



UNIVERSITI MALAYSIA TERENGGANU

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PEPERIKSAAN AKHIR
FINAL EXAMINATIONSEMESTER I SESI 2015/2016 (PROGRAM SARJANA MUDA)
SEMESTER I 2015/2016 SESSION (DEGREE PROGRAMME)

NAMA KURSUS COURSE	:	LITAR DAN PERANTI ELEKTRIK CIRCUIT AND ELECTRIC DEVICES
KOD KURSUS COURSE CODE	:	FEI4201
TARIKH DATE	:	14 JANUARI 2016 (KHAMIS) 14 JANUARY 2016 (THURSDAY)
TEMPAT VENUE	:	DEWAN SYARAHAN 1 (DS1)
MASA TIME	:	9.00 – 11.00 PAGI (2 JAM) 9.00 – 11.00 AM (2 HOURS)

NO. MATRIK STUDENT NO.	:	_____
NAMA PROGRAM PROGRAMME	:	_____
NO. MEJA SEAT NO.	:	_____

ARAHAN KEPADA CALON
INSTRUCTIONS TO CANDIDATES

- i. Kertas soalan ini mengandungi **LIMA** (5) soalan. Pilih dan jawab **TIGA** (3) soalan sahaja. *This question booklet consists of **FIVE** (5) questions. Choose and answer **THREE** (3) questions.*
- ii. Semua jawapan hendaklah ditulis dalam **BUKU JAWAPAN** yang disediakan. *All answers must be written in **ANSWER BOOKLET** provided.*

JANGAN BUKA BUKU SOALAN INI SEHINGGA DIBERITAHU
DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED
KERTAS SOALAN INI MENGANDUNGI 10 MUKASURAT BERCETAK
THIS QUESTION PAPER CONSISTS OF 10 PRINTED PAGES

Trigonometric identities:

$$\sin(\omega t \pm 180^\circ) = -\sin \omega t$$

$$\cos(\omega t \pm 180^\circ) = -\cos \omega t$$

$$\sin(\omega t \pm 90^\circ) = \pm \cos \omega t$$

$$\cos(\omega t \pm 90^\circ) = \mp \sin \omega t$$

Mathematic operation of complex number:

- | | |
|----------------------|--|
| 1. Addition | $z_1 + z_2 = (x_1 + x_2) + j(y_1 + y_2)$ |
| 2. Subtraction | $z_1 - z_2 = (x_1 - x_2) + j(y_1 - y_2)$ |
| 3. Multiplication | $z_1 z_2 = r_1 r_2 \angle \phi_1 + \phi_2$ |
| 4. Division | $\frac{z_1}{z_2} = \frac{r_1}{r_2} \angle \phi_1 - \phi_2$ |
| 5. Reciprocal | $\frac{1}{z} = \frac{1}{r} \angle -\phi$ |
| 6. Square root | $\sqrt{z} = \sqrt{r} \angle \phi/2$ |
| 7. Complex conjugate | $z^* = x - jy = r \angle -\phi = r e^{-j\phi}$ |
| 8. Euler's identity | $e^{\pm j\phi} = \cos \phi \pm j \sin \phi$ |

Question 1 [30M]
Soalan 1

(a) Find v_o and i_o in the circuit of Figure 1.

Cari nilai v_o dan i_o dalam litar pada Gambarajah 1.

[5M]

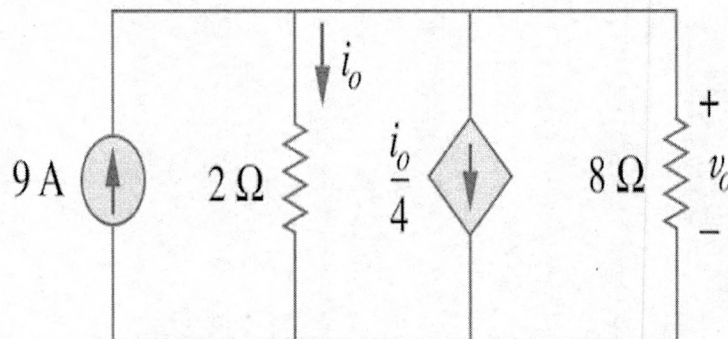


Figure 1
Gambarajah 1

(b) Find the voltages at the three nodes (v_1 , v_2 and v_3) in the circuit of Figure 2.

Cari nilai voltan di ketiga-tiga nod (v_1 , v_2 , dan v_3) dalam litar pada Gambarajah 2.

[10M]

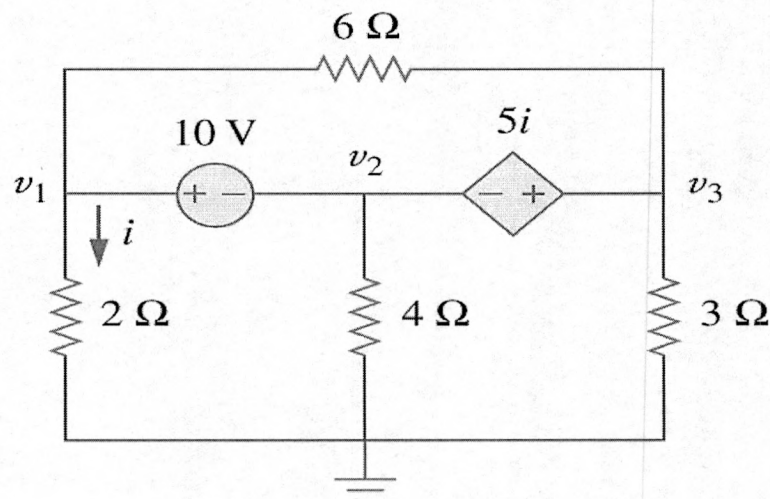


Figure 2
Gambarajah 2

(c) Calculate the mesh currents i_1 and i_2 of the circuit shown in Figure 3.

Kira arus kekisi i_1 dan i_2 bagi litar pada Gambarajah 3.

[5M]

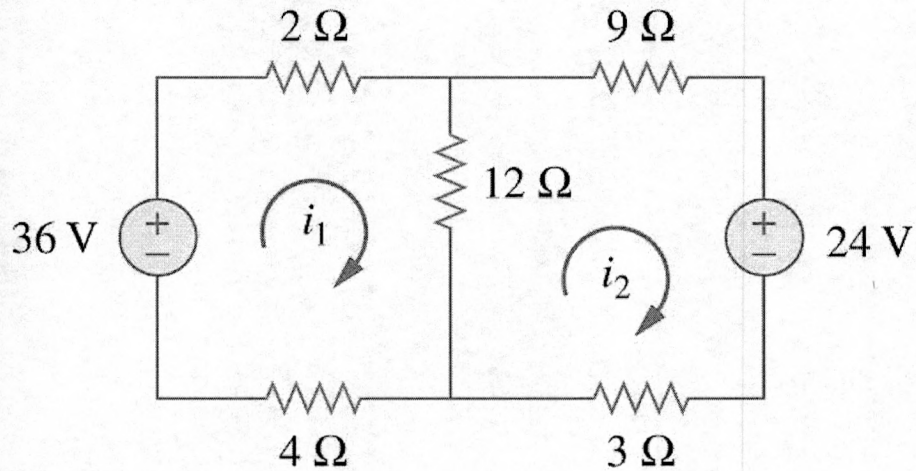


Figure 3
Gambarajah 3

(d) Using mesh analysis, find i_1 , i_2 , and i_3 in the circuit of Figure 4.

Dengan menggunakan analisa kekisi, cari nilai i_1 , i_2 , dan i_3 dalam litar pada Gambarajah 4.

[10M]

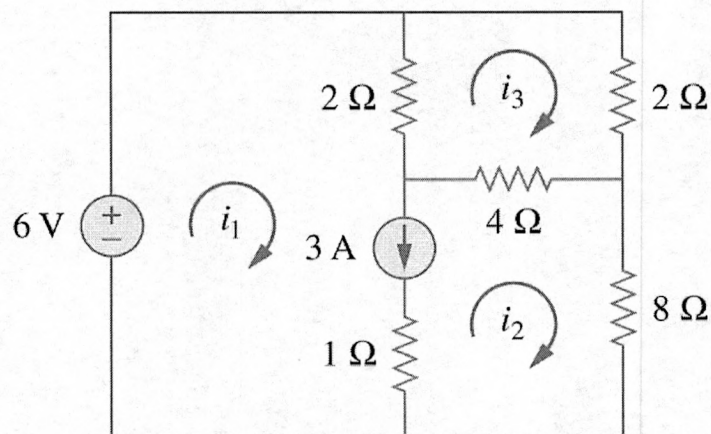


Figure 4
Gambarajah 4

Question 2 [30M]
Soalan 2

(a) Using the superposition theorem, find v_x in the circuit of Figure 5.

Dengan menggunakan teorem superposisi, cari v_x dalam litar pada Gambarajah 5. [8M]

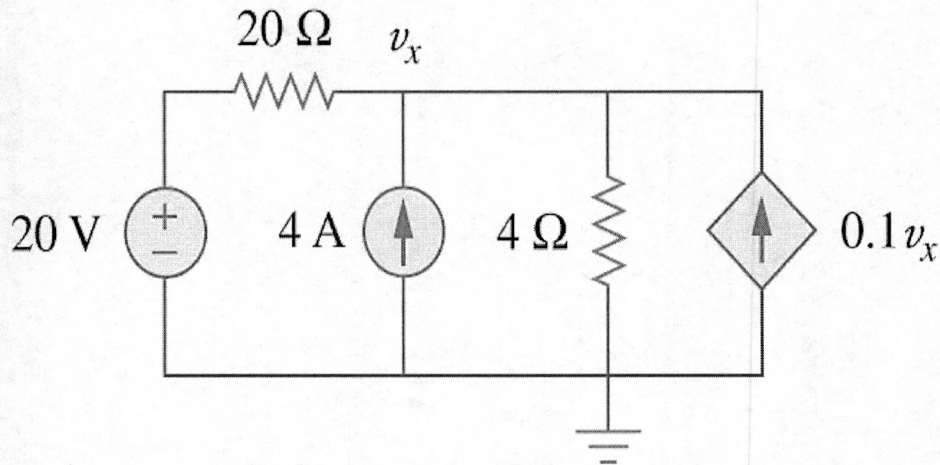


Figure 5
Gambarajah 5

(b) Find the Thevenin equivalent circuit to the left of the terminals ($a-b$) in the circuit of Figure 6.

Cari nilai litar setara Thevenin pada sebelah kiri terminal ($a-b$) dalam litar pada Gambarajah 6. [8M]

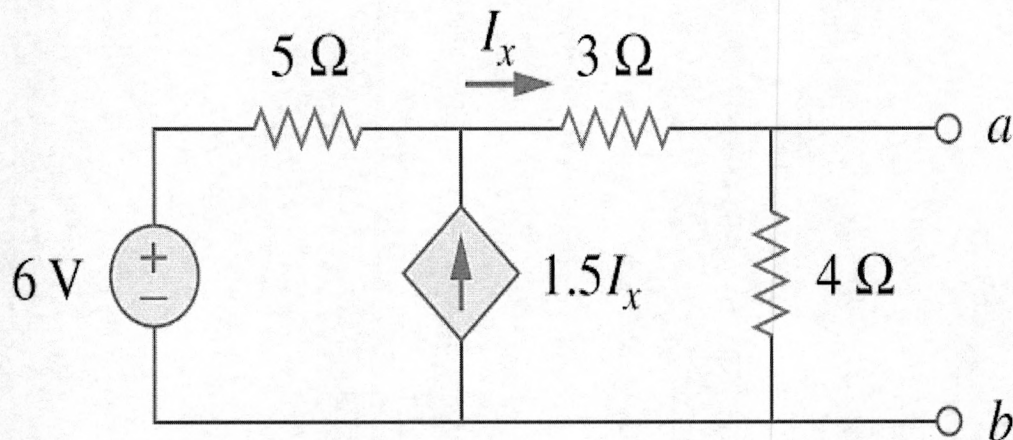


Figure 6
Gambarajah 6

(c) Given the circuit in Figure 7, obtain the Norton equivalent circuit as viewed from terminals:

Diberikan litar seperti Gambarajah 7, carikan litar setara Norton seperti yang dilihat dari terminal:

(i) a-b

(ii) c-d

[14M]

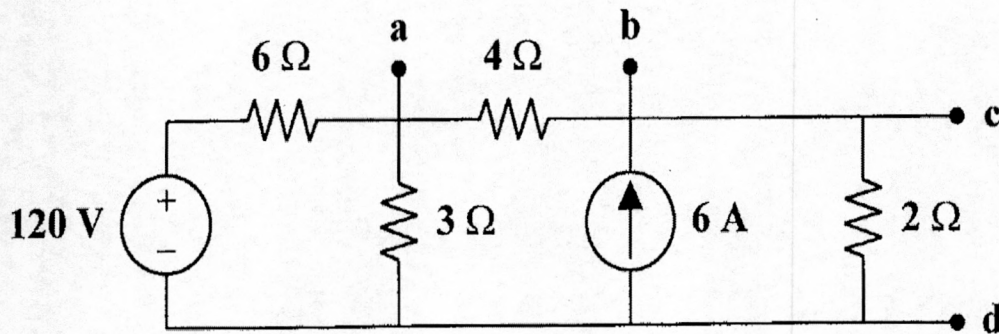


Figure 7
Gambarajah 7

Question 3 [30M]
Soalan 3

(a) Refer to the circuit in Figure 8. Let $v_c(0) = 60$ V. Determine v_c , v_x and i_o for $t > 0$.

Rujuk pada litar dalam Gambarajah 8. Biar $v_c(0) = 60$ V. Tentukan nilai v_c , v_x dan i_x apabila $t > 0$.

[7M]

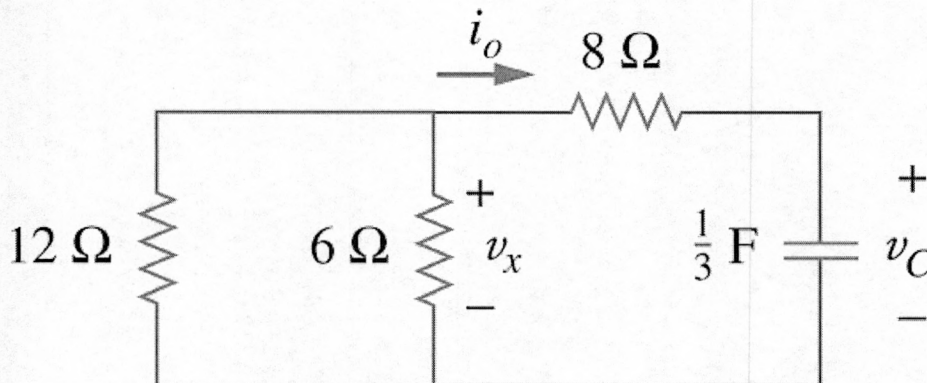


Figure 8
Gambarajah 8

(b) If the switch in Figure 9 opens at $t = 0$, find $v(t)$ for $t \geq 0$ and $w_c(0)$ (initial energy stored).

Jika suis dalam Gambarajah 9 terbuka pada $t = 0$, cari nilai $v(t)$ untuk $t \geq 0$ dan $w_c(0)$ (tenaga awal tersimpan).

[7M]

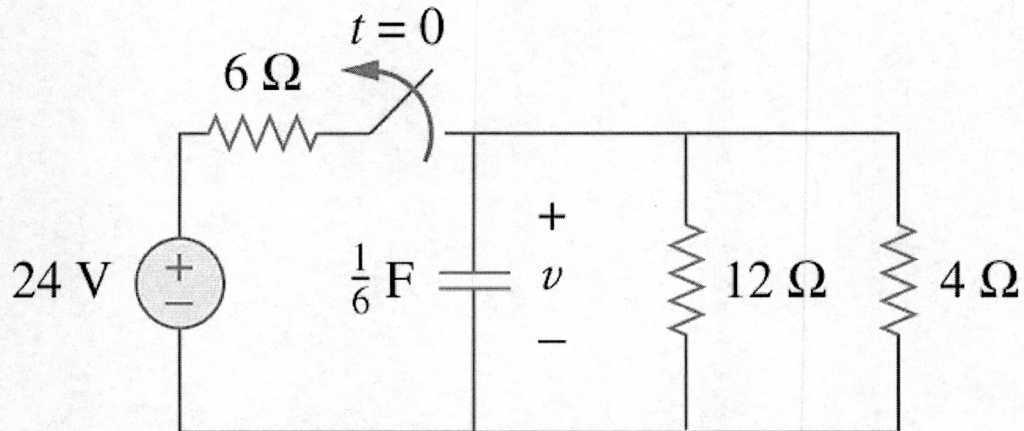


Figure 9
Gambarajah 9

(c) Find i and v_x in the circuit of Figure 10. Let $i(0) = 12$ A.

Cari nilai i dan v_x dalam litar pada Gambarajah 10. Biarkan $i(0) = 12$ A.

[9M]

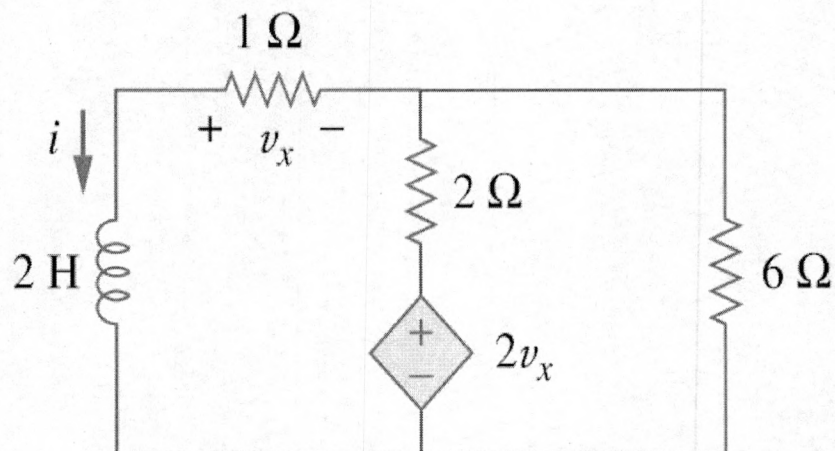


Figure 10
Gambarajah 10

(d) For the circuit in Figure 11, find $i(t)$ for $t > 0$.

Untuk litar dalam Gambarajah 11, cari nilai $i(t)$ untuk $t > 0$.

[7M]

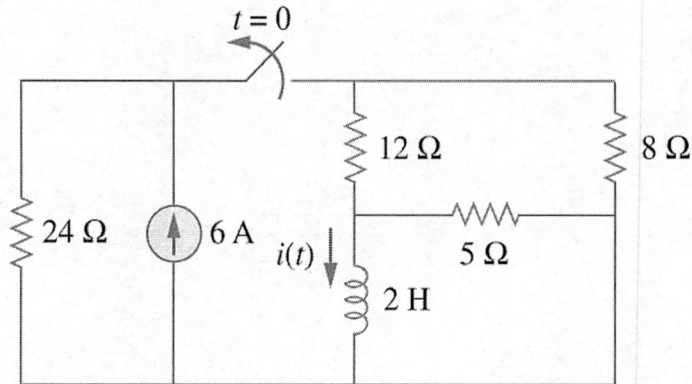


Figure 11
Gambarajah 11

Question 4 [30M]
Soalan 4

(a) If $R = 10 \Omega$, $L = 5 \text{ H}$, and $C = 2 \text{ mF}$ in Figure 12, find α (damping factor), ω_0 (resonant frequency), s_1 , and s_2 (natural frequencies). What type of natural response will the circuit have?

Jika $R = 10 \Omega$, $L = 5 \text{ H}$, and $C = 2 \text{ mF}$ dalam Gambarajah 12, cari α (faktor redaman), ω_0 (frekuensi salunan), s_1 , dan s_2 (frekuensi tabii). Apakah jenis tindakbalas semulajadi litar ini?

[5M]

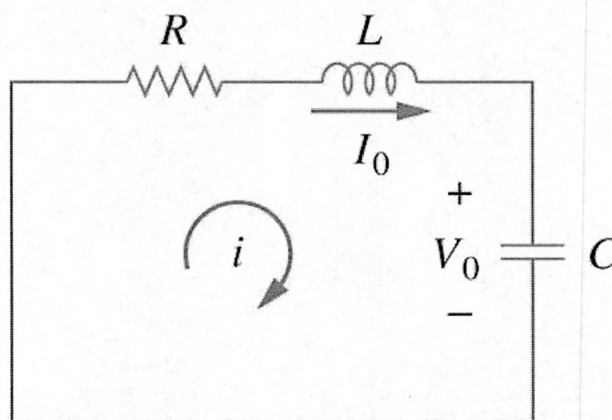


Figure 12
Gambarajah 12

(b) In the parallel circuit of Figure 13, find $v(t)$ for $t > 0$, assuming $v(0) = 5 \text{ V}$, $i(0) = 0 \text{ A}$, $L = 1 \text{ H}$, $C = 10 \text{ mF}$, and $R = 1.923 \Omega$.

Dalam litar sesleri bagi Gambarajah 13, cari $v(t)$ untuk $t > 0$, anggapkan $v(0) = 5 \text{ V}$, $i(0) = 0 \text{ A}$, $L = 1 \text{ H}$, $C = 10 \text{ mF}$, dan $R = 1.923 \Omega$. [10M]

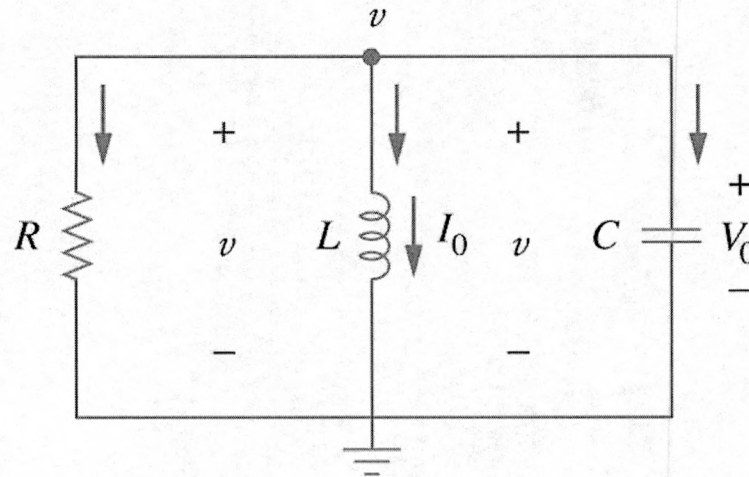


Figure 13
Gambarajah 13

(c) Refer to the circuit in Figure 14. Find $v(t)$ and $i(t)$ for $t > 0$. Consider $R = 4 \Omega$.

Merujuk kepada litar dalam Gambarajah 14. Cari nilai $v(t)$ dan $i(t)$ untuk $t > 0$.
Pertimbangkan $R = 4 \Omega$. [15M]

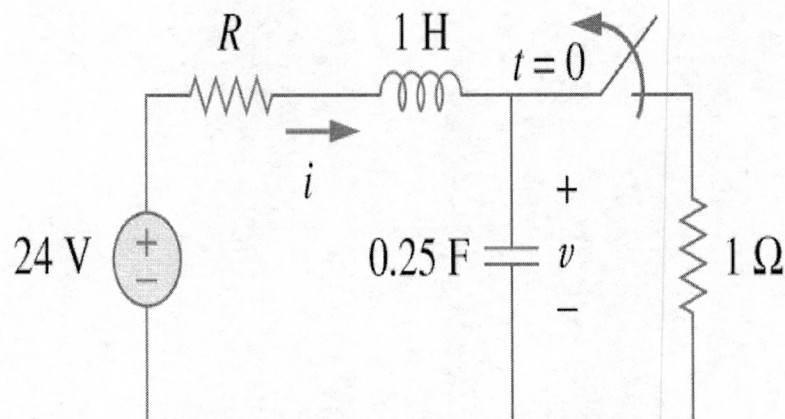


Figure 14
Gambarajah 14

Question 5 [30M]
Soalan 5

- (a) Given the sinusoid $v(t) = 12 \cos(50t + 10^\circ)$, calculate its amplitude, phase, angular frequency, period, and frequency.

Diberi sinusoid $v(t) = 12 \cos(50t + 10^\circ)$, kira amplitud, fasa, sudut frekuensi, masa, dan frekuensinya. [4M]

- (b) Find the phase angle between $v_1 = -10 \cos(\omega t + 50^\circ)$ and $v_2 = 12 \sin(\omega t - 10^\circ)$. State which sinusoid is leading?

Cari sudut fasa antara $v_1 = -10 \cos(\omega t + 50^\circ)$ and $v_2 = 12 \sin(\omega t - 10^\circ)$. Nyatakan yang mana mendahului? [4M]

- (c) (i) Find the following complex number:

Cari nilai nombor kompleks berikut: [5M]

$$[(5 + j2)(-1 + j4) - 5 \angle 60^\circ]^*$$

- (ii) Express this sinusoids as phasors:

Tukarkan sinusoids sebagai phasors: [3M]

$$i = -4 \sin(10t + 10^\circ) \text{ A}$$

- d) Determine $v(t)$ and $i(t)$ in the circuit shown in Figure 15.

Tentukan nilai $v(t)$ dan $i(t)$ bagi litar dalam Gambarajah 15. [14M]

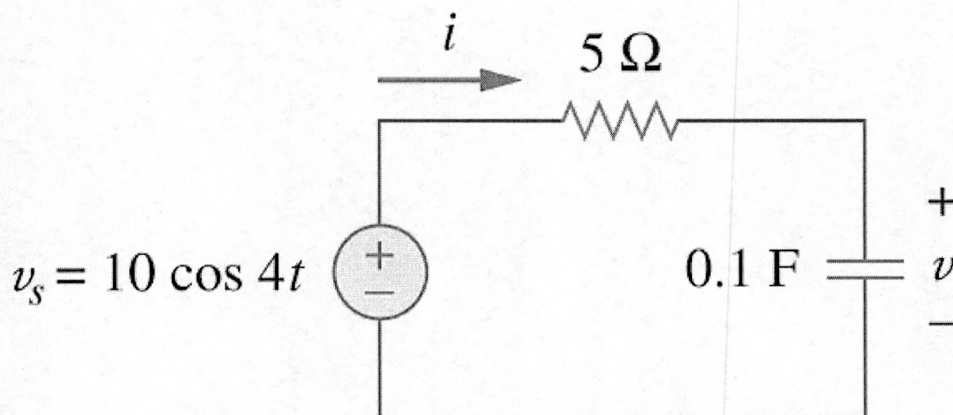


Figure 15
Gambarajah 15

Kertas Soalan Tamat
End of Question Paper