

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENGAJIAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN KEJURUTERAAN ELEKTRIK

**PEPERIKSAAN AKHIR
SESI DISEMBER 2013**

ET 101 : ELECTRICAL TECHNOLOGY

**TARIKH : 23 APRIL 2014
TEMPOH : 8.30AM – 10.30 AM (2 JAM)**

Kertas ini mengandungi **DUA PULUH SATU (21)**halaman bercetak.

Bahagian A: Objektif (20 soalan)

Bahagian B: Struktur (10soalan)

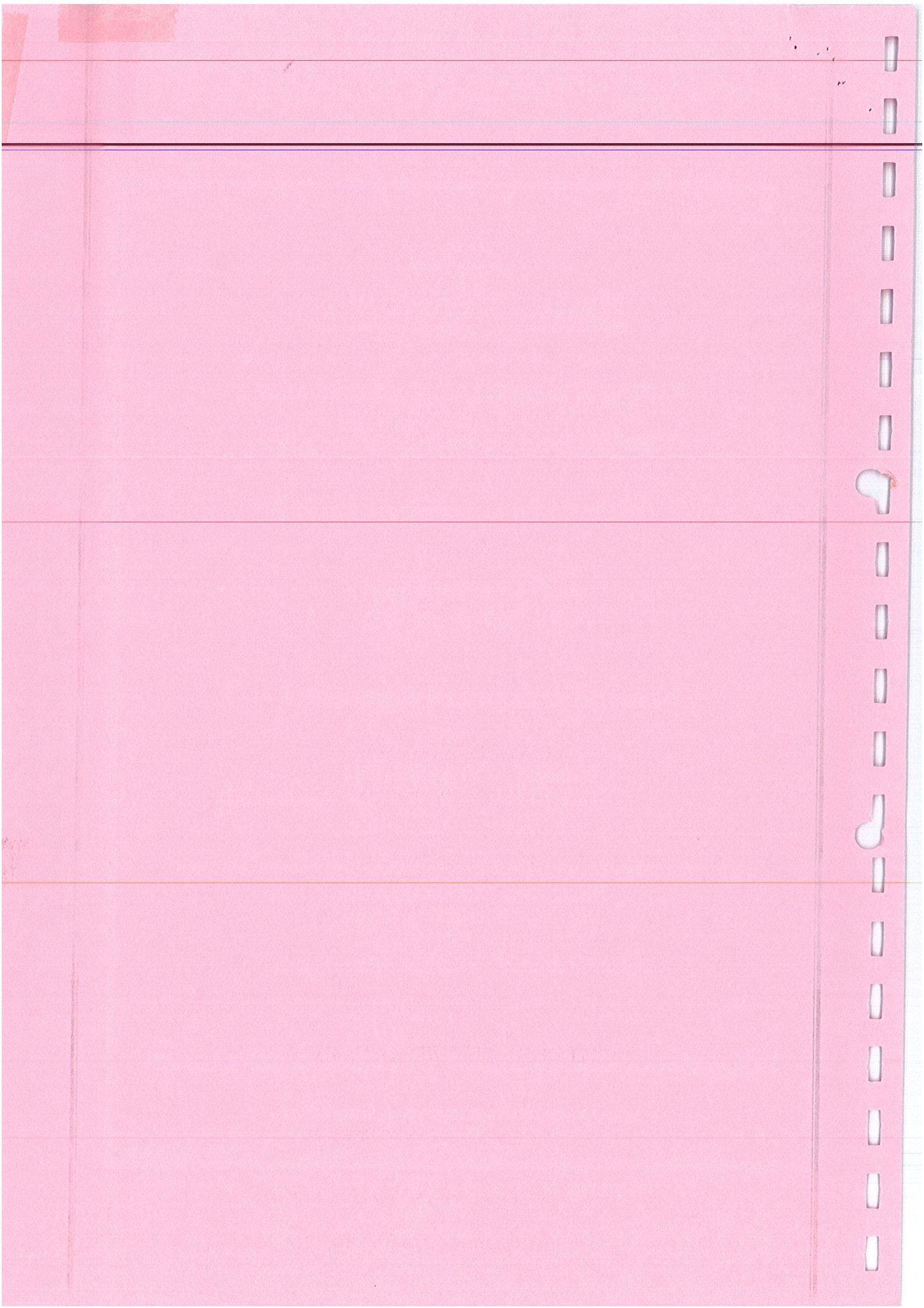
Bahagian C: Esei (2 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A : 20 MARKS

BAHAGIAN A : 20 MARKAH**INSTRUCTION:**

This section consists of **TWENTY (20)** objective questions. Mark your answers in the OMR form provided.

ARAHAN :

Bahagian ini mengandungi DUA PULUH (20) soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.

CLO 1
C2

1. 30×10^{-3} in prefixes notation is _____.

30×10^{-3} dalam bentuk awalan tatatanda adalah _____.

- A. 30M
- B. 30m
- C. 30n
- D. 30p

CLO 1
C2

2. When the following numbers are multiplied,

$$:(6 \times 10^3) (5 \times 10^5)$$

the result is.....

Bila nombor berikut didarabkan,

$$:(6 \times 10^3) (5 \times 10^5),$$

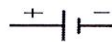



hasilnya ialah.....

- A. 3×10^8
- B. 30×10^8
- C. 300×10^9
- D. $3,000 \times 10^7$

CLO1
C1

3. Which of the following symbols is a cell?

Antara yang berikut yang manakah simbol sel?

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

CLO2
C3

4. Calculate the e.m.f of the battery which are connected in parallel contain twelve cells, each with an internal resistance of 0.24Ω and e.m.f of 1.5 V .

Kirakan d.g.e bateri yang disambungkan secara selari yang mengandungi dua belas sel, setiap satu dengan rintangan dalam 0.24Ω dan d.g.e 1.5 V .

- A. 0.05 V
- B. 1.5 V
- C. 12 V
- D. 18 V

CLO1
C2

5.

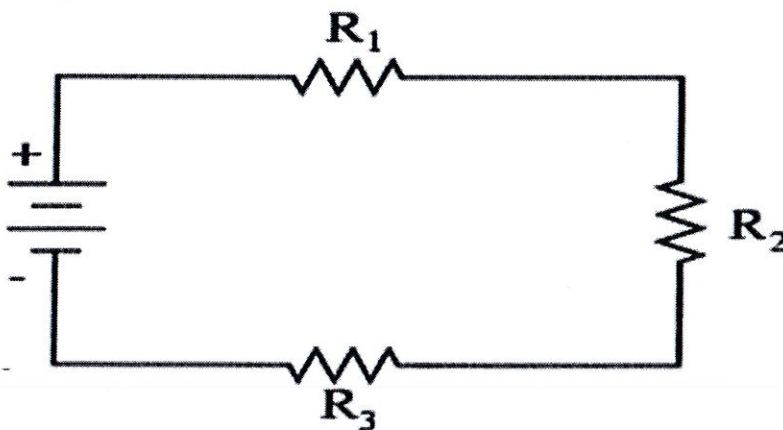


Figure A5/Rajah A5

Based on Figure A5, which of the following statements is **FALSE**?

Berpandukan Rajah A5, yang manakah pernyataan berikut adalah TIDAK BENAR?

- A. The total resistances of any series circuit is not equal to the sum of the individual resistances.

Jumlah rintangan mana-mana litar siri adalah tidak sama dengan hasil campur setiap rintangan

- B. The current value that flow through all resistors is the same.

Nilai arus yang melalui semua perintang adalah sama.

- C. Voltage drop in each resistor is different depending on the value of the resistor.

Kejatuhan voltan di dalam setiap perintang adalah berbeza bergantung kepada nilai perintang.

- D. The total voltage drop across the resistor is equal to the supply voltage.

Jumlah voltan susut merentasi perintang adalah sama dengan sumber bekalan.

6. Which of the following formula for electrical power, P is **INCORRECT**.

Yang manakah persamaan untuk elektrik kuasa, P berikut yang TIDAK BENAR.

A. $P = IV$

B. $P = \frac{V}{R}$

C. $P = I^2 R$

D. $P = \frac{V^2}{R}$

CLO 1
C2

CLO1
C2

7. When 12 V is applied across a 68Ω resistor, the current is.

Apabila 12 V dikenakan merentasi perintang 68Ω , nilai arusnya ialah.

- A. 17.6 mA
- B. 81.6 mA
- C. 176 mA
- D. 816 mA

CLO2
C3

8. Refer to Figure A8 below, calculate the total resistance of the circuit.

Merujuk kepada Rajah A8 di bawah, kirakan jumlah perintang litar tersebut.

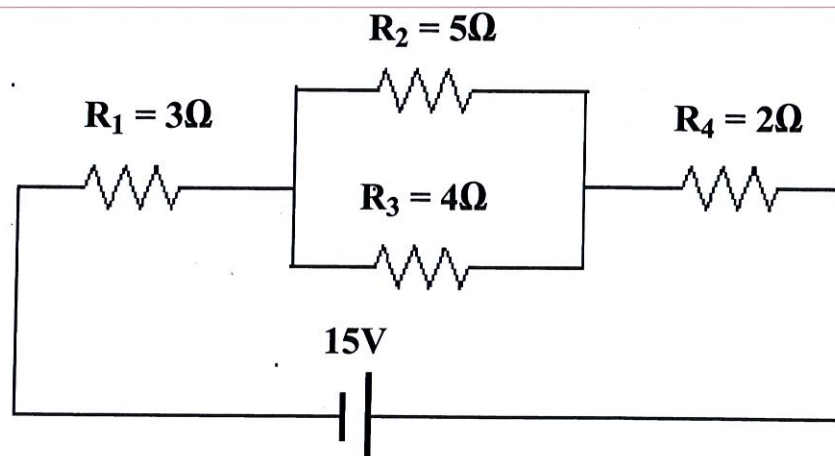


Figure A8/Rajah A8

- A. 0.72Ω
- B. 7.22Ω
- C. $7.22 \text{ k}\Omega$
- D. $72.22 \text{ k}\Omega$

CLO 2
C3

9. Refer to Figure A9 using Superposition Theorem when $E_1 = 4\text{ V}$ is "ON", but $E_2 = 2\text{ V}$ is "OFF", calculate current that flows through the resistance $R = 4\ \Omega$

Merujuk kepada Rajah A9, menggunakan Theorem Tindihan sekiranya when $E_1 = 4\text{ V}$ di E ~~NA~~ kan, tetapi $E_2 = 2\text{ V}$ di ~~FF~~ kan. Kira arus yang mengalir melalui perintang pada $R = 4\ \Omega$.

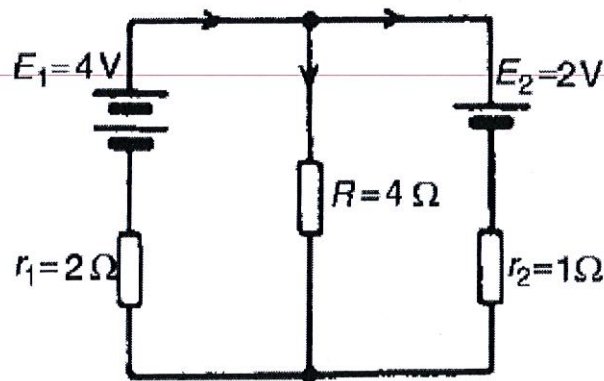


Figure A9/Rajah A9

- A. 0.29A
- B. 0.57A
- C. 0.65A
- D. 0.86A

CLO2
C3

10. Referring to Figure A10, identify the current value of I_1 and I_2 at nodes Y and Z

Merujuk kepada Rajah A10, tentukan nilai arus I_1 dan I_2 di nod Y dan Z

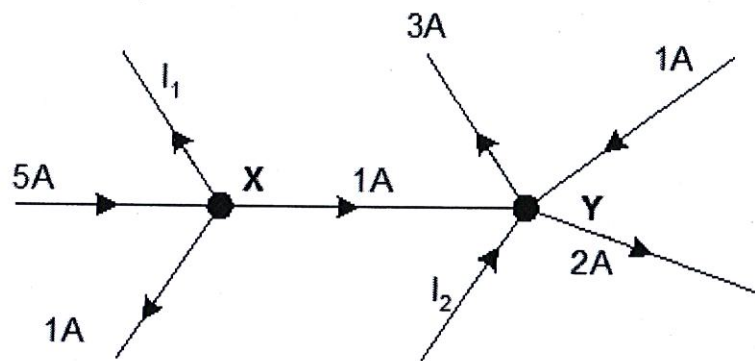


Figure A10/RajahA10

- A. $I_1=3A$, $I_2=2A$
- B. $I_1=5A$, $I_2=3A$
- C. $I_1=3A$, $I_2=3A$
- D. $I_1=5A$, $I_2=5A$

CLO2
C3

11. A d.c source has an open circuit voltage of 30 V and internal resistance of 1.5 Ω . Calculate the value of load power during its maximum power transfer from the source to the load.

Satu sumber bekalan a.t mempunyai voltan litar buka sebanyak 30 V dan rintangan dalam 1.5 Ω . kirakan nilai kuasa pada beban semasa pemindahan kuasa maksimum dari sumber bekalan kepada beban.

- A. 100W
- B. 150W
- C. 200W
- D. 250W

CLO 2
C3

12. Determine I_N for the circuit consisting of V_S , R_1 , R_2 , and R_3 as shown in the Figure A12.

Tentukan nilai I_N bagi litar yang mengandungi V_S , R_1 , R_2 , dan R_3 yang ditunjukkan dalam Rajah A12 .

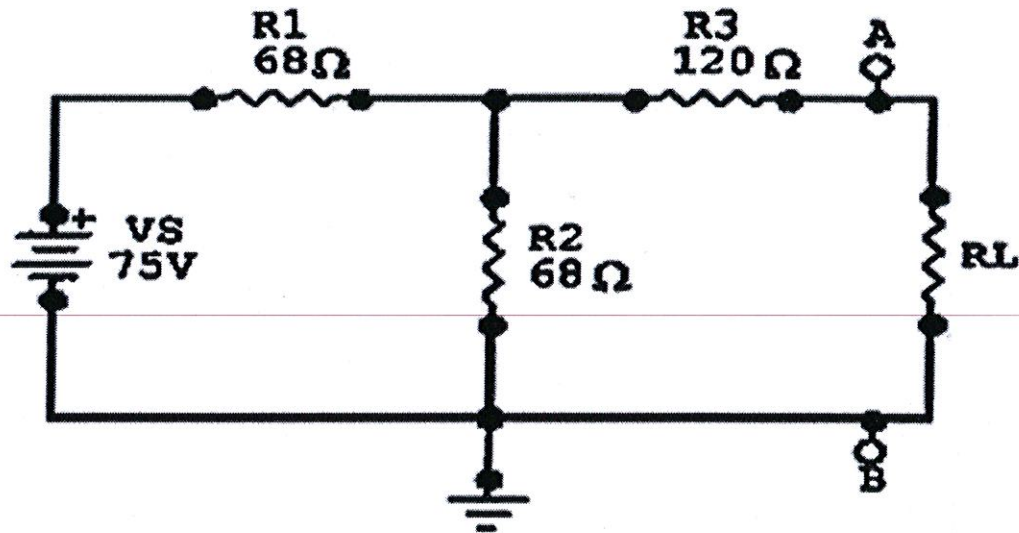


Figure A12/RajahA12

- A. 75 mA
- B. 245 mA
- C. 431 mA
- D. 676 mA

CLO2
C2

13. Find the charge on a $5 \mu\text{F}$ capacitor when it is connected across a 120 V source.

Dapatkan cas pada pemuat $5 \mu\text{F}$ apabila disambung merentasi sumber 120

- A. 60 mC
- B. 30 mC
- C. 24 mC
- D. 12 mC

CLO2
C314. Identify the formula for total capacitance in **PARALLEL** connection.*Kenalpasti formula bagi jumlah kemuant yang disambung secara SELARI.*

- A. $C_t = C_1 = C_2 = \dots = C_n$
- B. $C_t = C_1 + C_2 + \dots + C_n$
- C. $C_t = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$
- D. $\frac{1}{C_t} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$

CLO 1
C3

15. Calculate the value of capacitance of the the current as show in Figure A15.

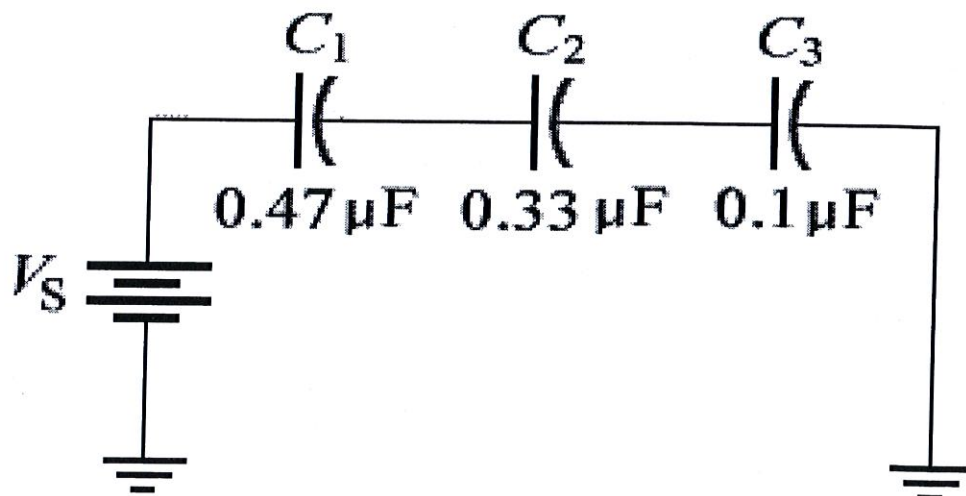
Kirakan nilai kemuatan pada Rajah A14 seperti dalam litar yang diberikan.

Figure A15/RajahA15

- A. $0.066 \mu\text{F}$
- B. $0.9 \mu\text{F}$
- C. 65.97 pF
- D. 900 pF

CLO1
C2

16. The following factors influence the inductance, **EXCEPT**
*Berikut faktor yang mempengaruhi kearuhan, **KECUALI***

- A. Dielectric material
- B. Numbers of turn in a coil
- C. Cross Sectional Area of wire
- D. Length of coil

CLO2
C1

17. Four inductors each of 10 mH are connected in series. The total inductance is...
Empat peraruh setiap satu bernilai 10 mH disambung secara siri .Jumlah aruhan adalah.....

- A. 2.5 mH
- B. 25 μ H
- C. 40 μ H
- D. 40 mH

CLO1
C1

18. The SI unit for magnetic flux is
Unit SI bagi fluk magnet ialah

- A. maxwell
- B. weber
- C. tesla
- D. henry

CLO2
C3

19. Determine the magnetomotive force in a 75 turn coil of wire when a current of 4 A flows through it

Tentukan daya gerak magnet pada 75 lilitan gegelung dawai apabila arus sebanyak 4 A mengalir melaluinya

- A. 18.75 At
- B. 30 At
- C. 187 At
- D. 300 At

CLO1
C1

20. A coil of wire is placed in a changing magnetic field. If the number of turns in the coil is increased the voltage induced across the coil will

Suatu gelung wayar diletakkan dalam kawasan medan magnet yang berubah-ubah. Jika bilangan gelung ditambah, voltan yang teraruh merintangi gelung itu akan

- A. Remain unchanged
Masih tidak berubah
- B. Decrease
Berkurangan
- C. Increase
Bertambah
- D. Drop to zero
Menjadi kosong

SECTION B : 30 MARKS**BAHAGIAN B : 30 MARKAH****INSTRUCTION:**

This section consists of **TEN (10)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **SEPULUH (10)** soalan berstruktur. Jawab semua soalan.*

CLO2
C1**QUESTION 1**

An e.m.f source of 15 V supplies a current of 8 A for 20 minutes. How much energy is provided during this time?

SOALAN 1

Satu punca dge 15 V membekalkan arus 8 A selama 20 minit. Berapa banyak tenaga yang diberikan pada masa tersebut?

[3 marks]

[3 markah]

CLO1
C2**QUESTION 2**

There are two types of cells, primary cells and secondary cells. Compare between these primary and secondary cells.

SOALAN 2

Terdapat dua jenis sel, iaitu sel primer dan sel sekunder. Bandingkan antara sel primer dan sel sekunder ini.

[3 marks]

[3 markah]

CLO2
C3**QUESTION 3**

Refer to Figure B3 below. If $r_i = 0.01 \Omega$, Calculate I_L and V_L if the value of load resistance, $R_L = 10 \Omega$

SOALAN 3

Merujuk Rajah B3 di bawah. Jika $r_i = 0.01 \Omega$, Kirakan I_L dan V_L jika nilai rintangan beban, $R_L = 10 \Omega$.

[3 marks]

[3 markah]

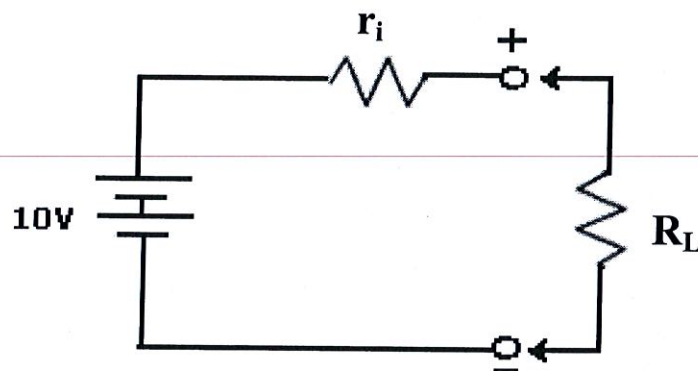


Figure B3/Rajah B3

CLO2
C3**QUESTION 4**

Refer to Figure B4, Calculate the resistance value of R_1 , R_2 and R_3 using Star to Delta transformation

SOALAN 4

Merujuk kepada Rajah B4, Kirakan nilai rintangan R_1 , R_2 dan R_3 dengan menggunakan transformasi Star kepada Delta.

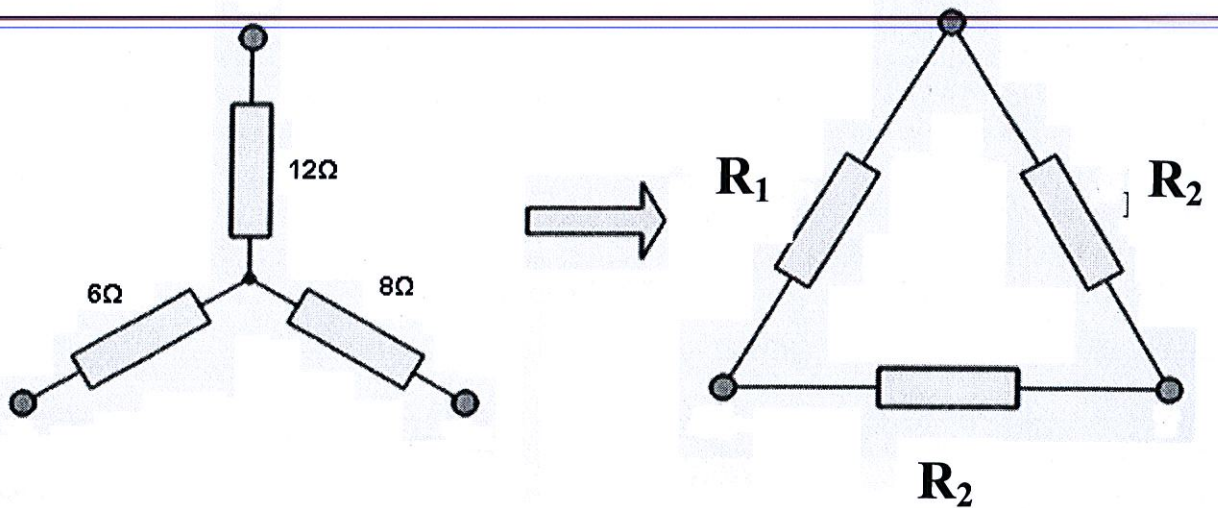


Figure B4/Rajah B24

[3 marks]

[3 markah]

CLO2
C3**QUESTION 5**

A 12 V battery is connected across a load having a resistance of 40Ω . Calculate:

- Current flowing in the load
- Power consumed
- Energy dissipated in two (2) minutes

SOALAN 5

Bateri 12 V disambung ke beban yang mempunyai rintangannya 40Ω . Kirakan:

- Arus yang melalui beban
- Kuasa yang digunakan
- Tenaga yang diresap dalam dua (2) minit

[3 marks]

[3 markah]

CLO 2

QUESTION 6

C3

By using Norton Theorem, calculate the value of R_N in the Figure B6, when the load resistor R_L is $30\ \Omega$

SOALAN 6

Dengan menggunakan Teorem Norton, kirakan nilai R_N pada Rajah B6. Apabila rintangan beban $R_L = 30\ \Omega$

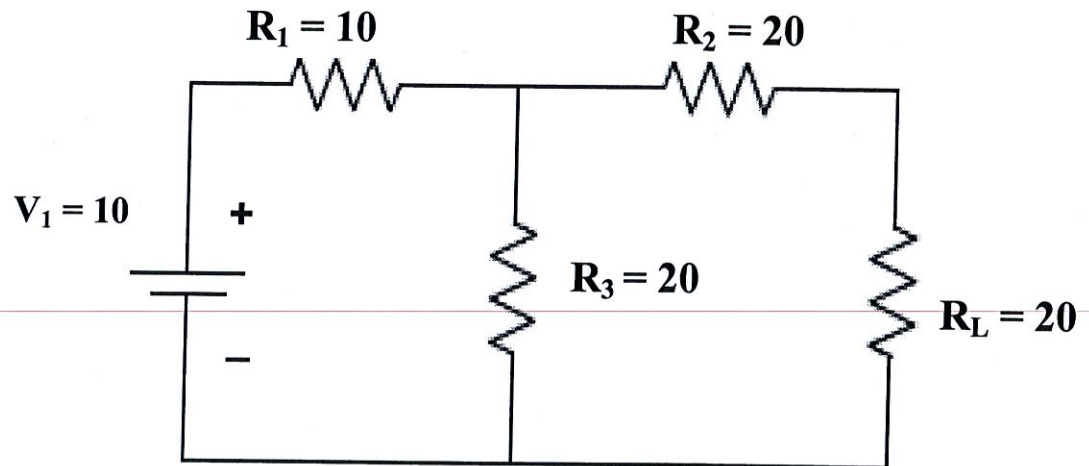


Figure B6/Rajah B3

[3 marks]

[3 markah]

QUESTION 7

CLO2

C1

Find the value of currents value I_3 , I_4 and I_6 in Figure B7 below

SOALAN 7

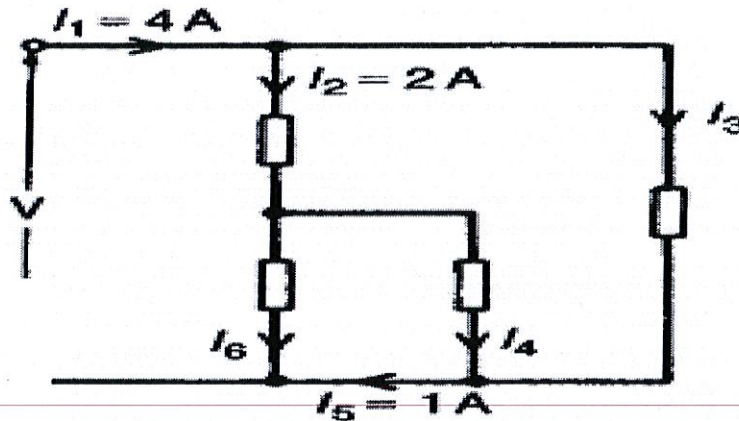
Dapatkan nilai arus I_3 , I_4 dan I_6 dalam Rajah B7 di bawah

Figure B7/Rajah B7

[3 marks]

[3 markah]

CLO1

C2

QUESTION 8

Based on Figure B8 below, compute C_T between point AB.

SOALAN 8

Berdasarkan pada Rajah B8, kirakan C_T antara titik AB

[3 marks]

[3 markah]

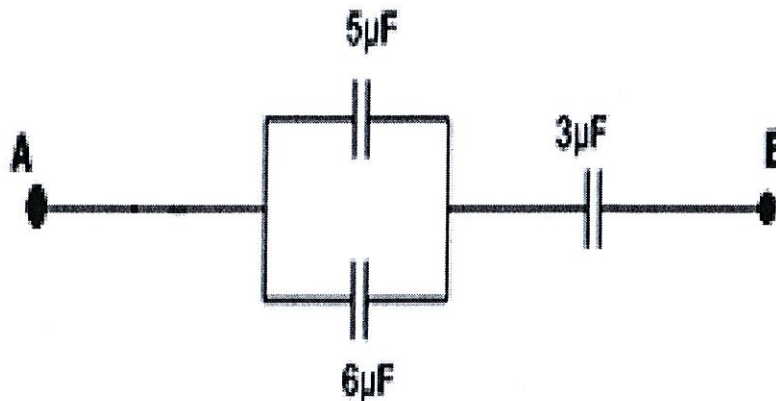


Figure B8/Rajah B8

CLO1

QUESTION 9

C2

An inductor of 40 mH has a current of 1.5 A flowing in it. Find the energy stored in the magnetic field of the inductor.

SOALAN 9

Pearuh 40 mH mempunyai arus 1.5 A mengalir di dalamnya. Cari tenaga yang disimpan dalam medan magnet pearuh tersebut.

[3 marks]

[3 markah]

CLO1

QUESTION 10

C2

State **THREE (3)** ways to determine the direction of magnetic field.

SOALAN 10

*Nyatakan **TIGA(3)** cara untuk mengenal pasti arah daya magnet.*

[3 marks]

[3 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**

(a) Based on Figure C1(a), determine.

Berdasarkan Rajah C1(a), tentukan.

i. Equivalent resistance (R_T).

Jumlah perintang.

ii. Total current (I_T).

Jumlah arus.

iii. Current flow through 6Ω and 2Ω .

Arus melalui 6Ω dan 2Ω .

CLO 2
C3

iv. Voltage Drop across $8\ \Omega$.

Voltan susut merentasi $8\ \Omega$.

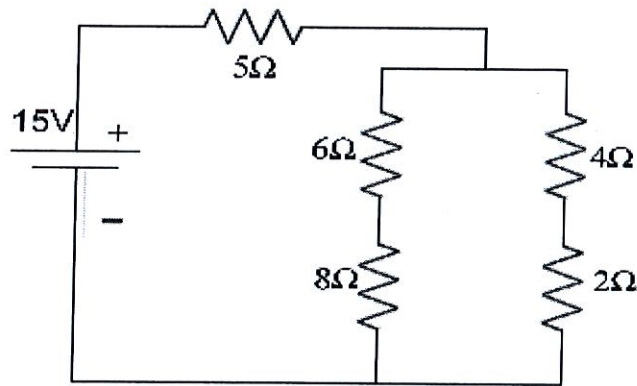


Figure C1(a)/Rajah C1(a)

[11 marks]

[11 markah]

CLO 2
C3

(b) By referring to Figure C1(b).

Merujuk kepada Rajah C1(b).

i. Define Thevenin Theorem.

Takrifkan Teorem Thevenin

ii. Calculate current through $15\ \Omega$ by using Thevenin Theorem.

Kirakan arus yang melalui $15\ \Omega$ dengan menggunakan Teorem Thevenin.

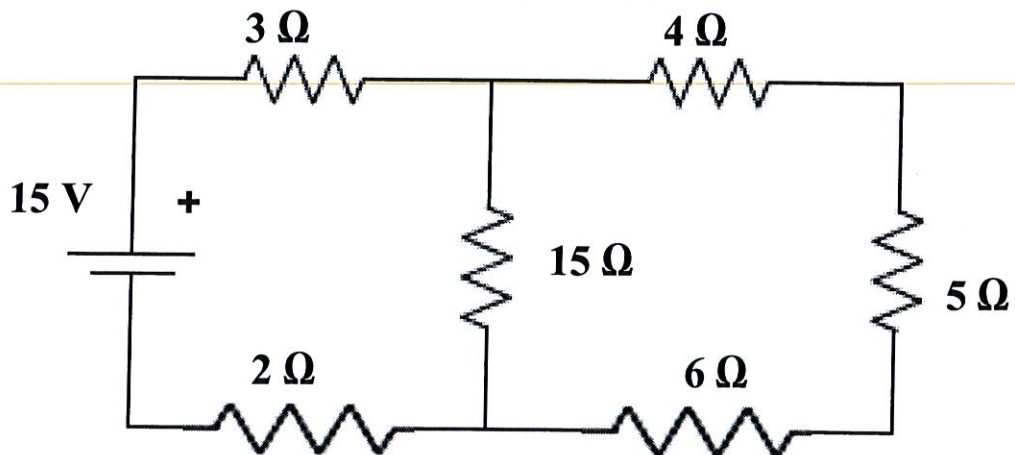


Figure C1(b)/Rajah C1(b)

[14 marks]

[14 markah]

QUESTION 2

CLO1
C2

SOALAN 2

- a) Draw and describe the construction of a capacitor.

Lukiskan dan terangkan binaan pemuat.

[5 marks]

[5 markah]

CLO2
C3

- b) With reference to Figure C2(b) below, calculate:

Berdasarkan Rajah C2(b) di bawah, kirakan:

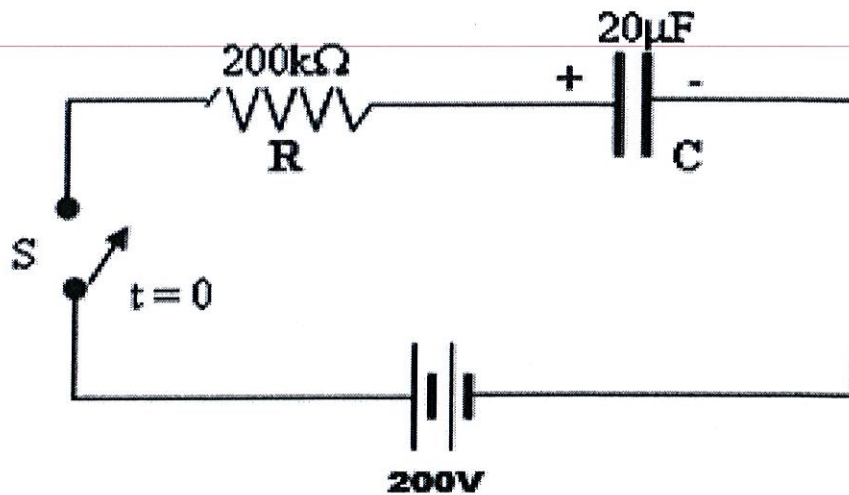


Figure C2(b) /Rajah C2(b)

- i) the initial current flow.
Arus permulaan
- ii) Initial voltage across capacitor
Voltan permulaan merentasi pemuat
- iii) The charging current time constant
Pemalar masa arus mengecas

- iv) The time taken to complete the charge

Masa yang diambil untuk melengkapkan cas

- v) Energy stored in the capacitor when it is charged by the DC supply

Tenaga yang disimpan dalam kapasitor apabila ia dicas oleh bekalan AT

[12 marks]

[12 markah]

CLO1
C2

- c) State 4 factors that influence inductances.

Nyatakan 4 faktor yang mempengaruhi kearuhan.

[4 marks]

[4 markah]

CLO2
C3

- d) With reference to Figure C2(d) below, calculate the equivalent inductance (L_T) between point A and B.

Merujuk Rajah C2(d) di bawah, kirakan kearuhan setara (L_T) antara titik A dan B.

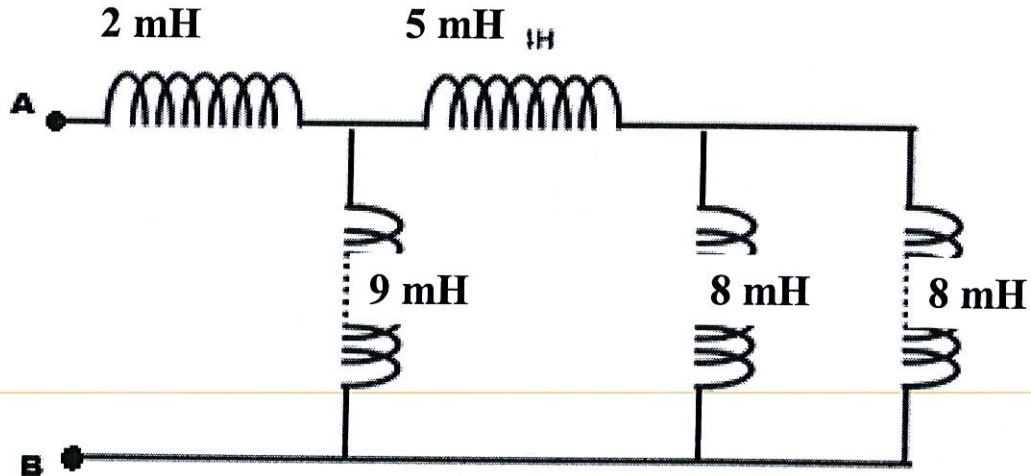


Figure C2(d) /Rajah C2(d)

[4 marks]

[4 markah]

SOALAN TAMAT