

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN KEJURUTERAAN ELEKTRIK

**PEPERIKSAAN AKHIR
SESI DISEMBER 2015**

DET1013: ELECTRICAL TECHNOLOGY

**TARIKH : 11 APRIL 2016
TEMPOH : 8.30AM-10.30AM (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 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. Identify the basic unit of potential difference.
Kenalpasti unit asas beza keupayaan.

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

CLO1
C2

2. Choose the right equation for total resistance in the circuit Figure A2.
Pilih persamaan yang betul untuk jumlah rintangan bagi litar di Rajah A2.

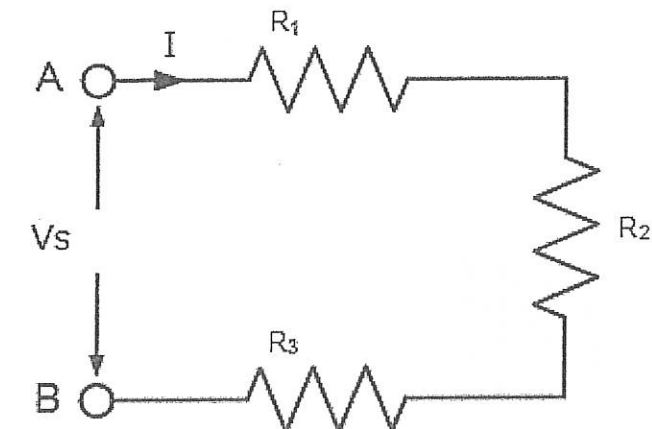


Figure A2 / Rajah A2

- A. $R_T = R_1 + R_2 // R_3$
B. $R_T = R_1 // R_2 // R_3$
C. $R_T = R_1 + R_2 + R_3$
D. $R_T = R_1 // R_2 + R_3$

CLO1
C1

3. By referring to Figure A3, recognize the equation for Loop I_1 using Kirchoff's Law.
Merujuk Rajah A3, kenalpasti persamaan bagi gelung 1 menggunakan Hukum Kirchoff's.

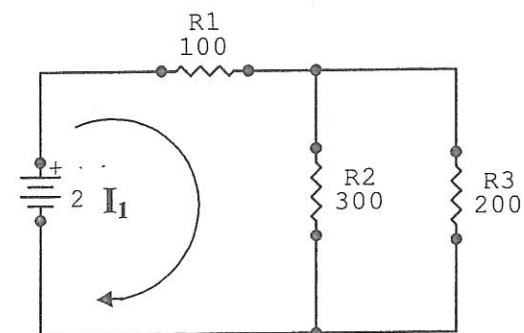


Figure A3 / Rajah A3

- A. $24V = 400I_1 - 300I_2$
 B. $24V = 400I_1 + 300I_2$
 C. $24V = 100I_1 - 300I_2$
 D. $24V = 100I_1 + 300I_2 - 200I_3$

CLO2
C2

4. Calculate the value of P_{max} for maximum power transferred in Figure A4 below.
Kirakan nilai P_{max} untuk pemindahan kuasa maksimum dalam Rajah A4 di bawah

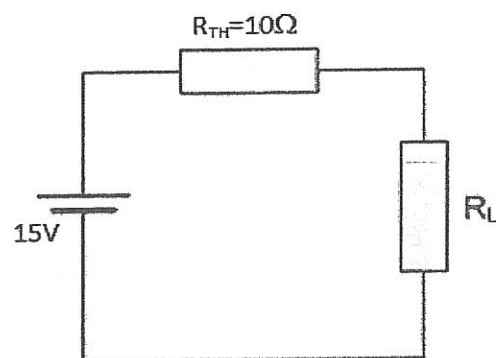


Figure A4/ Rajah A4

- A. 5.256W
 B. 5.625W
 C. 6.525W
 D. 6.252W

CLO1
C2

5. Calculate the Thevenin resistance (R_{TH}) when the supply is short circuit and R_L is in open condition at point A – B in Figure A5.
Kira rintangan Thevenin (R_{TH}) apabila bekalan di litar pintas dan R_L berada dalam keadaan terbuka pada titik A – B pada Rajah A5.

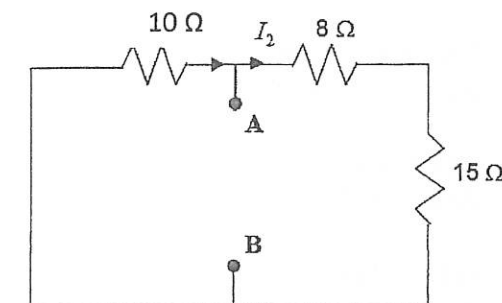


Figure A5 / Rajah A5

- A. 6.97 Ω
 B. 15.22 Ω
 C. 33 Ω
 D. 23 Ω

CLO1
C1

6. Identify the characteristic of the stored charge when the voltage across a capacitor is increased.
Tentukan ciri pada cas yang disimpan apabila voltan merentasi pemuat ditingkatkan.

- A. Increases
Meningkat
 B. Decreases
Menurun
 C. Remains constant
Kekal malar
 D. Fluctuates
Turun naik

CLO1
C2

7. Four 0.022 μF capacitors are in parallel. Calculate the total capacitance.
Empat pemuat 0.022 μF berada dalam selari. Kirakan jumlah kemuatan.

- A. 0.022 μF
 B. 0.088 μF
 C. 0.011 μF
 D. 0.044 μF

CLO1
C1

8. The following are factors that influence inductance, **EXCEPT**
*Berikut adalah faktor yang mempengaruhi kearuhan, **KECUALI***

- A. Dielectric material
Bahan Dielektrik
- B. Numbers of turn in a coil
Bilangan lilitan pada gelung
- C. Cross Sectional Area of wire
Luas keratan rentas wayar
- D. Length of coil
Panjang gelung

CLO1
C2

9.

"The direction of an induced e.m.f. is always such that it tends to set up a current opposing the motion or the change of flux responsible for inducing that e.m.f."

"Arah aruhan e.m.f. biasanya meningkatkan arus yang bertentangan dengan pergerakan atau perubahan flux yang menyebabkan aruhan e.m.f."

The above statement is related to the definition of :
Kenyataan di atas merupakan definisi bagi :

- A. Faraday's Law
Hukum Faraday
- B. Lenz's Law
Hukum Lenz
- C. Kirchoff's Law
Hukum Kirchoff
- D. Fleming's Right Hand Rule
Peraturan Tangan Kanan Fleming

CLO2
C2

10. Determine the magnetomotive force (mmf) of a wire with 8 turns carried by 3 A of current.
Kirakan nilai daya gerak magnet (dgm) untuk satu wayar dengan bilangan lilitan 8 dan membawa arus sebanyak 3 A.

- A. 2,400 At
B. 2.4 At
C. 240 At
D. 24 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 struktur. Jawab SEMUA soalan.

QUESTION 1

SOALAN 1

CLO1
C1

- (a) Define the Ohm's Law.

Takrifkan Hukum Ohm.

[3 marks]
[3 markah]

CLO1
C2

- (b) By applying Ohm's law for Figure B1(b), calculate the voltage drop at each resistor, V_{R1} , V_{R2} and V_{R3} . The value of R_1 , R_2 and R_3 is 10Ω , 20Ω and 30Ω respectively.

Dengan menggunakan hukum Ohm padarajah B1(b), kirakan voltan susut pada setiap resistor, V_{R1} , V_{R2} dan V_{R3} . Nilai R_1 , R_2 dan R_3 masing-masing adalah 10Ω , 20Ω dan 30Ω .

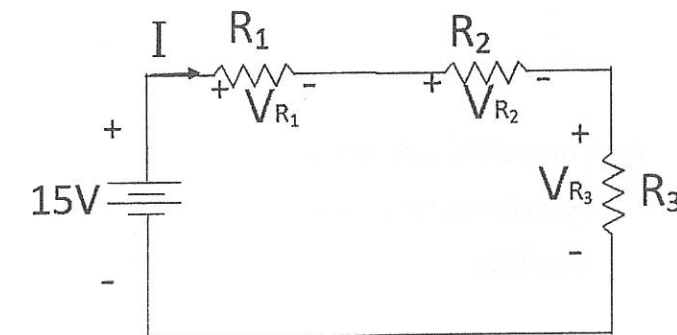


Figure B1(b) / Rajah B1(b)

[5marks]
[5 markah]

CLO2
C3

- (c) By applying the current divider rule, calculate the current that flows to each resistor in circuit of Figure B1(c).

Dengan mengaplikasikan hukum pembahagian arus, kira arus yang melalui setiap perintang dalam litar di Rajah B1(c).

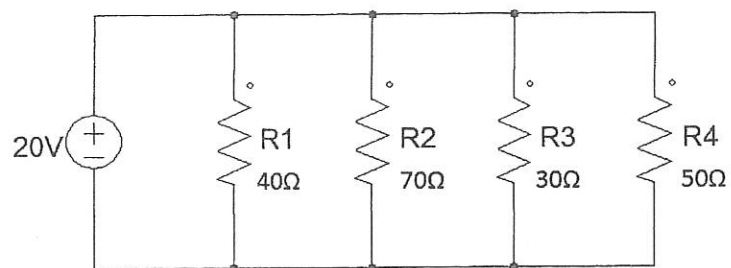


Figure B1(c) / Rajah B1(c)

[7 marks]

[7 markah]

QUESTION 2

SOALAN 2

CLO1
C1

(a) Define Thevenin Theorem.

Takrifkan Teorem Thevenin.

[3 marks]

[3 markah]

CLO1
C2

(b) Identify the steps or procedures adopted when using Thevenin's Theorem for solving any circuit problem.

Kenalpasti langkah atau prosedur yang digunakan apabila menggunakan Teorem Thevenin untuk menyelesaikan masalah litar.

[5marks]

[5markah]

CLO2
C3

(c) Convert the network shown in Figure B2(c) to an equivalent Thevenin circuit.

Tukarkan rangkaian yang ditunjukkan dalam Rajah B2(c) kepada litar setara Thevenin.

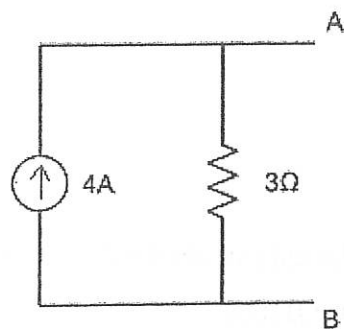


Figure B2(c) \ Rajah B2(c)

[7 marks]

[7 markah]

SULIT

QUESTION 3

SOALAN 3

CLO1
C2

(a) Determine the formula of total inductance (L_T) for the three inductors L_1, L_2, L_3 that are connected in

i. Series

ii. parallel

Senaraikan formula bagi jumlah kearuhan (L_T) untuk tiga peraruh L_1, L_2, L_3 yang disambung secara

i. Siri

ii. Selari

[3 marks]

[3 markah]

CLO1
C3

(b) By referring to the Figure B3(b), calculate the equivalent inductance (L_T) between point A and B.

Merujuk Rajah B3(b), kirakan jumlah kearuhan (L_T) antara titik A dan B.

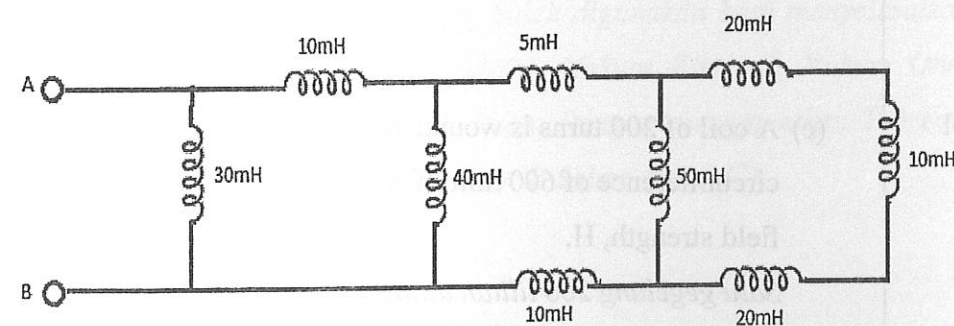


Figure B3(b) / Rajah B3(b)

[6 marks]

[6 markah]

CLO2
C3

(c) A coil of inductance 20 mH and a resistance 5 Ω is connected to a 9 volt supply.

Determine:

i. The time constant (τ).

ii. The value of current after 5ms .

iii. The value of the induced e.m.f after 3ms.

Sebuah pearly 20 mH dan perintang 5 Ω disambung pada bekalan 9 Volt. Tentukan:

- Pemalar masa (τ).
- Nilai arus selepas masa mencapai 5 ms.
- Nilai d.g.e aruhan selepas 3 ms.

[6 marks]

[6 markah]

QUESTION 4

SOALAN 4

CLO1
C1

- (a) Define permanent magnet and give **TWO (2)** examples of magnet.

Takrifkan magnet kekal dan berikan **DUA (2)** contoh daripadanya.

[3 marks]

[3 markah]

CLO1
C2

- (b) List **FIVE (5)** characteristics of magnetic field lines.

Senaraikan **LIMA (5)** ciri garisan medan magnet.

[5 marks]

[5 markah]

CLO1
C3

- (c) A coil of 200 turns is wound uniformly over a wooden ring which has a mean circumference of 600 mm. If current through the coil is 4 A, calculate the magnetic field strength, H.

Satu gegelung 200 lilitan dililitkan secara seragam pada sebuah cincin kayu yang mempunyai ukurlilit purata 600 mm. Jika arus melalui gegelung ialah sebanyak 4 A, kirakan kekuatan medan magnet, H.

[7 marks]

[7 markah]

SECTION C : 50 MARKS

BAHAGIAN C : 50 MARKAH

INSTRUCTION:

This section consists of **THREE (3)** essay questions. Answer **TWO (2)** questions only.

ARAHAN:

Bahagian ini mengandungi **TIGA (3)** soalan esei. Jawab **DUA (2)** soalan sahaja.

QUESTION 1

SOALAN 1

CLO2
C3

There are several laws and theorems that can be used to solve Direct Current circuit problems. Some of the theorems are Kirchoff's Law, Ohm's Law, Thevenin Theorem, Norton Theorem and Superposition Theorem. By using Superposition Theorem, calculate the value of current through the 1 Ω resistor for the circuit in Figure C1.

Terdapat beberapa hukum dan teorem yang boleh digunakan bagi menyelesaikan masalah litar arus terus. Sebahagian teoremnya adalah Hukum Kirchoff, Hukum Ohm, Teorem Thevenin, Teorem Norton dan Teorem Tindihan. Dengan menggunakan Teorem Tindihan, kirakan nilai arus pada perintang 1 Ω bagi litar di dalam Rajah C1.

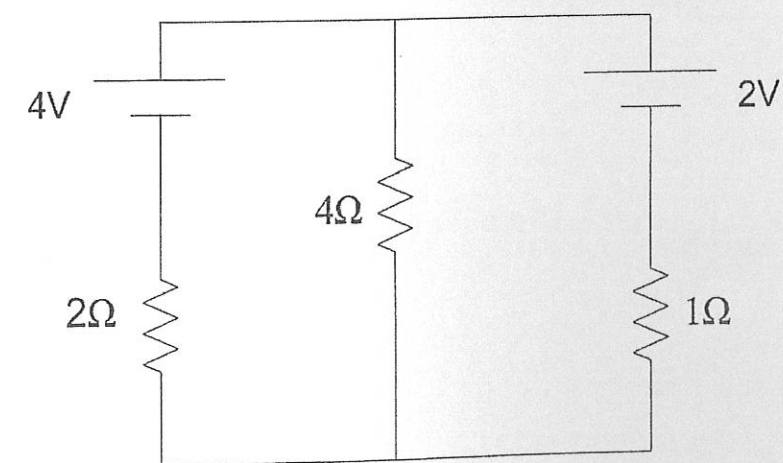


Figure C1 /Rajah C1

[15 marks]

[15 markah]

QUESTION 2

SOALAN 2

CLO2
C3

By referring to Figure C2, calculate the total equivalent capacitance.

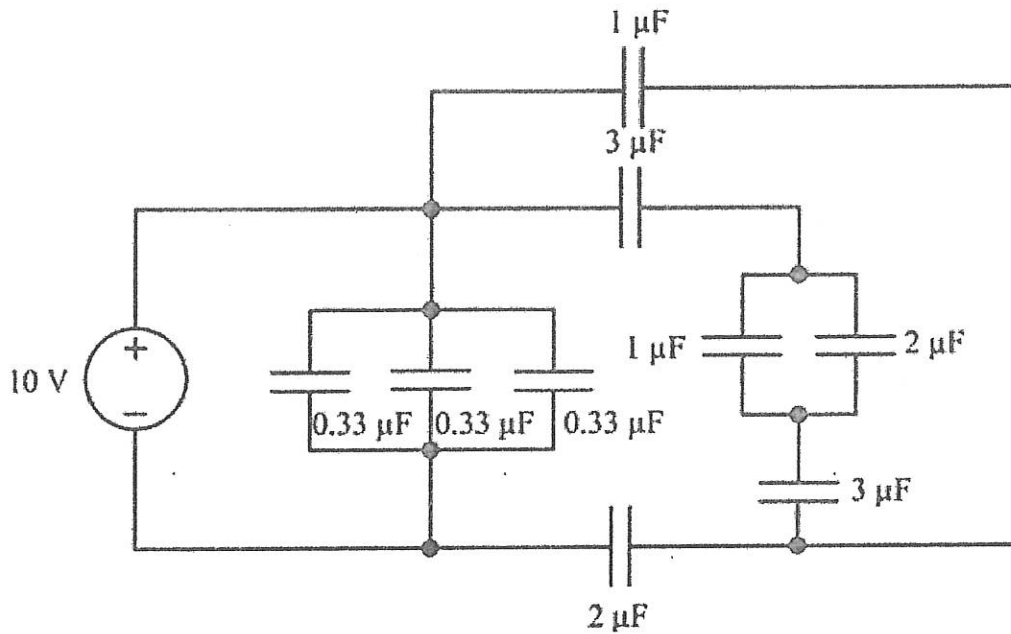
Merujuk kepada litar di Rajah C2, kirakan jumlah kekuatan setara.

Figure C2 /Rajah C2

[15 marks]

[15 markah]

SOALAN TAMAT