

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR  
SESI DISEMBER 2014

**DET1013: ELECTRICAL TECHNOLOGY**

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TARIKH : 14 APRIL 2015  
MASA : 8.30 – 10.30 PAGI

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

Bahagian A: Objektif (10 soalan)

Bahagian B: Struktur (4 soalan)

Bahagian C: Esei (2 soalan)

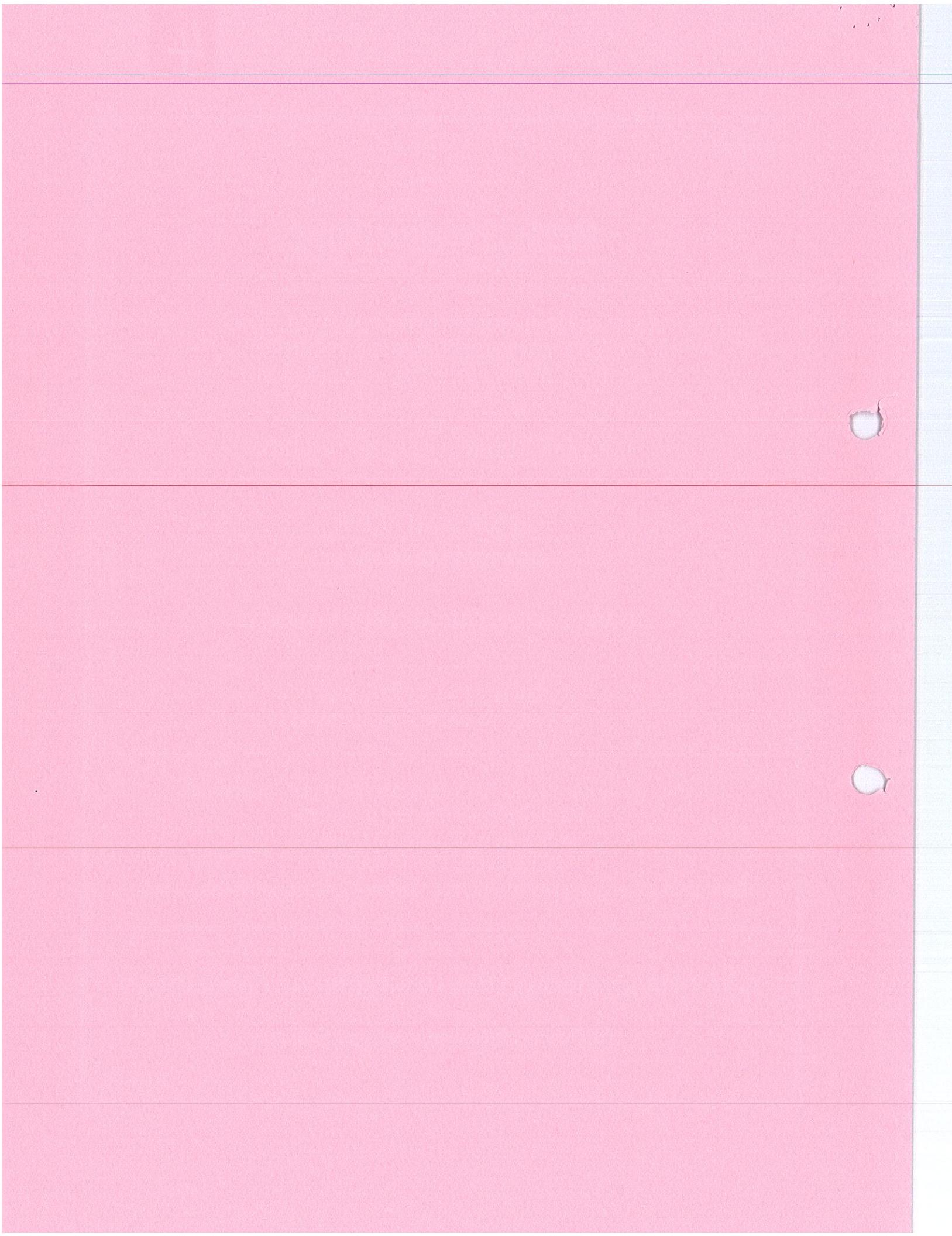
Dokumen sokongan yang disertakan : Kertas Graf, Formula-dsb / Tiada

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**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. Ohm's law is a relationship between

*Hukum Ohm ialah hubungan di antara*

- A. Voltage, current and time  
*Voltan, arus dan masa*
- B. Power, current and resistance  
*Kuasa, arus dan rintangan*
- C. Resistance, current and time  
*Rintangan, arus dan masa*
- D. Voltage, current and resistance  
*Voltan, arus dan rintangan*

CLO 1  
C2

2. Which of the following formula for electrical power, P is **TRUE**?

*Yang manakah persamaan untuk kuasa elektrik, P berikut adalah **BENAR**?*

- A.  $P = I^2V$
- B.  $P = V^2/R$
- C.  $P = IR^2$
- D.  $P = I^2/V$

- CLO 1      3. "The sum of currents entering a junction of a network must equal the sum of the currents leaving the same junction".

This statement is refer to :

"Jumlah arus yang memasuki cabang litar adalah sama dengan jumlah arus keluar pada cabang tersebut".

Penyataan diatas merujuk kepada:

- A. Ohm's Law  
*Hukum Ohm*
- B. Ohm's Current Law  
*Hukum Arus Ohm*
- C. Kirchoff's Current Law  
*Hukum Arus Kirchoff*
- D. Kirchoff's Voltage Law  
*Hukum voltan Kirchoff*



- CLO 2      4. By referring to the circuit in Figure A4, calculate  $I_N$  between the terminal A and B

*Merujuk kepada litar dalam Figure A4, kirakan  $I_N$  diantara terminal A dan B*

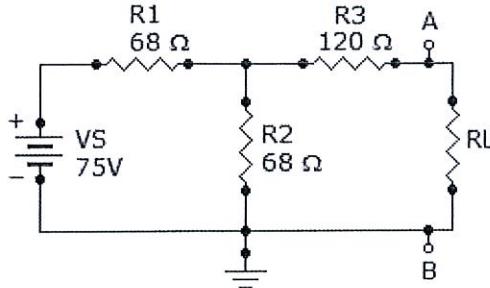


Figure A4 / Rajah A4

- A. 676 mA
- B. 245 mA
- C. 431 mA
- D. 75 mA

CLO 1  
C1

5. A capacitor is fully charged when the time constant is equal to \_\_\_\_\_

*Suatu pemuat akan mencapai cas penuh apabila pemalar masa bersamaan dengan \_\_\_\_\_.*

- A.  $6RC$
- B.  $5RC$
- C.  $RC$
- D.  $10RC$

CLO 1  
C2

6. Determine the total capacitance if three  $25\mu F$  capacitors are connected in series.

*Tentukan jumlah kemudahan jika tiga pemuat  $25\mu F$  disambung secara sesiri.*

- A.  $75\mu F$
- B.  $75F$
- C.  $8.33\mu F$
- D.  $0.12\mu F$

CLO 1  
C1

7. State the unit for inductance?

*Nyatakan unit bagi kearuhan?*

- A. Farad (F)
- B. Henry (H)
- C. Joule (J)
- D. Coulomb (C)

CLO 1  
C2

8. Identify the formula for total inductance in **PARALLEL** connection

*Kenalpasti formula bagi jumlah kearuhan yang disambung secara **SELARI***

- A.  $L_T = L_1 = L_2 = \dots = L_n$
- B.  $L_T = L_1 + L_2 + \dots + L_n$
- C.  $L_T = 1/L_1 + 1/L_2 + \dots + 1/L_n$
- D.  $1/L_T = 1/L_1 + 1/L_2 + \dots + 1/L_n$

CLO 1 9. For a wire wound core, an increase in current through the coil will

C2 *Bagi satu teras belitan wayar, peningkatan arus melalui gelung akan*

- A. reverses the flux lines  
*membalikkan garisan fluks*
- B. decreases the flux density  
*mengurangkan ketumpatan fluks*
- C. increases the flux density  
*meningkatkan ketumpatan fluks*
- D. causes no change in flux density  
*menyebabkan tiada perubahan ketumpatan fluks*



CLO 2 10. If the total flux in a magnetic circuit is 2mWb and the cross sectional area of the C3 circuit is  $10\text{cm}^2$ , the flux density is.....

*Sekiranya jumlah fluks dalam litar magnet adalah 2mWB dan luas keratan rentas litar adalah  $10\text{cm}^2$ , ketumpatan fluks adalah.....*

- A. 0.2T
- B. 2T
- C. 20T
- D. 20mT



**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)** main effects of electric current

*Nyatakan **TIGA (3)** kesan utama arus electric*

[3 marks]

[3 markah]

CLO1  
C2

- b) Calculate the individual resistance for the star network from delta network as shown in Figure B1(b).

*Kirakan kerintangan individu untuk rangkaian bintang daripada rangkaian delta yang ditunjukkan dalam Rajah B1(b).*

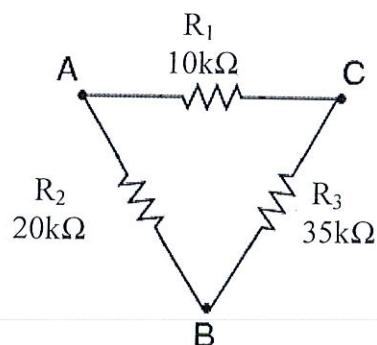


Figure B1(b) / Rajah B1(b)

[5 marks]  
[5 markah]

CLO2  
C3

- c) Calculate the total resistance,  $I_S$ ,  $I_1$ ,  $I_2$ ,  $V_1$  and  $V_2$  as shown in Figure B1(c).

*Kira jumlah rintangan,  $I_s$ ,  $I_1$ ,  $I_2$ ,  $V_1$  and  $V_2$  seperti yang ditunjukkan dalam Rajah B1(c)*

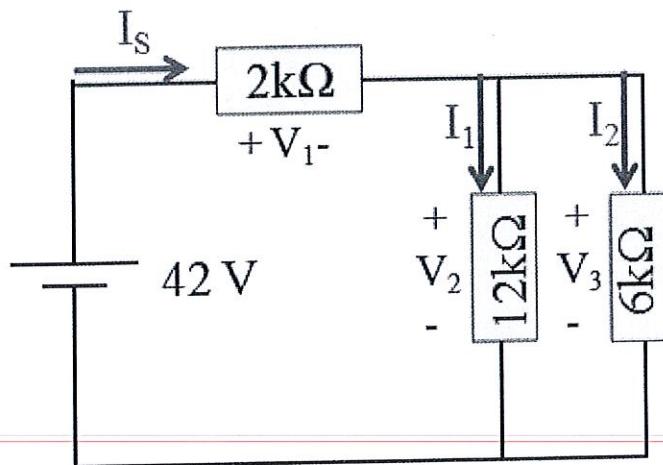


Figure B1 (c) / Rajah B1 (c)

[7 marks]  
[7 markah]

## QUESTION 2

### SOALAN 2

CLO 1  
C1

- a) Define Thevenin's Theorem and draw its Equivalent circuit  
*Takrifkan Teorem Thevenin dan lakarkan litar setara Thevenin*

[3 marks]  
[3 markah]

- CLO 1  
C2 b) Express the equation for loop 1 and loop 2 by using Kirchoff's Law for the circuit in Figure B2(b)

*Nyatakan persamaan gelung 1 dan gelung 2 dengan menggunakan Hukum Kirchoff berdasarkan Rajah B2(b)*

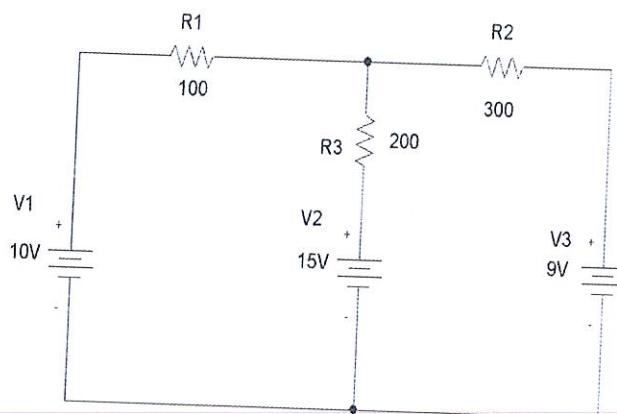


Figure B2(b) / Rajah B2(b)

[4 marks]  
[4 markah]

- CLO 2  
C3 c) Calculate the branch current through  $R_1$  using the mesh method as shown in Figure B2(c).

*Kirakan arus cabang,  $I_{R1}$  menggunakan kaedah gelung seperti yang ditunjukkan dalam Rajah B2(c).*

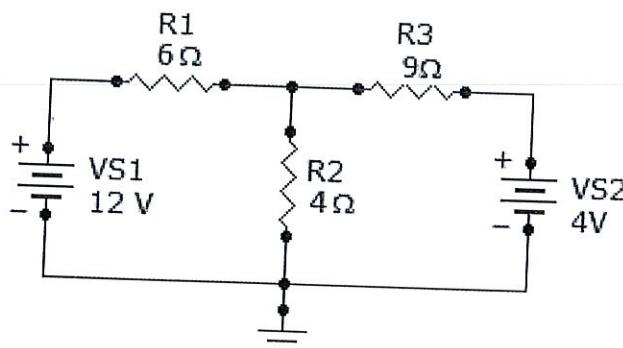


Figure B2(c) / Rajah B2(c)

[8 marks]  
[8 markah]

**QUESTION 3**  
**SOALAN 3**

CLO 1  
C1

- a) List **TWO (2)** types of capacitor and sketch **ONE (1)** symbol of capacitor.

*Senaraikan DUA (2) jenis pemuat dan SATU (1) simbol pemuat.*

[3 marks]  
[3 markah]

CLO 1  
C2

- b) Determine the total capacitances as shown in Figure B3(b).

*Tentukan jumlah kemuatan seperti yang ditunjukkan dalam Rajah B3(b).*

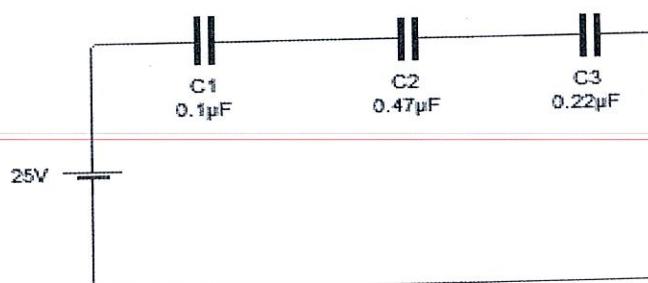


Figure B3(b) / Rajah B3(b)

[5 marks]  
[5 markah]

CLO 2  
C3

- c) A capacitor consists of two circular metal plates, each with a radius of 5 cm. The plates are parallel to each other and separated by a distance of 1 mm. The capacitor also connected to 9 volt battery across the plates in vacuum. Calculate the capacitance of the capacitor and the charge on each plate

*Satu kapasitor mempunyai dua plat besi dengan setiap satunya berjejari 5 cm. Kedudukan plat adalah selari dan jarak antara plat ialah 1 mm. Kedua-dua plat kapasitor ini disambung kepada 9V bateri dan dalam keadaan vakum. Kirakan kemuatan kapasitor dan cas setiap plat*

[7 marks]  
[7 markah]

**QUESTION 4**  
**SOALAN 4**

- CLO 1      a) Define induced voltage and state its formula

*Nyatakan maksud voltan teraruh dan formulanya*

[3 marks]  
[3 markah]

- CLO 1      b) Explain first Faraday's Law by using suitable diagram

*Terangkan dengan bantuan gambarajah Hukum Faraday yang pertama*

[4 marks]  
[4 markah]

- CLO 2      c) Calculate the equivalent inductance,  $L_T$  between terminal A and B as shown in Figure B4(c)

*Kirakan arahan setara,  $L_T$  antara terminal A dan B seperti yang ditunjukkan dalam Rajah B4(c)*

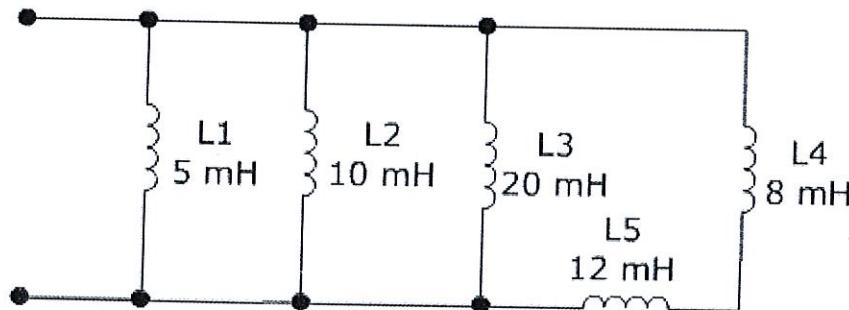


Figure B4(c) / Rajah B4(c)

[8 marks]  
[8 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 esei. Jawab **SEMUA** soalan.

**QUESTION 1****SOALAN 1**

CLO 2  
C3

Calculate  $V_{th}$ ,  $R_{th}$  and current through load resistor,  $R_L$  as shown in Figure C1

Kirakan  $V_{th}$ ,  $R_{th}$  dan arus yang melalui perintang beban,  $R_L$  seperti yang ditunjukkan dalam Rajah C1.

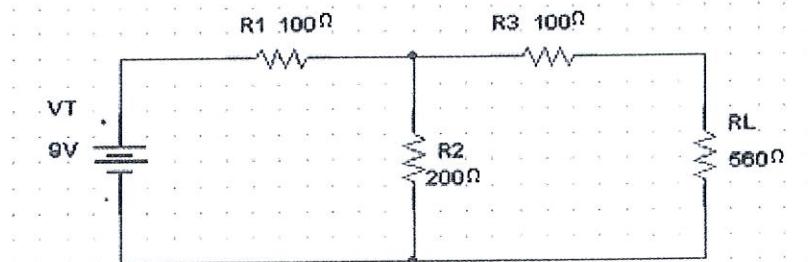


Figure C1 / Rajah C1

[15 marks]

[15 marks]

**QUESTION 2****SOALAN 2**CLO 2  
C3

Given the value of the current = 0.3A, coil = 500 turns, flux,  $\emptyset = 536\mu\text{Wb}$ , cross-sectional area (A) = 1800mm<sup>2</sup> and length, l = 150mm. Calculate magnetomotive force (m.m.f), reluctance of the circuit, magnetic flux density (B) and permeability,  $\mu$  by referring to Figure C2.

Diberi arus = 0.3A, gegelung = 500 lilitan, fluks,  $\emptyset = 536\mu\text{Wb}$  dan panjang l = 150mm.  
Kirakan daya gerak magnet, keengganan litar, ketumpatan fluks magnetik (B) dan ketelapan,  $\mu$  dengan merujuk Rajah C2.

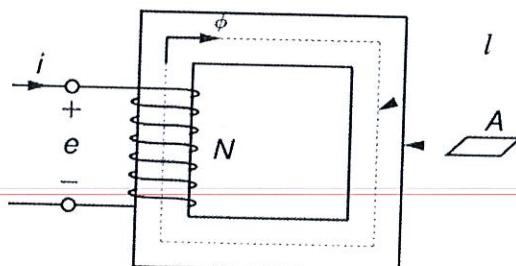


Figure C2 / Rajah C2

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



3