

**SULIT**



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

**JABATAN KEJURUTERAAN ELEKTRIK**

**PEPERIKSAAN AKHIR**

**SESI JUN 2018**

**DET1013 : ELECTRICAL TECHNOLOGY**

**TARIKH : 14 NOVEMBER 2018**

**MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)**

---

Kertas ini mengandungi **TIGA BELAS (13)** 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 SOALAN INI 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.*

CLO1  
C1

1. Determine the right statement from the list below.

*Tentukan pernyataan yang benar daripada senarai di bawah.*

- A. A cell is a series of two or more connected battery.  
*Sel adalah sambungan sesiri dua atau lebih bateri yang bersambung.*
- B. A battery changes electrical energy into chemical energy.  
*Bateri mengubah tenaga elektrik kepada tenaga kimia.*
- C. A battery is a series of two or more connected cells.  
*Bateri adalah sambungan sesiri dua atau lebih sel.*
- D. The total voltage of batteries that connected in parallel is the sum of each voltage in batteries.  
*Jumlah keseluruhan voltan bateri yang disambungkan secara selari adalah hasil tambah setiap voltan pada bateri.*

CLO1  
C2

2. Calculate the total current flowing into circuit in Figure A2.

*Kirakan jumlah arus keseluruhan yang mengalir dalam litar pada Rajah A2.*

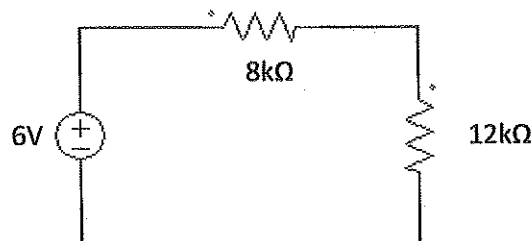


Figure A2/ Rajah A2

- A. 0.3A  
 B. 300A  
 C. 300mA  
 D. 0.3mA

CLO1  
C1

3. Identify equation that is related to the maximum power transfer.  
*Kenalpasti persamaan yang berkaitan dengan pindahan kuasa maksimum.*

- A.  $R_L = R_{TH}$   
 B.  $\Sigma I_{in} = \Sigma I_{out}$   
 C.  $\Sigma V_{supply} = \Sigma V_{drop}$   
 D.  $V = IR$

CLO2  
C2

4. Based on Figure A4, calculate the Thevenin resistance,  $R_{TH}$ .  
*Berdasarkan Rajah A4, kirakan rintangan Thevenin,  $R_{TH}$ .*

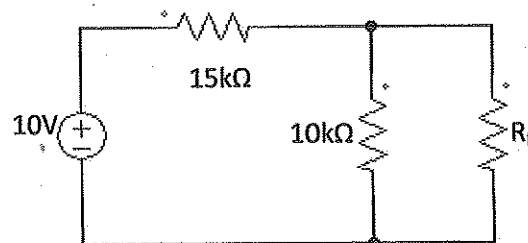


Figure A4/ Rajah A4

- A.  $25k\Omega$   
 B.  $6k\Omega$   
 C.  $5k\Omega$   
 D.  $10k\Omega$

CLO1  
C2

5. Using KCL, determine the value of current  $c$  in Figure A5.  
*Dengan menggunakan KCL, tentukan nilai arus  $c$  pada Rajah A5.*

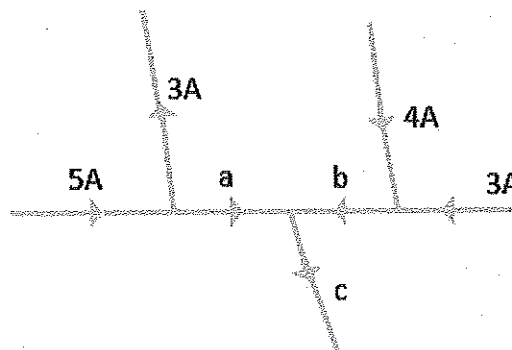


Figure A5/ Rajah A5

- A. 5A  
 B. 9A  
 C. 15A  
 D. 4A

CLO1  
C1

6. State the material located between two plates of capacitor.

*Nyatakan bahan yang terletak di antara dua plat kapasitor.*

- A. Conductor  
*Pengalir*
- B. Insulator  
*Penebat*
- C. Induktor  
*Pearuh*
- D. Dielectric  
*Dieletrik*

CLO1  
C2

7. Determine the total capacitance if three  $30\mu\text{F}$  capacitors are connected in series.

*Tentukan jumlah kemuatan jika tiga pemuat  $30\mu\text{F}$  disambung secara sesiri.*

- A. 10mF
- B.  $10\mu\text{F}$
- C. 90mF
- D.  $90\mu\text{F}$

CLO1  
C1

8. State the definition of an inductor.

*Nyatakan definisi pearuh.*

- A. A component which restricts the flow of electric current  
*Komponen yang menyekat pengaliran arus elektrik*
- B. A passive component that can store energy in an AC circuit  
*Komponen pasif yang boleh menyimpan tenaga dalam litar AU*
- C. A component that conducts electric current in only one direction  
*Komponen yang menjalankan arus elektrik dalam satu arah sahaja*
- D. A passive component that can store electric charge in an AC circuit  
*Komponen pasif yang boleh menyimpan cas elektrik di litar AU*

CLO1  
C2

9. Identify which of the following is **NOT** the characteristic of the magnetic flux.

*Kenalpasti yang manakah antara yang berikut adalah **BUKAN** ciri fluks magnet.*

A. The flux lines are elastic and easily shaped.

*Garis fluks adalah elastik dan mudah dibentuk.*

B. The flux lines will cross each other.

*Garis fluks akan melintasi antara satu sama lain.*

C. The magnetic flux lines show the exiting direction from the north pole and entering direction to the south pole forming a complete loop.

*Garis fluks magnet menunjukkan arah keluar dari kutub utara dan arah masuk melalui kutub selatan dan membentuk satu gelung lengkap.*

D. All flux lines having the same orientation will combine and attract each other, while flux lines having the opposite orientation will repel one another.

*Semua garis fluks yang mempunyai orientasi yang sama akan menarik antara satu sama lain, manakala garis fluks yang mempunyai orientasi yang bertentangan akan menolak antara satu sama lain.*

CLO2  
C2

10. Calculate the magnetic flux density in a magnetic field if the magnetic flux in  $0.1\text{m}^2$  cross sectional area is  $600\ \mu\text{Wb}$ .

*Kirakan ketumpatan fluks di dalam medan magnet jika fluks magnetik di dalam luas keratan rentas  $0.1\text{m}^2$  adalah  $600\ \mu\text{Wb}$ .*

A.  $6000\ \mu\text{T}$

B.  $600\ \mu\text{T}$

C.  $600\ \text{mT}$

D.  $60\ \text{T}$

## SECTION B: 30 MARKS

## BAHAGIAN B: 30 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 the definition of Ohm's Law.

*Nyatakan definisi Hukum Ohm's.*

[3 marks]

[3 markah]

CLO1  
C2

- b) By referring to Figure B1(b), given that total resistance in the circuit is  $1.5\text{k}\Omega$ , determine  $R_2$ .

*Merujuk kepada Rajah B1(b), diberi nilai kerintangan dalam litar ialah  $1.5\text{k}\Omega$ , tentukan nilai  $R_2$ .*

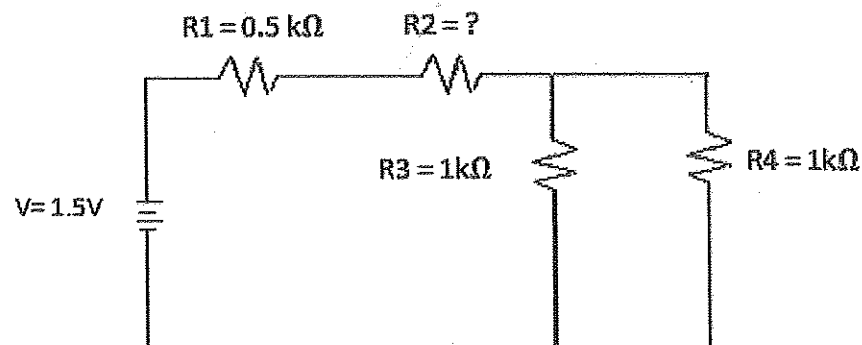


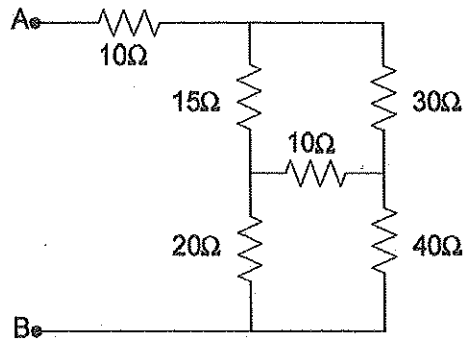
Figure B1 (b) / Rajah B1(b)

[5 marks]  
[5 markah]

CLO2  
C3

- c) Referring to **Figure B1(c)**, using STAR-DELTA transformation, calculate the total resistor ( $R_T$ ).

*Merujuk Rajah B1 (c), menggunakan penukaran BINTANG-DELTA, Kirakan jumlah perintang ( $R_T$ ).*



**Figure B1(c) / Rajah B1( c)**

[7 marks]  
[7 markah]

## QUESTION 2

## SOALAN 2

CLO1  
C1

- a) Define Norton's Theorem and sketch the NORTON'S Equivalent circuit.

*Takrifkan Teorem Norton dan lakarkan litar setara Norton.*

[3 marks]

[3 markah]

CLO1  
C2

- b) Determine the network which is shown in Figure B2 (b) into an equivalent Thevenin circuit.

*Tentukan rangkaian yang ditunjukkan dalam Rajah B2(b) kepada litar setara Thevenin.*

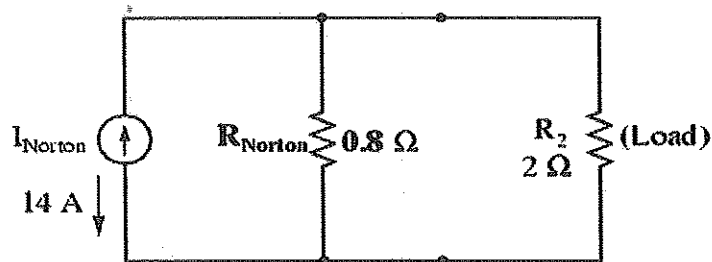


Figure B2 (b)/ Rajah B2 (b)

[5 marks]

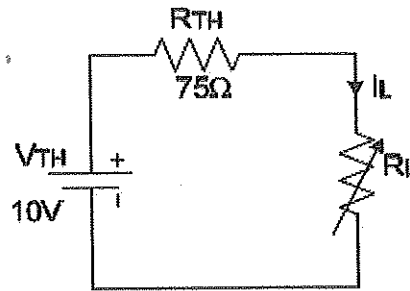
[5 markah]



CLO 2  
C3

c) Referring to **Figure B2(c)**,  
*Merujuk pada Rajah B2(c),*

- i. Determine the value of ( $R_L$ ) to achieve maximum power transfer.  
*Tentukan nilai ( $R_L$ ) untuk mencapai pindahan kuasa maksimum.*
- ii. Calculate the current ( $I_L$ ).  
*Kirakan nilai arus ( $I_L$ ).*
- iii. Calculate the maximum power ( $P_L$ ).  
*Kirakan nilai kuasa maksimum ( $P_L$ ).*



**Figure B2(c)/Rajah B2(c)**

[7 marks]

[7 markah]

## QUESTION 3

## SOALAN 3

CLO1  
C2

- a) By suitable diagram, differentiate symbol between fixed inductor and variable inductor.

*Dengan menggunakan gambarajah yang sesuai, bezakan simbol pearuh pearuh tetap dan pearuh boleh laras.*

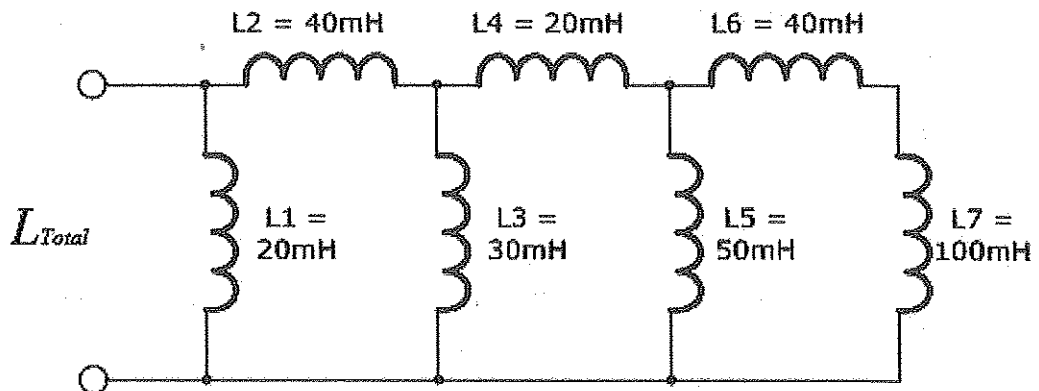
[3 marks]

[3 markah]

CLO1  
C3

- b) Referring to **Figure B3 (b)**, calculate the total inductance for circuit below.

*Merujuk kepada **Rajah B3 (b)**, tentukan jumlah kearuhan bagi litar di bawah.*



**Figure B3 (b) / Rajah B3 (b)**

[6 marks]

[6 markah]

CLO2  
C3

- c) The winding of an electromagnet has an inductance of 3H and a resistance of  $15\Omega$  and connected to a 120V voltage supply. Calculate:

*Suatu gelungan elektromagnet mempunyai kearuhan sebanyak 3H and kerintangannya  $15\Omega$  dan disambungkan dengan bekalan kuasa 120V. Kirakan:*

- i. The maximum current flowing in the winding  
*Nilai arus maksima yang melalui gelung.*
- ii. The time constant of the circuit.  
*Masa pemalar bagi litar tersebut.*
- iii. The value of the induced e.m.f. after 0.1s.  
*Nilai bagi d.g.e terjana selepas 0.1s*

[6 marks]

[6 markah]

## QUESTION 4

## SOALAN 4

CLO1  
C1

- a) State **THREE (3)** characteristics of magnetic field / flux lines.

*Nyatakan TIGA (3) ciri medan magnet/garisan fluks*

[3 marks]

[3 markah]

CLO 1  
C2

- a) A current of 5A is passed through a 1000-turn coil wound on a circular magnetic circuit of radius 120 mm. Calculate the magnetomotive force,  $F_m$  and magnetic field strength,  $H$ .

*Arus 5A melalui 1000 lilitan gegelung dalam litar magnet membulat dengan jejari 120mm. Kira daya gerak magnet,  $F_m$  dan kekuatan medan magnet,  $H$ .*

[5 marks]

[5 markah]

CLO 2  
C3

- b) Explain the Faraday's First Law and Faraday's Second Law with a suitable diagram.

*Terangkan Hukum Faraday's Pertama dan Hukum Faraday's Kedua dan lukiskan gambarajah yang bersesuaian.*

[7 marks]

[7 markah]

## SECTION C: 50 MARKS

## BAHAGIAN C: 50 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

By applying Kirchoff's Current Law (KCL) and Kirchoff's Voltage Law (KVL), calculate the value of  $I_1$ ,  $I_2$  and  $I_3$  in Figure C1.

Dengan mengaplikasikan Hukum Arus Kirchoff (KCL) dan Hukum Voltage Kirchoff (KVL), kira nilai  $I_1$ ,  $I_2$  dan  $I_3$  dalam Rajah C1.

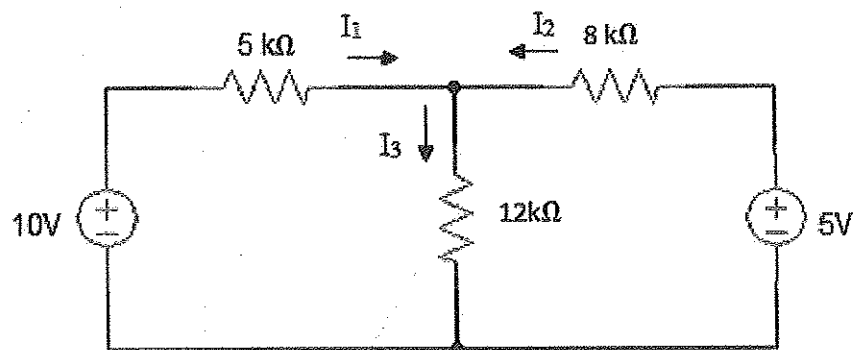


Figure C1/ Rajah C1

[15 marks]

[15 markah]

## QUESTION 2

## SOALAN 2

CLO2  
C3

Figure C2 shows a  $4700\mu\text{F}$  capacitor is connected in series with a  $5.6\text{ k}\Omega$  resistor and a  $6\text{Vdc}$  supply. When the switch is ON, calculate the time constant, initial charge current, time taken for capacitor voltage to increase to  $3\text{V}$ , the voltage across the capacitor at  $20\text{s}$  and energy stored in the capacitor.

*Rajah C2 menunjukkan kapasitor  $4700\mu\text{F}$  disambungkan secara sesiri dengan perintang  $5.6\text{ k}\Omega$  dan bekalan  $6\text{Vat}$ . Apabila suis dihidupkan, kirakan pemalar masa, arus awalan cas, masa diambil untuk voltan kapasitor meningkat kepada  $3\text{V}$ , nilai voltan kapasitor pada  $20\text{s}$ , dan tenaga yang tersimpan di dalam kapasitor.*

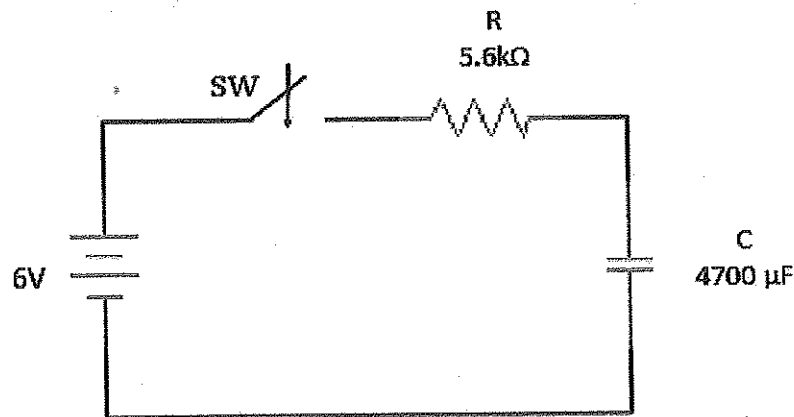


Figure C2 / Rajah C2

[15 marks]

[15 markah]

SOALAN TAMAT