

SULIT



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

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR  
**SESI DISEMBER 2018**

**DET1013: ELECTRICAL TECHNOLOGY**

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**TARIKH : 23 APRIL 2019**  
**MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)**

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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

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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

SULIT

62

**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. Select the basic unit of potential difference.

*Pilih unit asas bagi beza upaya.*

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

CLO1  
C2

2. Determine the current when 15V is applied across a  $1k\Omega$  resistor.

*Tentukan nilai arus apabila 15V dibekalkan merentasi perintang  $1k\Omega$ .*

- A. 0.015A
- B. 0.150A
- C. 1.500A
- D. 15.00A

A technique for replacing an electrical network, as viewed from a two-part output terminals by a single voltage source in series with a single resistor.

*Satu kaedah untuk menukar rangkaian elektrik, yang dilihat daripada dua terminal keluaran kepada satu voltan bekalan sesiri dengan satu perintang.*

CLO1  
C1

3. Identify which of electrical theorem represent the statement above.

*Tentukan hukum elektrik yang manakah mewakili kenyataan di atas.*

- A. Norton Theorem  
*Teorem Norton*
- B. Thevenin Theorem  
*Teorem Thevenin*
- C. Superposition Theorem  
*Teorem Superposition*
- D. Maximum Power Transfer Theorem  
*Teorem Pindahan Kuasa Maksima*

CLO2  
C2

4. Referring to Figure A4, calculate the current through  $R_3$  if voltage source  $V_{S2}$  is removed and replaced by short circuit wire when using the Superposition Theorem. Given the total current,  $I_1$  is 2A.

*Merujuk kepada Rajah A4, kirakan arus yang melalui  $R_3$  jika sumber voltan  $V_{S2}$  dibuang dan digantikan dengan wayar litar pintas apabila menggunakan Teorem Superposition. Diberi jumlah arus,  $I_1$  ialah 2A.*

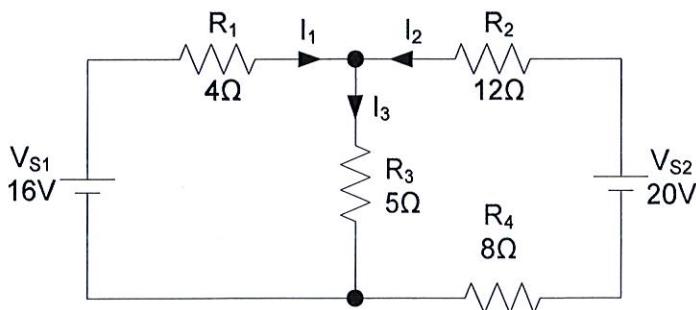


Figure A4 / Rajah A4

- A. 0.4A
- B. 1.6A
- C. 1.8A
- D. 2.0A

- CLO1      5. Calculate the current through load resistor,  $I_{RL}$ , if the Thevenin's voltage,  $V_{TH} = 10V$ , Thevenin's resistance,  $R_{TH} = 15\Omega$  and load resistance,  $R_L = 100\Omega$ .

*Kirakan arus yang mengalir pada rintangan beban,  $I_{RL}$ , jika voltan Thevenin,  $V_{TH} = 10V$ , rintangan Thevenin,  $R_{TH} = 15\Omega$  dan rintangan beban,  $R_L = 100\Omega$ .*

- A. 0.086mA
- B. 8.696mA
- C. 86.96mA
- D. 869.6mA

- CLO1      6. Identify the time taken when a capacitor is fully charged.

*Kenalpasti masa yang diambil apabila pemuat dicas sepenuhnya.*

- A.  $\tau$
- B.  $2\tau$
- C.  $5\tau$
- D.  $7\tau$

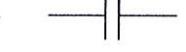
- CLO1      7. Determine the total capacitance if four  $22.2\mu F$  capacitors are connected in parallel.

*Tentukan jumlah kemuatan jika empat  $22.2\mu F$  disambung secara selari.*

- A.  $8.88\mu F$
- B.  $88.8\mu F$
- C.  $5.55\mu F$
- D.  $55.5\mu F$

- CLO1      8. Identify the symbol for inductor.

*Kenalpasti simbol bagi pearuh.*

- A. 
- B. 
- C. 
- D. 

- CLO1      9. Determine which of the following is NOT a characteristic of magnetic field.

C2

*Kenalpasti yang manakah antara berikut BUKAN ciri-ciri medan magnet*

- A. *Forming a close loop*  
Membentuk satu gelung tertutup
- B. Has a certain direction  
*Mempunyai arah tertentu*
- C. Cross against each other  
*Bersilang antara satu sama lain*
- D. Repel between one another  
*Menolak antara satu sama lain*

- CLO2      10. A coil has 2000 turns and current flow is 0.25A. Calculate the magnetomotive force,  $F_m$ .

C2

*Satu gelung mempunyai 2000 lilitan dan aliran arus ialah 0.25A. Kirakan daya gerak magnet,  $F_m$ .*

- A. 5 AT
- B. 50 AT
- C. 500 AT
- D. 5000 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 (a) State **THREE (3)** main effects of electric current.

*Nyatakan **TIGA (3)** kesan utama arus elektrik.*

[3 marks]  
[3 markah]

- CLO1 C2 (b) By referring to Figure B1 (b), calculate the voltage drop through each resistor using Voltage Divider Rule.

*Dengan berpandukan Rajah B1(b), kirakan susut voltan pada setiap perintang menggunakan Hukum Pembahagi Voltan.*

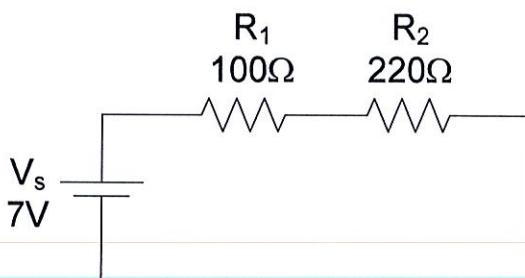


Figure B1(b) / Rajah B1(b)

[5 marks]  
[5 markah]

CLO2  
C3

- (c) Calculate the total resistance and current through each resistor by referring to Figure B1(c).

*Kirakan jumlah rintangan dan arus yang melalui setiap perintang merujuk pada Rajah B1(c).*

[7 marks]  
[7 markah]

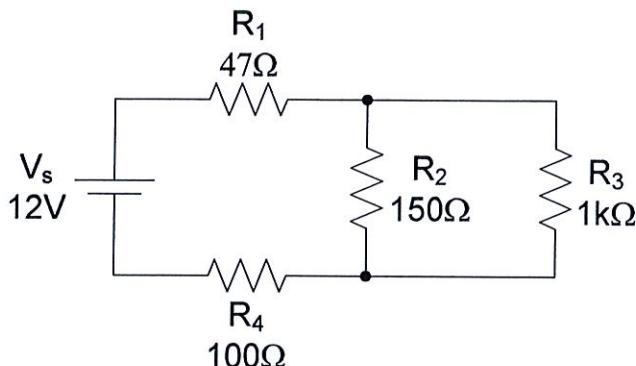


Figure B1(c) / Rajah B1(c)

### QUESTION 2 SOALAN 2

CLO1  
C1

- (a) Define Norton Theorem.

*Takrifkan Teorem Norton.*

[3 marks]  
[3 markah]

CLO1  
C2

- (b) Referring to Figure B2 (b), convert Thevenin equivalent circuit to Norton equivalent circuit. Determine the Norton Current,  $I_N$  and Norton Resistance,  $R_N$ .

*Merujuk kepada Rajah B2 (b), tukarkan litar setara Thevenin kepada litar setara Norton. Tentukan Arus Norton,  $I_N$  dan Rintangan Norton,  $R_N$ .*

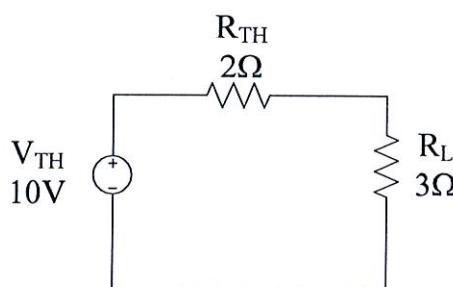


Figure B2 (b) / Rajah B2 (b)

[5 marks]  
[5 markah]

CLO2  
C3

- (c) Based on Figure B2(c), calculate Thevenin Resistance,  $R_{TH}$  and Thevenin Voltage,  $V_{TH}$  through Load Resistance,  $R_L$  using Thevenin Theorem.

*Berdasarkan Rajah B2(c), kirakan Rintangan Thevenin,  $R_{TH}$  dan Voltan Thevenin,  $V_{TH}$  yang melalui rintangan beban,  $R_L$  menggunakan Teorem Thevenin.*

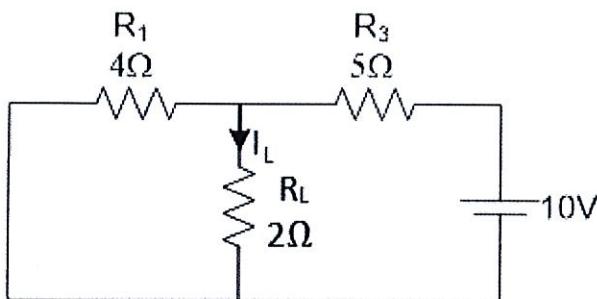


Figure B2(c) / Rajah B2(c)

[7 marks]  
[7 markah]

### QUESTION 3 SOALAN 3

CLO1  
C2

- (a) Explain and draw a suitable diagram for the first Faraday's Law.

*Terangkan dan lukis menggunakan gambarajah yang sesuai mengenai Hukum Faraday yang pertama.*

[3 marks]  
[3 markah]

CLO1  
C3

- (b) Calculate the equivalent inductance,  $L_T$  between terminal **a** and **b** as shown in Figure B3 (b).

*Kirakan arahan setara,  $L_T$  antara terminal **a** dan **b** seperti yang ditunjukkan dalam Rajah B3 (b).*

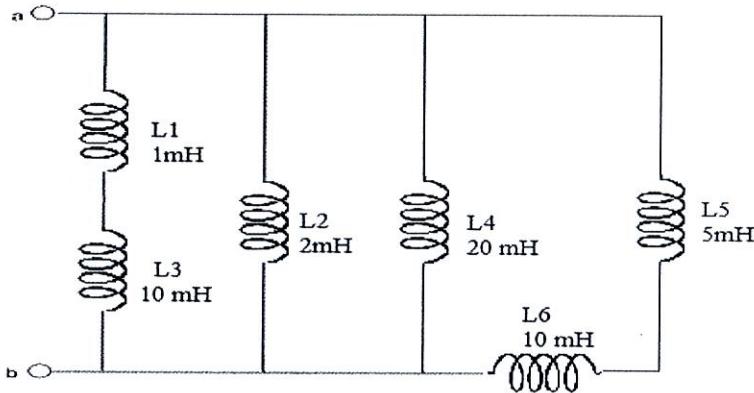


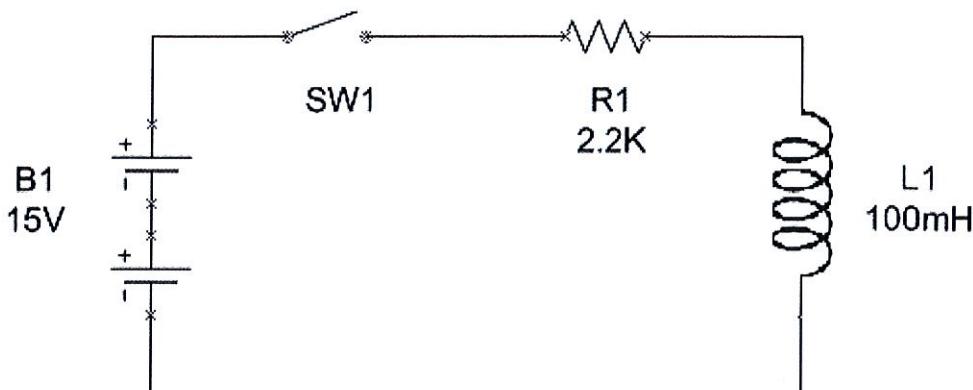
Figure B3(b) / Rajah B3(b)

[6 marks]  
[6 markah]

CLO2  
C3

- (c) By referring to Figure B3(c), calculate the inductor current after the switch is closed for  $30\mu\text{s}$ .

*Dengan merujuk kepada Rajah B3(c), kirakan arus yang melalui pearuh selepas  $30\mu\text{s}$  suis ditutup.*



**Figure B3(c) / Rajah B3(c)**

[6 marks]  
[6 markah]

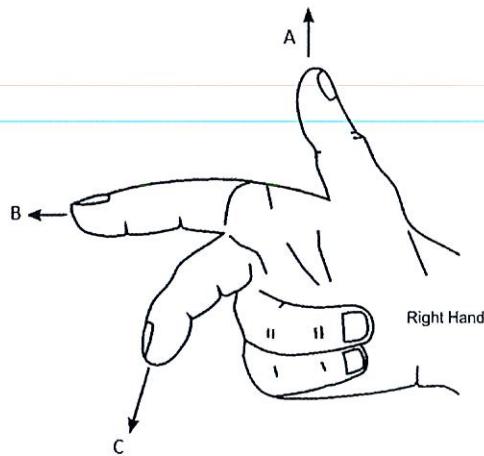
#### QUESTION 4

#### SOALAN 4

CLO1  
C1

- (a) By referring to Figure B4(a), state the finger representation of Fleming's Right Hand Rule.

*Dengan merujuk kepada Rajah B4(a), nyatakan perwakilan jari bagi Hukum Tangan Kanan Fleming.*



**Figure B4(a)/ Rajah B4(a)**

[3 marks]  
[3 markah]

CLO1  
C2

- (b) By using a suitable diagram, explain **ONE (1)** method to determine magnetic field direction.

*Dengan menggunakan gambarajah yang sesuai, terangkan **SATU (1)** kaedah untuk menentukan arah medan magnet.*

[5 marks]  
[5 markah]

CLO2  
C3

- (c) A coil having 200 turns and carry 0.5A current. If the length of magnetic circuit is 20cm, calculate the magnetomotive force and magnetic field strength.

*Satu gegelung mempunyai 200 lilitan dan membawa arus 0.5A. Jika panjang litar magnetik ialah 20cm, kirakan daya gerak magnet dan kekuatan medan magnet.*

[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**CLO2  
C3

Calculate the current  $I_1$ ,  $I_2$  and  $I_3$  in Figure C1 by using Kirchoff Law.

*Kirakan arus  $I_1$ ,  $I_2$  dan  $I_3$  dalam Rajah C1 dengan menggunakan Hukum Khirchoff.*

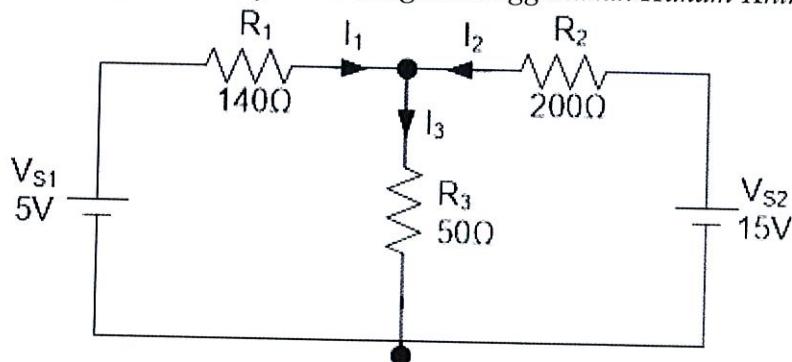


Figure C1 / Rajah C1

[15 marks]  
[15 markah]

**QUESTION 2****SOALAN 2**

- CLO2 C3 A  $220\mu F$  capacitor is connected in series with a  $1.3k\Omega$  resistor and a 120VDC voltage supply. Calculate the initial current, the time constant during charging, the time taken to be fully charge, potential different across capacitor at  $t = 2ms$  and the energy stored in the capacitor.

*Pemuat  $220\mu F$  disambungkan secara sesiri dengan perintang  $1.3k\Omega$  dan bekalan voltan 120VDC. Kirakan arus permulaan, pemalar masa semasa mengecas, masa yang diambil untuk mengecas sepenuhnya, beza keupayaan merentasi pemuat pada masa  $t = 2ms$  dan tenaga yang disimpan dalam pemuat.*

[15 marks]  
[15 markah]

**SOALAN TAMAT**