

SULIT



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

JABATAN KEJURUTERAAN ELEKTRIK

**PEPERIKSAAN AKHIR
SESI DISEMBER 2016**

DET1013: ELECTRICAL TECHNOLOGY

**TARIKH : 05 APRIL 2017
MASA : 2.30PM -4.30PM (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. Shade 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. There are many basic electrical quantities. Identify the basic unit of Power in electrical circuit.

Terdapat banyak kuantiti elektrik. Kenalpasti unit asas untuk Kuasa di dalam litar elektrik.

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

CLO1
C2

2. Figure A2 below is showing a circuit where four resistors are connected in series. Calculate total resistances (R_T) in the circuit.

Diberi litar seperti Rajah A2 di bawah dengan empat perintang disambung secara sesiri. Kirakan jumlah rintangan (R_T) di dalam litar.

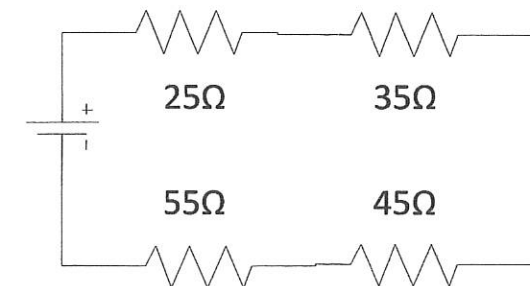


Figure A2/Rajah A2

- A. 160 K Ω
- B. 160 M Ω
- C. 160 m Ω
- D. 160 Ω

CLO1
C1

3. Which electrical law does the following statement represent

Hukum elektrik yang manakah mewakili kenyataan di bawah

$$\sum V_{SOURCE} = \sum V_{DROP}$$

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

CLO2
C2

4. Choose the right formula to determine the value of R_1 using Delta to Star transformation in Figure A4.

Pilih formula yang betul untuk menentukan nilai R_1 menggunakan transformasi Delta ke Star pada Rajah A4.

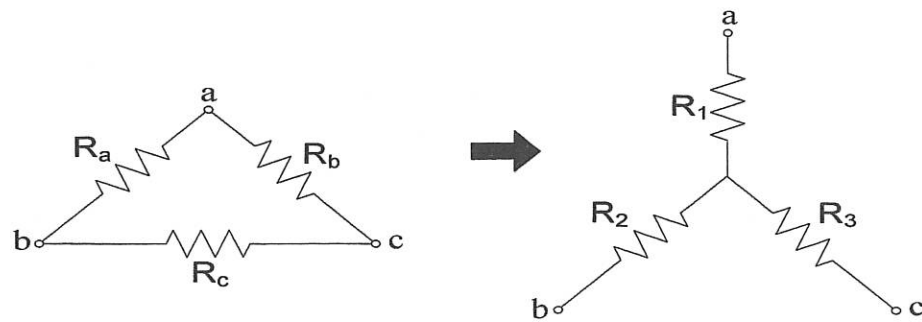


Figure A4 / Rajah A4

- A. $R_1 = \frac{R_a R_b}{R_a + R_b + R_c}$
- B. $R_1 = \frac{R_a + R_b}{R_a + R_b + R_c}$
- C. $R_1 = \frac{R_a R_b R_c}{R_a + R_b + R_c}$
- D. $R_1 = \frac{R_a R_b}{R_a R_b R_c}$

CLO1
C2

5. Based on figure A5, determine the value of current I_3

Berdasarkan rajah A1, tentukan nilai arus, I_3

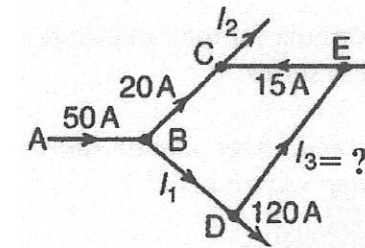


Figure A5/ Rajah A5

- A. - 9 A
-9A
- B. - 9 Ma
-9Ma
- C. - 90 A
-90 A
- D. - 90 mA
-90mA

CLO 1
C1

6. Which of the following capacitors is polarized?

Kapasitor berikut yang manakah dikutubkan?

- A. Mica
Mika
- B. Ceramic
Seramik
- C. Electrolytic
Elektrolitik
- D. Plastic-film
Plastik filem

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 **TWO (2)** differences between primary cell and secondary cell. List **ONE (1)**

Example of each cell

*Nyatakan **DUA (2)** perbezaan antara sel primer dan sel sekunder. Senaraikan*

***SATU (1)** contoh untuk setiap sel berkenaan.*

[3 marks]

[3 markah]

CLO 1
C2

- b) Based on Figure B1 (b), calculate the power that absorbed by the R_3 .

Merujuk kepada rajah B1 (b), kirakan kuasa yang terserap pada R_3

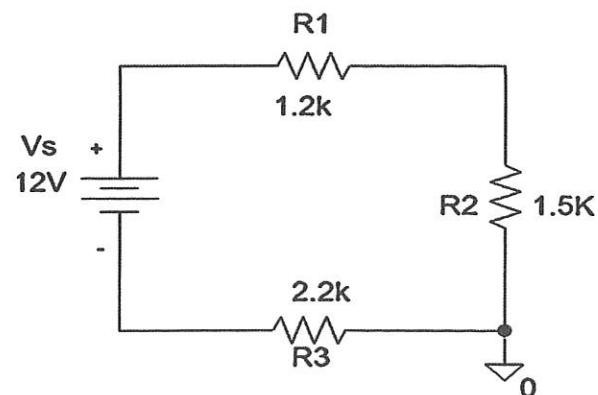


Figure B1 (b)/Rajah B1 (b)

[5 marks]

[5 markah]

CLO 2
C3

- c) By applying current divider rule for Figure B1 (c), calculate the current flow through resistor 4Ω .

Dengan menggunakan hukum pembahagi arus pada Rajah B1 (c), kirakan arus yang mengalir pada perintang 4Ω .

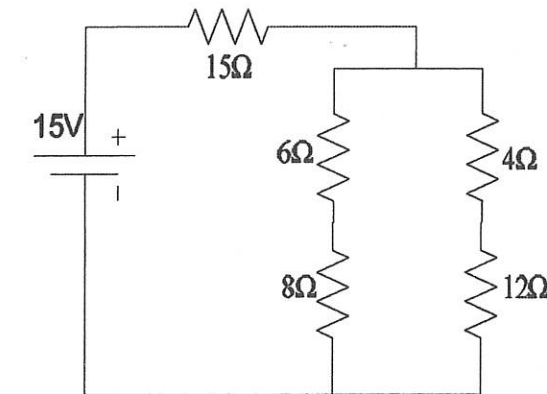


Figure B1(c)/Rajah B1(c)

[7 marks]

[7 markah]

QUESTION 2
SOALAN 2

CLO1
C1

(a) Define Thevenin's Theorem and draw the Thevenin's equivalent circuit.
Takrifkan Teorem Thevenin dan lakarkan litar setara Thevenin.

[3 marks]
[3 markah]

CLO1
C2

(b). A 200V supply consist of internal resistance of 20Ω produced maximum power when they are connected to a load. Calculate the value of load resistor and the maximum power of the circuit. Sketch the equivalent maximum power transfer circuit.

Satu bekalan 200V mengandungi rintangan dalaman 20Ω menghasilkan kuasa maksima apabila disambungkan kepada beban. Kirakan nilai bagi rintangan beban dan kuasa maksima bagi litar tersebut. Lakarkan litar setara bagi litar pindahan kuasa maksima.

[5 marks]
[5 markah]

CLO2
C3

(c) Determine V_a in the circuit below of Figure B2 (c) by using Node Analysis.
Kenalpasti V_a pada litar di Rajah B2 (c) di bawah dengan menggunakan Analisis Nod

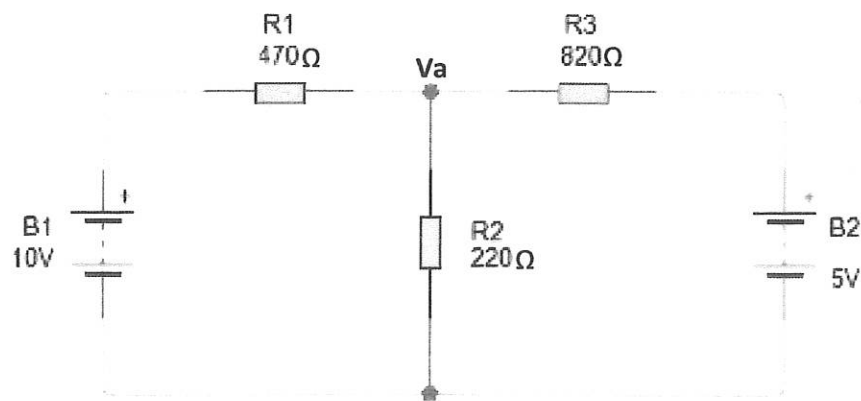


Figure B2 (c)/ Rajah B2 (c)

[7 marks]
[7 markah]

QUESTION 3
SOALAN 3

CLO1
C2

(a) By referring to the Figure B3(a) determine the formula for equivalent inductance (L_T) between point A and B.

Merujuk kepada Rajah B3(b), tentukan formula bagi jumlah aruhan (L_T) antara titik A dan B.

[3 marks]
[3 markah]

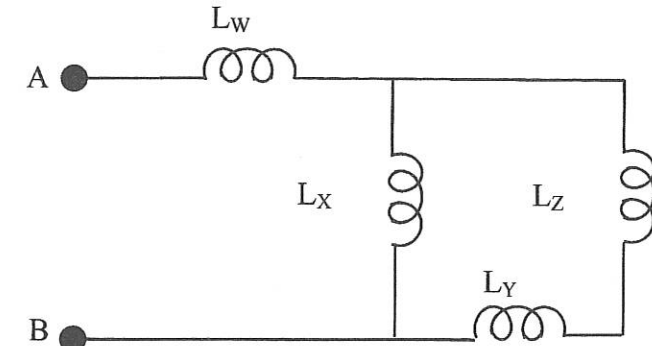


Figure B3(a) / Rajah B3(a)

CLO1
C3

(b) Sketch the curve of rising current in inductor and label the graph completely.

Lakarkan lengkung peningkatan arus dalam pearuh dan labelkan graf dengan lengkap.

[6 marks]
[6 markah]

CLO2
C3

(c) Figure B3(c) shows a schematic diagram that consists of resistive and inductive load. If the switch SW is switched to position a at $t=0s$, calculate the time constant and maximum energy stored by the inductor.

Rajah B3(c) menunjukkan gambarajah skematik yang terdiri daripada rintangan dan beban induktif. Jika suis ke titik a pada $t=0s$, kirakan pemalar masa dan tenaga maksimum yang disimpan oleh pearuh.

[6 marks]
[6 markah]

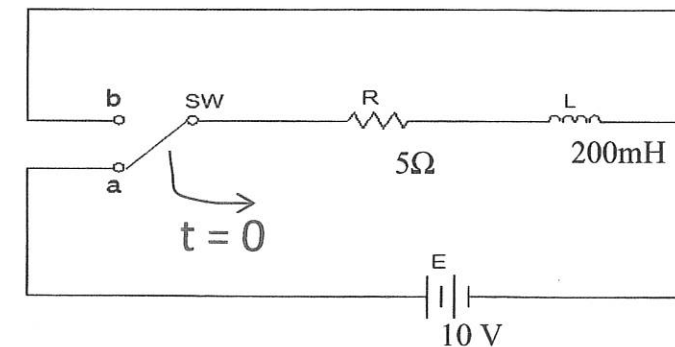


Figure B3(c) / Rajah B3(c)

QUESTION 4

SOALAN 4

CLO1
C1

- a) State **THREE(3)** characteristics of magnetic field.
Nyatakan **TIGA(3)** ciri-ciri medan magnet. [3 marks]
[3 markah]

CLO1
C2

- b) A coil of 300 turns is wrapped uniformly on a ring of non-magnetic material. The ring has a mean circumference of 40 cm and a uniform cross-sectional area of 4 cm². If the current in the coil is 5A, calculate :
i) the magnetic field strength
ii) the flux density if $\mu_r = 1$

Sebuah gegelung dengan 300 lilitan dibalut pada cincin bahan bukan magnet. Cincin ini mempunyai purata ukur lilit 40 cm dan luas keratan rentas yang seragam sebanyak 4 cm². Jika arus dalam gegelung adalah 5A, kira:

- i) kekuatan medan magnet
ii) ketumpatan fluks jika $\mu_r = 1$*

[5 marks]

[5 markah]

CLO2
C3

- c) A mild steel ring has a radius of 50mm and a cross-sectional area of 400 mm². A current of 0.5A flows in a coil wound uniformly around the ring and the flux produced is 0.1mWb. If the relative permeability is 200, calculate :
i) the reluctance of the mild steel
ii) the number of turns on the coil

Sebuah cincin keluli lembut mempunyai jejari 50mm dan luas keratan rentas 400 mm². Arus 0.5A mengalir dalam gegelung secara seragam di sekeliling bulatan dan fluks yang dihasilkan adalah 0.1mWb. Jika ketelapan relatif adalah 200, kirakan

- i) keengganan keluli ringan
ii) bilangan lilitan pada gegelung*

[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 **TIGA (3)** soalan esei. Jawab **DUA (2)** soalan sahaja.

QUESTION 1

SOALAN 1

CLO2
C3

- Calculate the current flow through 40 Ω resistor for the circuit in Figure C1 by using Norton Theorem.

Kirakan nilai arus yang melalui rintangan 40 Ω dalam Rajah C1 dengan menggunakan Theorem Norton.

[15 marks]

[15 markah]

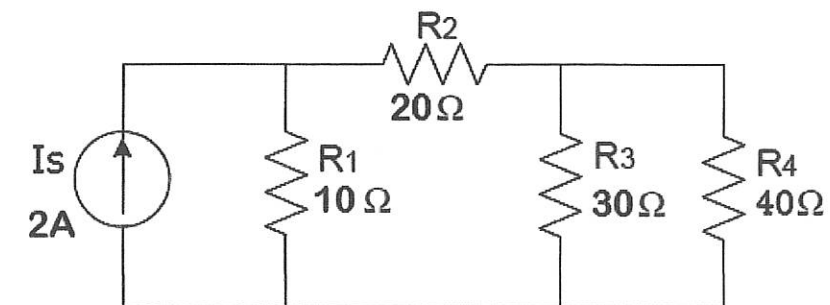


Figure C1 / Rajah C1

CLO 2
C3QUESTION 2
SOALAN 2

When the voltage across a capacitor is increased, it draws current from the rest of the circuit, acting as a power load. In this condition, the capacitor is said to be charging, because there is an increasing amount of energy being stored in its electric field. Figure C2 below show, a $40\mu\text{F}$ capacitor connected in series with a $400\text{ k}\Omega$ resistor while the circuit is connected to a 450 V , d.c. supply. Calculate the;

- Current (I_c) and potential difference (V_c), when the capacitor charged for 30 s ;
- Current (I_c) and potential difference (V_c), when the capacitor discharged for 15 s ;

Bila voltan merentasi satu kapasitor dinaikkan, ia menarik arus dari keseluruhan litar, bertindak sebagai beban kuasa. Dalam keadaan ini kapasitor berada dalam keadaan cas, kerana terdapat peningkatan jumlah tenaga disimpan dalam medan elektriknya. Rajah C2 dibawah menunjukkan, kapasitor $40\mu\text{F}$ disambungkan secara siri dengan perintang $400\text{ k}\Omega$ dan litar disambungkan kepada bekalan kuasa AT. 450V .

Kirakan;

- Arus (I_c) dan beza upaya (V_c), bila pemuat di cas 30 saat*
- Arus (I_c) dan beza upaya (V_c), bila pemuat di nyahcas 15 saat*

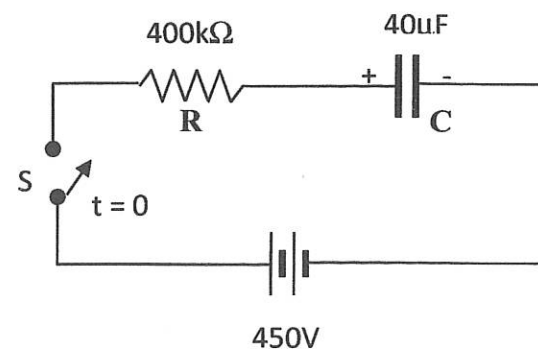


Figure C2/Rajah C2

[15 marks]
[15 markah]

SOALAN TAMAT