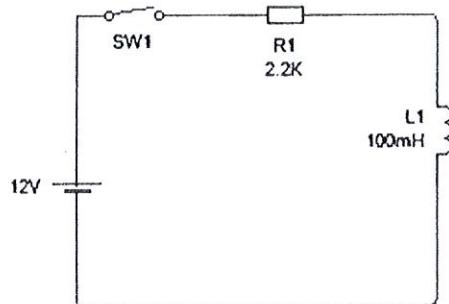


Figure B4 (c) / Rajah B4 (c)

[7 marks]
[7 markah]

SECTION C : 30 MARKS**BAHAGIAN C : 30 MARKAH****INSTRUCTION:**

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

LO 2
C3

Kirchhoff's Laws include two circuit laws that are essential to the analysis of electrical circuits. They are Kirchhoff's Current Law (also known as Kirchhoff's First Law) and Kirchhoff's Voltage Law (also known as Kirchhoff's Second Law). Using a suitable diagram, explain Kirchoff's Current Law (KCL). By referring to Figure C1, calculate the current that flows through 6Ω resistor by using Kirchoff's Law .

Hukum Kirchhoff's termasuk dua hukum litar yang penting bagi analisis litar elektrik. Ia adalah Hukum Arus Kirchhoff (juga dikenali sebagai Hukum Kirchhoff 's pertama) dan Hukum Voltan Kirchhoff (juga dikenali sebagai Hukum Kirchhoff kedua). Menggunakan rajah yang sesuai, terangkan Hukum Arus Kirchoff. Dengan merujuk kepada Rajah C1, kirakan arus yang melalui perintang 6Ω dengan menggunakan Hukum Kirchoff's.

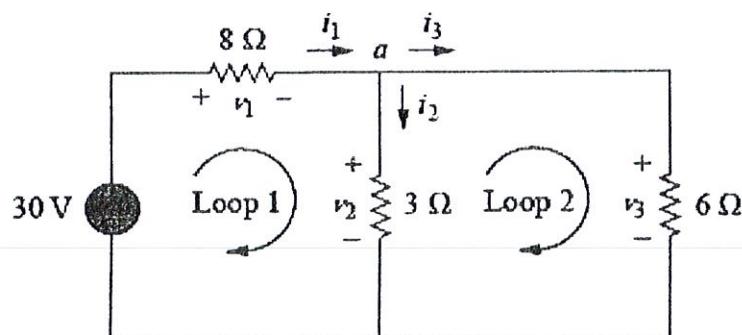


Figure C1 / Rajah C1

[15 marks]
[15 markah]

QUESTION 2
SOALAN 2CLO 2
C3

A coil is uniformly wound on a toroidal core. Given the value of $\Phi = 0.5 \mu\text{Wb}$, $N = 600$ turns, cross sectional area $A = 1 \text{ cm}^2$ and current $I = 2\text{A}$. Explain magnetomotive force (fm). Calculate magnetomotive force, winding flux density, the reluctance of the magnetic flux path and magnetic field strength when length, $l = 0.3 \text{ m}$.

Sebuah gegelung dibalut dengan teras toroid. Diberi nilai $\Phi = 0.5 \mu\text{Wb}$, $N = 600$ lilitan, luas permukaan rentas, $A = 1 \text{ cm}^2$ dan arus $I = 2\text{A}$. Nyatakan maksud daya gerak magnet. Kirakan daya gerak magnet, ketumpatan fluks lilitan, keengganan bagi laluan fluks magnet dan kekuatan medan magnet apabila panjang, $l = 0.3 \text{ m}$.

[15 marks]
[15 markah]**SOALAN TAMAT**