



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : CIRCUIT THEORY
COURSE CODE : DEE 1013
EXAMINATION : JANUARY 2024
DURATION : 2 HOURS 30 MINUTES

**INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON**

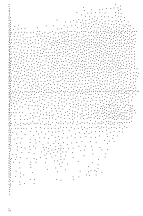
1. This examination paper consists of **ONE (1)** part : / PART A (100 Marks) /
*Kertas soalan ini mengandungi **SATU (1)** bahagian: BAHAGIAN A (100 Markah)*

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator. The formula was attached at the back of the question paper. /
Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke bilik peperiksaan tanpa arahan/kebenaran daripada pengawas. Rumus dilampirkan di belakang kertas soalan peperiksaan.

3. Please check to make sure that this examination pack consists of: /
Pastikan kertas soalan peperiksaan ini mengandungi:
 - i. Question Paper /
Kertas Soalan
 - ii. Answering Booklet /
Buku Jawapan

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

This examination paper consists of **9** printed pages including front page
*Kertas soalan ini mengandungi **9** muka surat termasuk kulit hadapan*



This part contains of **FOUR (4)** questions. Answer all question in the Answering Booklet.

*Bahagian ini mempunyai **EMPAT (4)** soalan. Jawab semua soalan di dalam Buku Jawapan.*

QUESTION 1 / SOALAN 1

a) As shown in **Figure Q1a**, determine what will be the reading on the ammeter.
(4 marks / markah)

b) An electric kettle has a resistance of 30Ω . Determine:

- i) The current, I will flow when its is connected to a 240 V supply.
- ii) The power rating of the kettle.

(4 marks / markah)

c) Using the information provided in **Figure Q1c**, determine the value of branch resistors R_1 and R_3 , the total resistance R_T , and the voltage source E .

(8 marks / markah)

d) Determine the equivalent resistance, R_{ab} in the **Figure Q1d**.

(9 marks / markah)

a) *Seperti yang ditunjukkan dalam **Rajah Q1a**, tentukan apakah bacaan pada ammeter.*

b) *Sebuah cerek elektrik mempunyai rintangan 30Ω . Tentukan:*

- i) Arus, I yang mengalir apabila ia disambungkan kepada bekalan 240 V.*
- ii) Kadar kuasa cerek.*

c) *Dengan menggunakan maklumat yang diberikan dalam **Rajah Q1c**, tentukan nilai perintang R_1 dan R_3 , jumlah rintangan, R_T dan punca voltan, E .*

d) *Tentukan rintangan setara, R_{ab} dalam **Rajah Q1d**.*

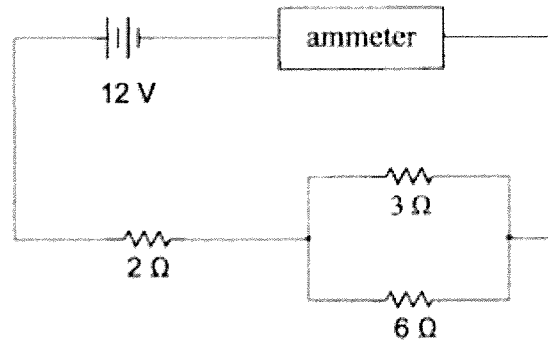


Figure Q1a / Rajah Q1a

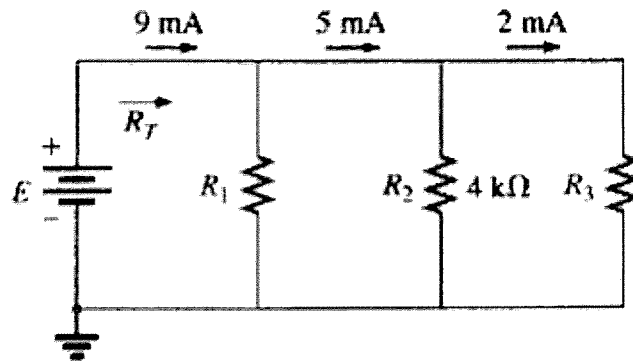


Figure Q1c / Rajah Q1c

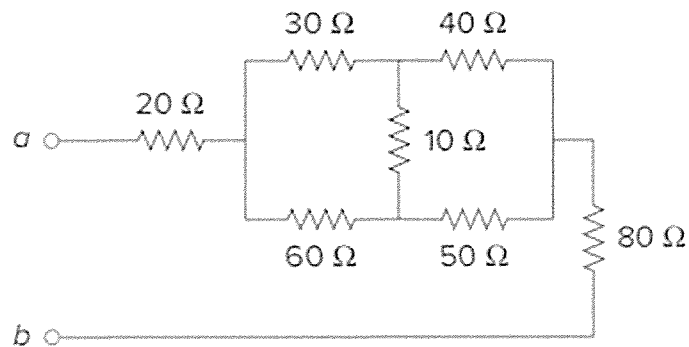


Figure Q1d / Rajah Q1d

QUESTION 2 / SOALAN 2

- a) Use nodal analysis to determine the node voltages V_A and V_B in the circuit of **Figure Q2a**.

(8 marks / markah)

- b) Use the mesh current method to determine the power dissipated in the $2\ \Omega$ resistor for the circuit in **Figure Q2b**.

(10 marks / markah)

- c) Use superposition theorem, determine the value of v in the circuit of **Figure Q2c**.

(7 marks / markah)

- a) Dengan menggunakan analisis nodal, tentukan voltan nod V_A dan V_B dalam litar pada **Rajah Q2a**.

- b) Dengan menggunakan kaedah arus jejaring, tentukan lesapan kuasa dalam perintang $2\ \Omega$ untuk litar dalam **Rajah Q2b**.

- c) Dengan menggunakan kaedah tindihan, tentukan nilai v dalam litar pada **Rajah Q2c**.

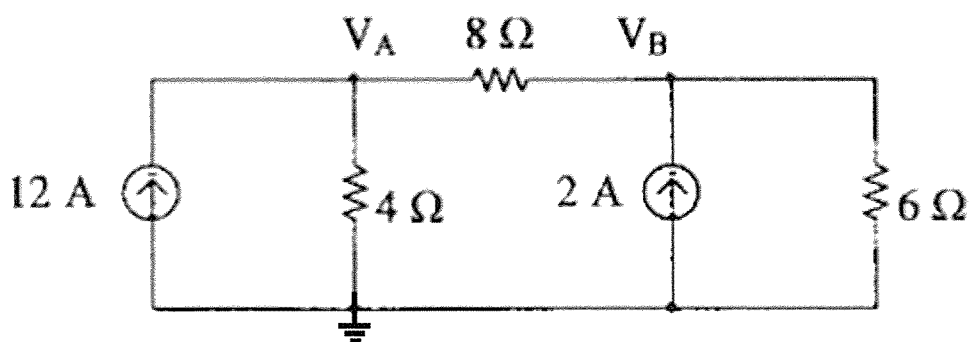


Figure Q2a/ Rajah Q2a

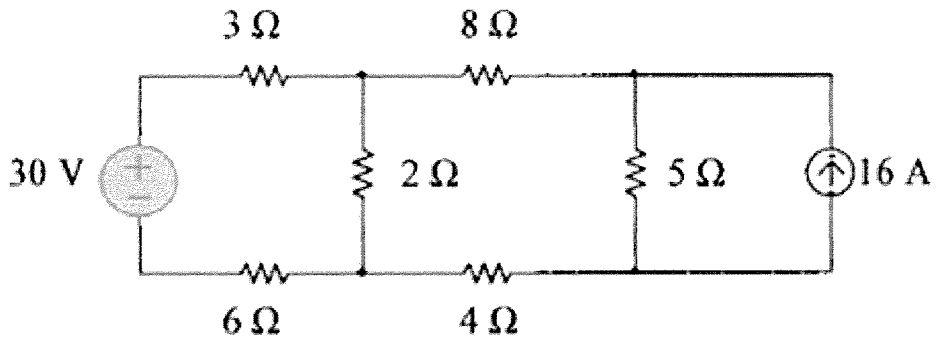


Figure Q2b/ Rajah Q2b

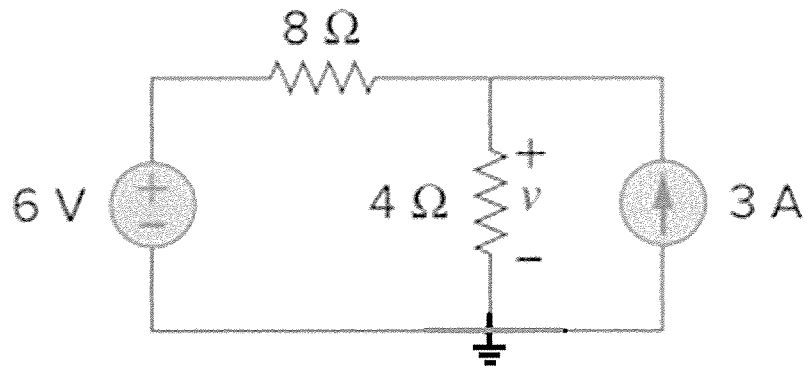


Figure Q2c/ Rajah Q2c

QUESTION 3 / SOALAN 3

- a) Determine the Norton equivalent for the circuit shown in **Figure Q3a** looking from the terminal a-b.

(11 marks / markah)

- b) For the circuit shown in **Figure Q3b**.

- i) Determine the Thevenin equivalents at terminals a-b.
- ii) Then, determine the value of current load, I_L if the value of load resistor, R_L is 6Ω .

(11 marks / markah)

- c) Determine the maximum power transferred to R_L for the circuit shown in **Figure Q3c**.

(3 marks / markah)

- a) Tentukan persamaan Norton untuk litar yang ditunjukkan dalam **Rajah Q3a** dengan melihat dari terminal a-b.

- b) Bagi litar yang ditunjukkan dalam **Rajah Q3b**.

- i) Tentukan persamaan setara Thevenin di terminal a-b.
- ii) Kemudian, tentukan nilai arus pada beban, I_L jika nilai rintangan beban, R_L ialah 6Ω .

- c) Tentukan kuasa maksima yang dipindahkan ke R_L untuk litar yang ditunjukkan dalam **Rajah Q3c**.

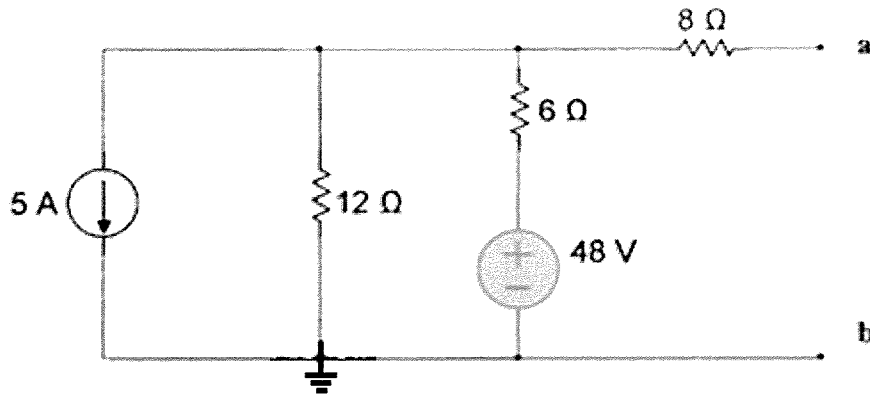


Figure Q3a/ Rajah Q3a

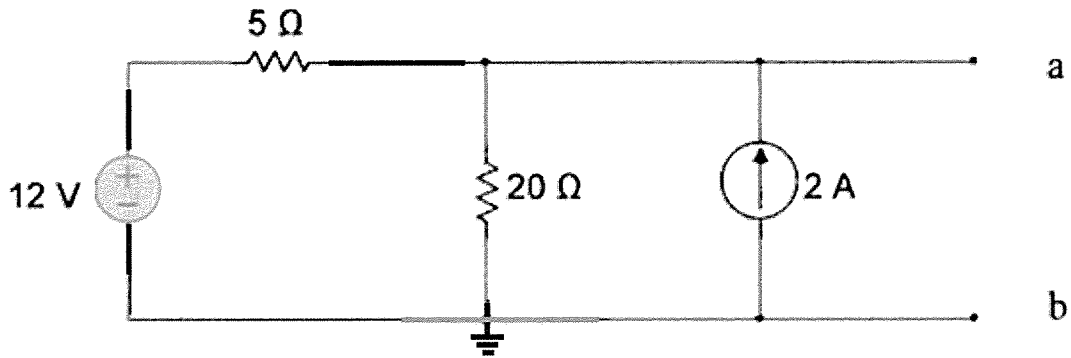


Figure Q3b/ Rajah Q3b

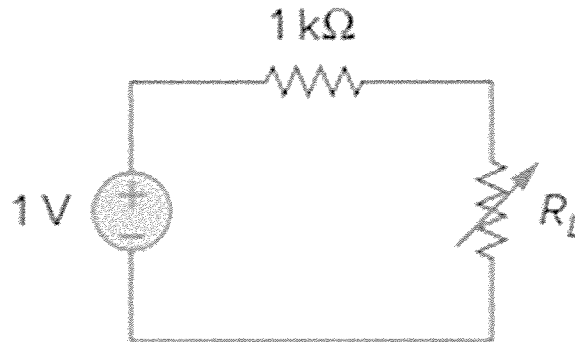


Figure Q3c/ Rajah Q3c

QUESTION 4 / SOALAN 4

- a) Determine the amplitude, phase, angular frequency, period, and frequency of the sinusoid.

$$v(t) = 12 \cos(50t + 10^\circ) \text{ V.}$$

(10 marks / markah)

- b) Determine current, i_x in the circuit of **Figure Q4b** using nodal analysis.

(15 marks / markah)

- a) Tentukan amplitud, fasa, sudut frekuensi, tempoh, dan frekuensi bagi sinusoid.

$$v(t) = 12 \cos(50t + 10^\circ) \text{ V.}$$

- b) Tentukan arus, i_x dalam litar pada **Rajah Q4b** dengan menggunakan analisis nodal.

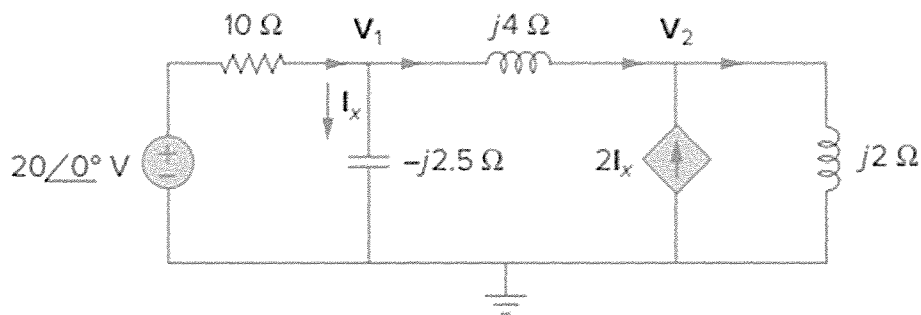


Figure Q4b/ Rajah Q4b

[100 MARKS / MARKAH]

END OF QUESTION PAPER/ KERTAS SOALAN TAMAT

LIST OF FORMULA

$$v_1 = \frac{R_1}{(R_1 + R_2)} v$$

$$i_1 = \frac{R_2}{(R_1 + R_2)} i$$

DELTA-TO-WYE TRANSFORMATION

$$R_1 = \frac{R_b R_c}{(R_a + R_b + R_c)} \quad R_2 = \frac{R_c R_a}{(R_a + R_b + R_c)}$$

$$R_3 = \frac{R_a R_b}{(R_a + R_b + R_c)}$$

WYE-TO-DELTA TRANSFORMATION

$$R_a = \frac{(R_1 R_2 + R_2 R_3 + R_3 R_1)}{R_1}, \quad R_b = \frac{(R_1 R_2 + R_2 R_3 + R_3 R_1)}{R_2}$$

$$R_c = \frac{(R_1 R_2 + R_2 R_3 + R_3 R_1)}{R_3}$$

$$I_L = \frac{V_{Th}}{(R_{Th} + R_L)}$$

$$R_N = R_{Th}$$



