



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : CIRCUIT THEORY
COURSE CODE : DEE 1013
EXAMINATION : DECEMBER 2022
DURATION : 2 HOURS 30 MINUTES

**INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON**

1. This examination paper consists of **SIX (6)** questions. Answer **ALL** questions. /
Kertas soalan ini mengandungi ENAM (6) soalan. Jawab SEMUA soalan.

2. Candidates are not allowed to bring any material/note to the examination hall/room except with the permission from the invigilator. /
Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke dewan/bilik peperiksaan tanpa kebenaran daripada pengawas.

3. Please check to make sure that this examination pack consist of: /
Pastikan kertas soalan peperiksaan ini mengandungi:
 - i. The Question Paper /
Kertas Soalan
 - ii. An 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 **8** printed pages including front page
*Kertas soalan ini mengandungi **8** halaman bercetak termasuk muka hadapan*

This examination paper consists of **SIX (6)** questions. Answer **ALL** the questions in the answering booklet.

Kertas soalan ini mengandungi ENAM (6) soalan. Jawab SEMUA soalan dalam buku jawapan.

QUESTION 1/ SOALAN 1

<p>Two (2) 2.5 hp air conditioners for 8 hours 30 minutes.</p> <p>Five (5) 250 W personal computers for 5 hours 50 minutes</p> <p>Seven (7) 31 W bladeless fans for 10 hours.</p> <p>One (1) 10 W internet modem for 24 hours.</p> <p>Two (2) 7 W phone charges for 5 hours 30 minutes.</p> <p><i>Dua(2) 2.5 hp penyaman udara untuk 8 jam 30 minit.</i></p> <p><i>Lima (5) 250 W komputer peribadi untuk 5 jam 50 minit.</i></p> <p><i>Tujuh (7) 31 W kipas tanpa bilah untuk 10 jam.</i></p> <p><i>Satu (1) 10 W modem internet untuk 24 jam.</i></p> <p><i>Dua (2) 7 W pengecas telefon untuk 5 jam 30 minit.</i></p>

Statement 1/ Pernyataan 1

Block Tariff <i>Blok Tarif</i>	Tariff Rate <i>Kadar Tarif</i>
For the first 200 kWh (1-200 kWh) per month <i>Untuk 200 kWj pertama (1-200 kWj) per bulan</i>	RM 0.218
For the next 100 kWh (201-300 kWh) per month <i>Untuk 100 kWj seterusnya (201-300 kWj) per bulan</i>	RM 0.334
For the next 300 kWh (301-600 kWh) per month <i>Untuk 300 kWj seterusnya (301-600 kWj) per bulan</i>	RM 0.516
For the next 300 kWh (601-900 kWh) per month <i>Untuk 300 kWj seterusnya (601-900 kWj) per bulan</i>	RM 0.546
For the next kWh (901 kWh onwards) per month <i>Untuk kWj seterusnya (901 kWh dan seterusnya) per bulan</i>	RM 0.571

Table 1/ Jadual 1

Statement 1 is the daily energy consumption at People's Cyber Center. **Table 1** is the tariff rate according to the use of the tariff block used and given 1 hp = 746 W.

Based on **Statement 1** and **Table 1**, calculate the total electricity consumption for the month of March which contains 31 days.

(12 marks/ markah)

***Pernyataan 1** ialah penggunaan tenaga harian di Pusat Siber Rakyat. **Jadual 1** ialah kadar tarif mengikut penggunaan blok tarif yang digunakan dan diberi 1 hp = 746 W.*

*Berdasarkan **Pernyataan 1** dan **Jadual 1**, kirakan jumlah penggunaan kos elektrik bagi bulan Mac yang mengandungi 31 hari.*

QUESTION 2/ SOALAN 2

Based on **Figure 2**, determine the following values:

- the resistance viewed from the voltage supply.
- the supply current, I_s .
- the voltage, V_B using voltage divider rule.
- the voltage, V_4 using Kirchhoff's voltage law.
- the current, I_3 using current divider rule.
- the current, I_x using Kirchhoff's current law.

(20 marks/ markah)

Berdasarkan **Rajah 2**, tentukan nilai berikut:

- rintangan jumlah dilihat dari bekalan voltan.
- arus bekalan, I_s .
- voltan, V_B menggunakan aturan pembahagi voltan.
- voltan, V_4 menggunakan hukum voltan Kirchhoff.
- arus, I_3 menggunakan aturan pembahagi arus.
- arus, I_x menggunakan hukum arus Kirchhoff.

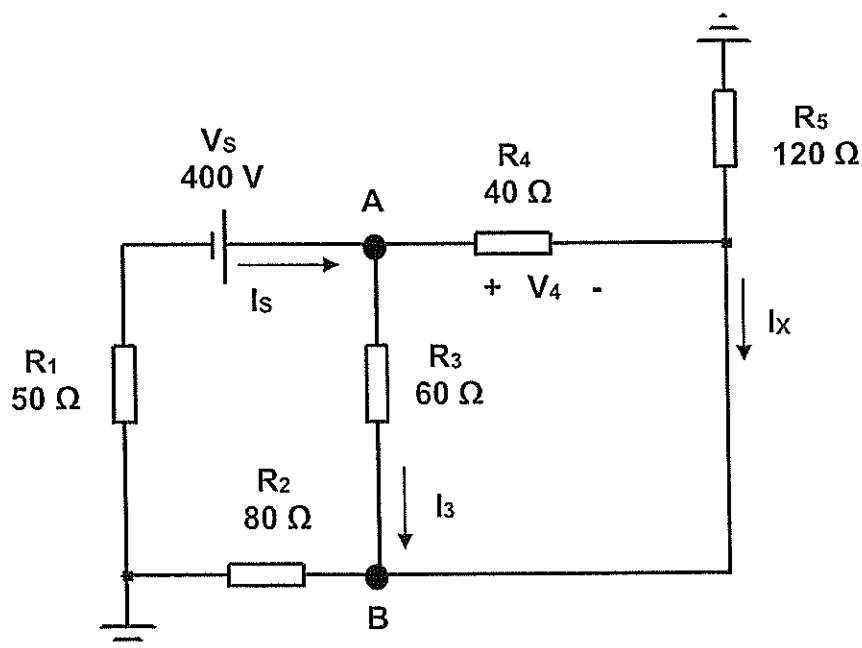


Figure 2/ Rajah 2

QUESTION 3/ SOALAN 3

Based on **Figure 3** which is terminal A-B:

- determine the resistance Thevenin, R_{TH} .
- determine Thevenin voltage, V_{TH} looking at terminal A-B and draw the Thevenin's equivalent for the circuit.
- calculate the maximum power dissipated by R_B .
- draw the Norton's equivalent circuit for the circuit by using source conversion.

(18 marks/ markah)

Berdasarkan **Rajah 3** iaitu terminal A-B:

- tentukan rintangan Thevenin, R_{TH} .
- tentukan voltan Thevenin, V_{TH} dilihat pada terminal A-B dan lukiskan litar setara Thevenin untuk litar tersebut.
- kirakan kuasa maksimum yang dilesapkan oleh R_B .
- lukiskan litar setara Norton untuk litar tersebut dengan menggunakan penukaran punca bekalan.

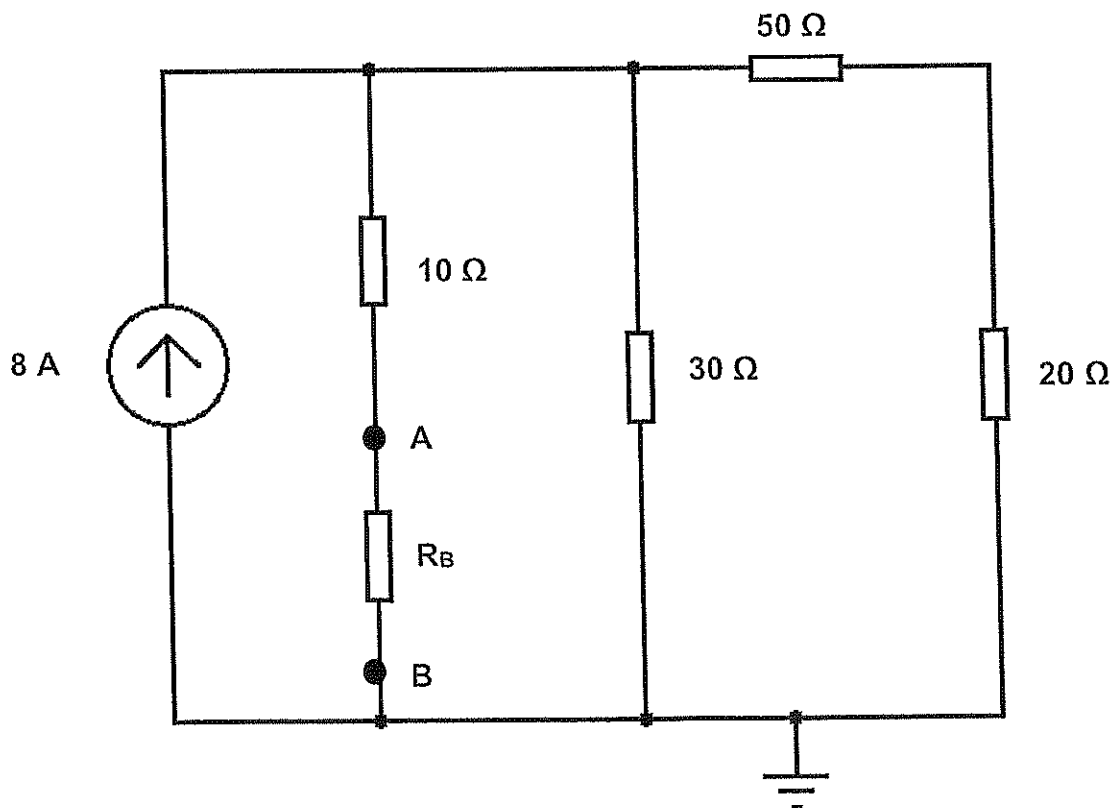


Figure 3/ Rajah 3

QUESTION 4/ SOALAN 4

$$v_1(t) = 120 \sin (300t + 70^\circ) \text{ V}$$

$$v_2(t) = 75 \sin (300t + 70^\circ) \text{ V}$$

$$v_1(t) = 120 \sin (300t + 70^\circ) \text{ V}$$

$$v_2(t) = 75 \sin (300t + 70^\circ) \text{ V}$$

Statement 2/ Pernyataan 2

Statement 2 refers to the sine wave equation.

- a) Based on $v_2(t)$, determine:
 - i) peak value.
 - ii) angular velocity.
 - iii) frequency.
 - iv) period.
 - v) phase angle in millisecond.
- b) Based on $v_1(t)$, determine the instantaneous value at $t = 3.0 \text{ ms}$.
- c) Determine phase angle in radian if phase for $v_1(t)$ become 120° .
- d) Sketch the sinusoidal waveform of $v_1(t)$ and $v_2(t)$ for one cycle on the same axis.
- e) Sketch the phasor diagram for both waveforms on the same axis.

(20 marks/ markah)

Pernyataan 2 merujuk kepada persamaan gelombang sinus.

- a) Berdasarkan $v_2(t)$, tentukan:
 - i) nilai puncak.
 - ii) halaju sudut.
 - iii) frekuensi.
 - iv) tempoh.
 - v) sudut fasa dalam milisaat.
- b) Berdasarkan $v_1(t)$, tentukan nilai ketika $t = 3.0 \text{ ms}$.
- c) Tentukan sudut fasa dalam radian jika sudut jika θ bagi $v_1(t)$ menjadi 120° .
- d) Lakarkan gelombang sinus bagi $v_1(t)$ dan $v_2(t)$ untuk satu kitar di atas paksi yang sama.
- e) Lakarkan gambar rajah pemfasa bagi kedua-dua gelombang di atas paksi yang sama.

QUESTION 5/ SOALAN 5

Determine the voltage V_o in the circuit of Figure 5 using mesh analysis.

(18 marks/ markah)

Tentukan voltan V_o dalam litar Rajah 5 menggunakan analisis jejaring.

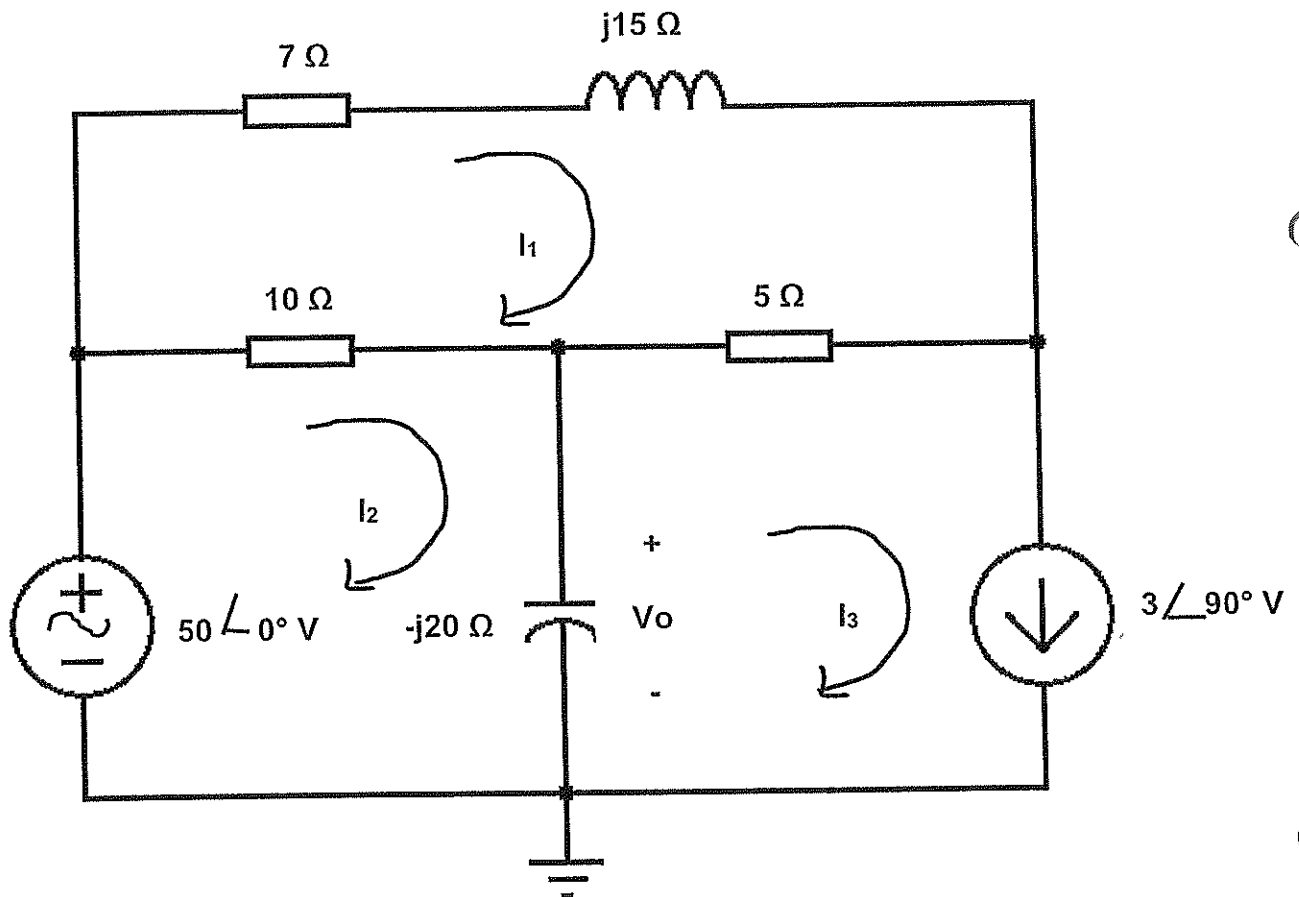


Figure 5/ Rajah 5

QUESTION 6/ SOALAN 6

Give a load, $v(t) = 150 \cos 323t$ V and $i(t) = 9 \cos (323t - 70^\circ)$ A. Calculate:

- the complex power, S.
- the apparent power, |S|.
- the real power, P and reactive power, Q.
- the power factor, pf.
- the load impedance, Z.

(12 marks/ markah)

Diberi beban, $v(t) = 150 \cos 323t$ V and $i(t) = 9 \cos (323t - 70^\circ)$ A. Kirakan:

- kuasa komplek, S.
- kuasa ketara, |S|.
- kuasa nyata, P dan kuasa reaktif, Q.
- faktor kuasa, pf.
- galangan beban, Z.

[100 MARKS/ MARKAH]

END OF QUESTION PAPER/ KERTAS SOALAN TAMAT