SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI JUN 2015

DET1013: ELECTRICAL TECHNOLOGY

TARIKH : 05 NOVEMBER 2015
TEMPOH : 2.30 PM – 4.30 PM (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (14)** 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 SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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) Explain the definition of Ohm's Law.

Terangkan definisi bagi Hukum Ohm. [3 marks]
[*3 markah*]

CLO1
C2

(b) Determine the value of R_1, R_2 and R_3 in Figure B1 (b).

Tentukan nilai R_1, R_2 dan R_3 seperti di dalam rajah B1 (b).

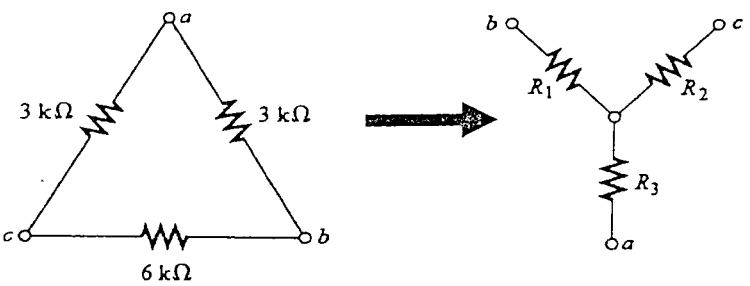

Figure B1 (b)/*Rajah B1 (b)*

[5 marks]
[*5 markah*]

CLO2
C3

(c) i. Referring to Figure B1 (c), calculate the value of the current flow through the 6 Ω resistor when the voltmeter shows 18 V.
Merujuk kepada Rajah B1 (c), kirakan nilai arus yang mengalir menerusi rintangan 6 Ω apabila bacaan meter voltan menunjukkan 18 V.

ii. Refer to Figure B1 (c), explain what happens to the power dissipated by the 6 Ω resistor if the voltage across it doubles.
Terangkan apa yang berlaku kepada kuasa lesapan rintangan 6 Ω sekiranya voltan merintanginya digandakan.

[7 marks]
[*7 markah*]

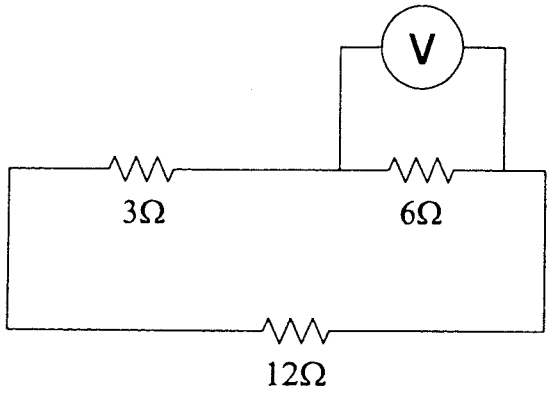

Figure B1 (c) / *Rajah B1 (c)*

QUESTION 2

SOALAN 2

CLO1
C1

(a) State **TWO (2)** principles of Kirchhoff's Laws that apply to DC circuits networks.
*Nyatakan kan **DUA (2)** prinsip asas Hukum Kirchoff yang digunakan dalam rangkaian litar AT.*

[3 marks]
[*3 markah*]

CLO1
C2

(b) Referring to Figure B2(b), find the current equation flowing into node **X** and the voltage equation rises around of loop 1 and loop 2 using Kirchoff's Law.
Merujuk kepada Rajah B2(b), dapatkan persamaan bagi arus yang mengalir memasuki nod X dan persamaan bagi voltan yang terhasil dalam gelung 1 dan gelung 2 menggunakan Hukum Kirchoff.

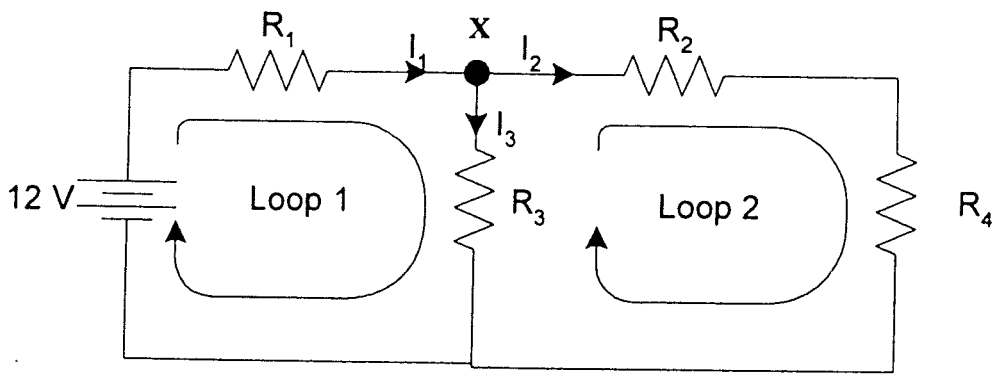

Figure B2 (b) / *Rajah B2 (b)*

[5 marks]
[*5 markah*]

CLO2
C3

(c) Referring to Figure B2 (c), find the short circuit current between point A and B of the circuit.

Merujuk Rajah B2 (c), dapatkan arus litar pintas di antara titik A dan B bagi litar tersebut.

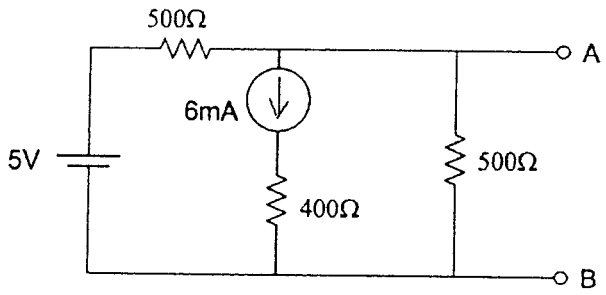

Figure B2 (c)/ *Rajah B2 (c)*

[7 marks]
[*7 markah*]

QUESTION 3

SOALAN 3

CLO1
C1

(a) State **THREE (3)** functions of inductor.

*Nyatakan **TIGA (3)** fungsi pearuh.*

[3 marks]
[*3 markah*]

CLO1
C2

(b) Referring to Figure B3(b), write Kirchoff's voltage rule for the circuit. Sketch a graph of I versus t. Shows the current when t = τ and 5τ.

Merujuk Rajah B3(b), tuliskan persamaan Hukum Kirchoff voltan bagi litar tersebut. Lakarkan graf I lawan t yang diperolehi. Tunjukkan arus apabila t =τ dan 5τ.

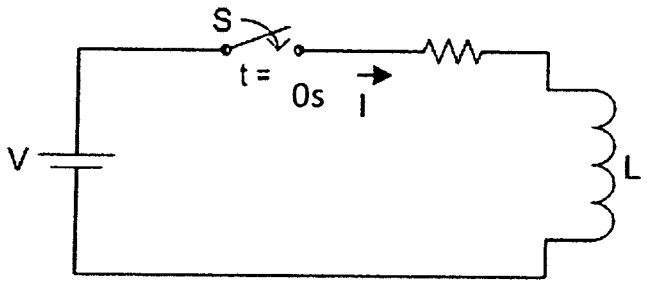

Figure B3(b)/ *Rajah B3(b)* [5 marks]
[*5 markah*]

CLO2
C3

(c) An 0.5 H inductor is connected in series with a 20 Ω resistor and a placed across a DC voltage of 120 V. Determine the time constant and energy that is stored in the inductor at time 0.025 s

Satu induktor 0.5 H yang disambung bersiri dengan perintang 20 Ω dan diletakkan voltan AT merentangi 120 V voltan AT . Tentukan pemalar masa dan tenaga yang disimpan dalam induktor pada masa 0.025 s

[7 marks]
[*7 markah*]

QUESTION 4

SOALAN 4

CLO1
C1

(a) State **TWO (2)** methods of determining magnetic field direction.
*Nyatakan **DUA (2)** kaedah bagi menentukan arah medan magnet.*

[3 marks]
[*3 markah*]

CLO1
C2

(b) Sketch the magnetic lines of two fields between parallel conductors in following condition :

Lakarkan garisan urat daya yang terbentuk diantara dua pengalir selari dalam keadaan berikut:

i) A ⊗ B ⊗

ii) A ⊗ B ⊙

iii) A ⊙ B ⊙

[5 marks]
[*5 markah*]

CLO2
C3

(c) When a conductor is moved across a magnetic field, there is a relative motion between the conductor and the magnetic field. Likewise, when a magnetic field is moved past a stationary conductor, there is also relative motion. This principle is known as electromagnetic induction and the resulting voltage is an induced voltage. Referring to statement above, with the help of a suitable diagram explain **TWO (2)** observations stated by Faraday's law.

Apabila digerakkan konduktor melintasi sesuatu medan magnet, akan terhasil pergerakkan relatif di antara konduktor tersebut dengan medan magnet tadi. Sebaliknya, juga apabila medan magnet digerakkan menerusi konduktor yang berada dalam keadaan statik, pergerakkan relatif juga terhasil. Inilah dinamakan prinsip aruhan elektromagnetik dan voltan yang terhasil dipanggil voltan teraruh.

Berdasarkan penyataan di atas, dengan bantuan gambarajah yang sesuai terangkan ***DUA (2)*** *pemerhatian yang telah dinyatakan oleh Hukum Faraday.*

[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 **TWO (2)** *soalan esei. Jawab semua soalan.*

QUESTION 1
SOALAN 1

CLO2
C3

Calculate the current I_L in Figure C1 by using Thevenin's Theorem.

Kirakan nilai arus I_L di Rajah C1 di bawah menggunakan Teorem Thevenin.

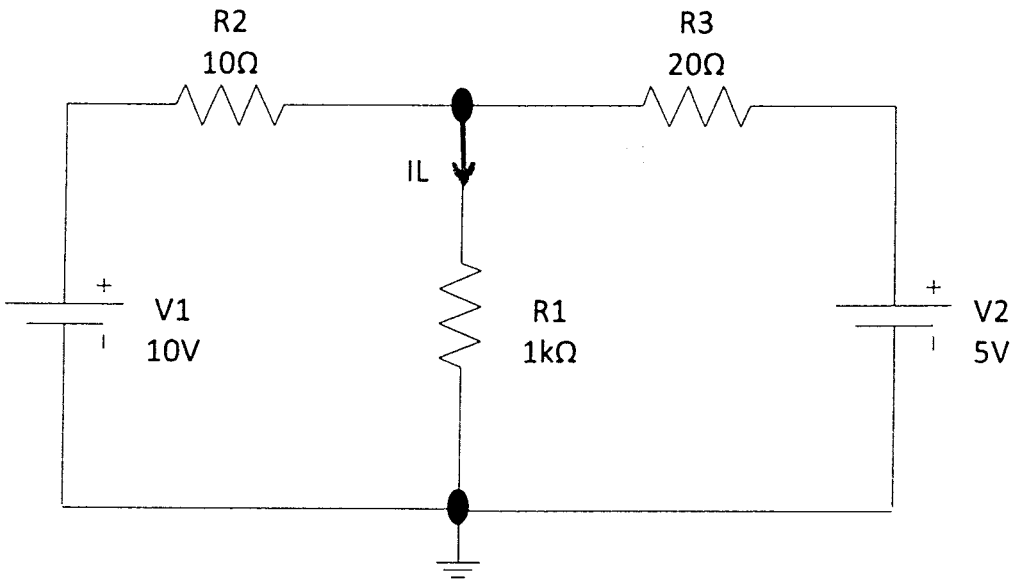

Figure C1 / Rajah C1

[15 marks]
[*15 markah*]

CLO2
C3

QUESTION 2
SOALAN 2

A capacitor with a capacitance of 20 μF which is connected in series to a 200 kΩ resistor is being placed a 250 VDC voltage supply. Calculate the initial current, initial potential different across capacitor, the time constant during charging, the time taken to be fully charge and the energy stored in the capacitor.

Suatu pemuat 20 μF disambung sesiri dengan perintang 200 kΩ dan ditempatkan merentasi bekalan voltan AT 250 V. Kirakan arus permulaan, beza keupayaan permulaan merentasi pemuat, pemalar masa semasa mengecas, masa yang diambil untuk cas sepenuhnya dan tenaga yang disimpan dalam pemuat.

[15 marks]
[15 markah]

SOALAN TAMAT