

**SULIT**



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

**JABATAN KEJURUTERAAN ELEKTRIK**

**PEPERIKSAAN AKHIR**

**SESI JUN 2015**

**DET2033 ELECTRICAL CIRCUIT**

**TARIKH : 19 OKTOBER 2015**

**TEMPOH : 2.30 PM - 4.30 PM (2 JAM)**

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Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Objektif (10 soalan)

Bahagian B: Struktur (4 soalan)

Bahagian C: Esei (2 soalan)

Dokumen sokongan yang disertakan : Tiada

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

## 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

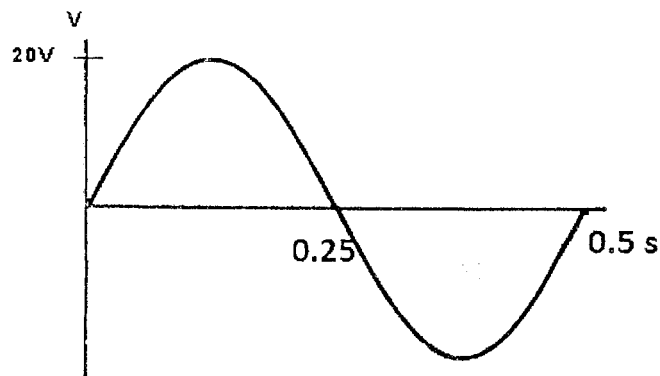


Figure B1(a)/ Rajah B1(a)

- a) Based on Figure B1(a);  
*Berdasarkan Rajah B1(a);*
- i) Define the time period,  $T$  of a sine waveform.  
*Berikan tempoh masa,  $T$  bagi gelombang sinus.*

[2 marks]

[2 markah]

- ii) Find the value of time period,  $T$ .  
*Dapatkan nilai tempoh masa,  $T$ .*

[1 mark]

[1 markah]

- b) Based on Figure B1(a);  
*Berdasarkan Rajah B1(a);*

- i) State the peak voltage,  $V_p$ .  
*Nyatakan nilai voltan puncak,  $V_p$ .*

[2 marks]

[2 markah]

CLO1  
C1CLO1  
C2

- ii) Write the sinusoidal waveform equation.  
*Tuliskan persamaan gelombang sinusoidal.*

[3 marks]

[3 markah]

CLO2  
C3

- c) An alternating voltage is given by  $V(t) = 282.8 \sin 314t$  V. Find;

*Satu voltan ulang alik mempunyai persamaan  $V(t) = 282.8 \sin 314t$  V. Dapatkan nilai;*

- i) average voltage ( $V_{avg}$ ).  
*Voltan purata ( $V_{avg}$ ).*

[2 marks]

[2 markah]

- ii) frequency ( $f$ ).  
*frekuensi ( $f$ ).*

[2 marks]

[2 markah]

- iii) the instantaneous voltage value when  $t = 4$  ms.  
*Nilai voltan seketika apabila  $t = 4$  ms.*

[3 marks]

[3 markah]

## QUESTION 2

## SOALAN 2

CLO 1  
C1

- a) Draw a phasor diagram to represent relation between current and voltage for a purely resistive AC circuit, a purely inductive AC circuit and a purely capacitive AC circuit.

*Lakarkan gambarajah bagi menunjukkan hubungan antara arus dan voltan bagi litar AU rintangan tulen, litar AU induktif tulen dan litar AU kapasitif tulen.*

[3 marks]

[3 markah]

CLO 1  
C2

- b) A series circuit consist of resistance,  $50\ \Omega$  and capacitance,  $20\ \mu\text{F}$  are connected to supply  $200\ \text{V}$ ,  $100\ \text{Hz}$ . Calculate:

*Satu litar sesiri mengandungi perintang  $50\ \Omega$  dan kapasitor  $20\ \mu\text{F}$  disambungkan kepada bekalan kuasa  $200\ \text{V}$ ,  $100\ \text{Hz}$ . Kirakan:*

- The circuit impedance,  $Z$   
*Galangan litar,  $Z$*
- The current flowing in the circuit  
*Arus yang mengalir dalam litar*
- The phase angle between voltage and current  
*Beza fasa antara voltan dan arus*

[5 marks]

[5 markah]

CLO 2  
C3

- c) For the circuit shown in Figure B2 (c), determine the voltage  $V_1$  and  $V_2$  if the supply frequency is  $1\ \text{kHz}$ . Then calculate the supply voltage  $V$ .

*Rujuk Rajah B2(c). Jika diberi frekuensi untuk litar tersebut adalah  $1\ \text{kHz}$ , tentukan nilai Voltan pada  $V_1$  dan  $V_2$ . Kemudian kirakan voltan bekalan untuk litar tersebut.*

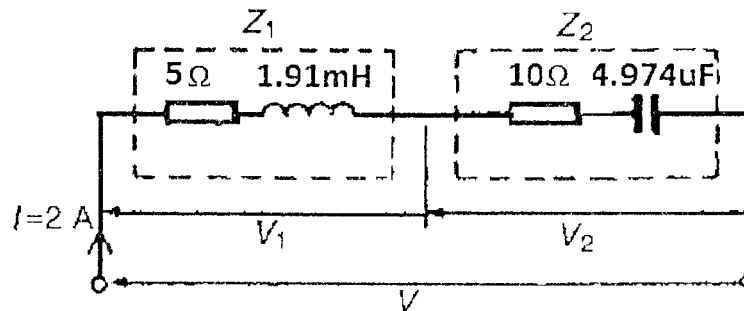


Figure B2(c) / Rajah B2(c)

[7 marks]

[7 markah]

**QUESTION 3**  
**SOALAN 3**CLO1  
C1

- a) Explain the differential of connection method of Star (Y) and Delta ( $\Delta$ ) system.

*Jelaskan perbezaan di antara sistem sambungan Bintang (Y) dan Delta ( $\Delta$ ).*

[ 3 marks]

[ 3 markah]

CLO1  
C2

- b) Three load resistance of  $40\ \Omega$  is connected in delta to a 415 V, 3 $\phi$ . Determine phase voltage and phase current for the system.

*Tiga beban rintangan  $40\ \Omega$  disambung secara delta kepada 415 V, 3 $\phi$ . Tentukan voltan fasa dan arus fasa untuk sistem ini.*

[5 marks]

[5 markah]

CLO2  
C3

- c) Each phase in Delta ( $\Delta$ ) connected consists of  $50\ \Omega$  resistor and connected in series with the capacitor, 50  $\mu\text{F}$ . This three phase load is supplied with line voltage, 440 V and frequency, 50 Hz. Calculate the phase and line currents.

*Setiap fasa di dalam sambungan Delta ( $\Delta$ ) terdiri daripada perintang  $50\ \Omega$  yang disambung bersiri dengan kapasitor 50  $\mu\text{F}$ . Beban tiga fasa ini dibekalkan dengan voltan talian 440 V dan frekuensi 50 Hz. Tentukan nilai arus fasa dan arus talian.*

[7 marks]

[7 markah]

## QUESTION 4

## SOALAN 4

CLO1  
C1

- a) Define transformer ratio

*Definisikan nisbah pengubah.*

[3marks]

[3 markah]

CLO1  
C2

- b) Explain the characteristics of the step up transformer.

*Terangkan ciri-ciri pengubah langkah naik.*

[5marks]

[5 markah]

CLO1  
C2

- c) By referring to Figure B4(c), calculate :

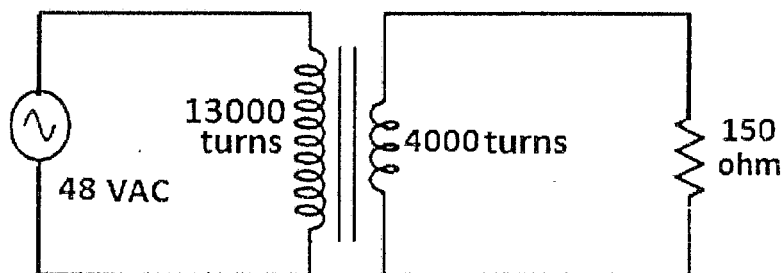
*Merujuk pada Rajah B4(c), kirakan:*

Figure B4(c) / Rajah B4(c)

- (i) Primary voltage

[1 mark]

*Voltan primer*

[1 markah]

- (ii) Secondary voltage

[2 marks]

*Voltan sekunder*

[2 markah]

- (iii) Secondary current

[2 marks]

*Arus sekunder*

[2 markah]

- (iv) Primary current

[2 marks]

*Arus primer*

[2markah]

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

This section consists of **TWO (2)** essay questions. Answer **ALL** questions.

**ARAHAN:**

*Bahagian ini mengandungi TWO (2) soalan esei. Jawab SEMUA soalan.*

**QUESTION 1**

CLO2  
C3

A series of RLC circuit has the following values  $R = 8\Omega$ ,  $C = 220\text{ }\mu\text{F}$  and  $L = 25\text{ mH}$ . If the circuit has an instantaneous voltage of  $V_s = 17 \sin(377t)\text{ V}$ , determine the instantaneous current and draw its phasor diagram. What value will this current have at  $5.0\text{ ms}$ ?

**SOALAN 1**

*Satu litar siri RLC mengandungi nilai  $R = 8\Omega$ ,  $C = 220\text{ }\mu\text{F}$  and  $L = 25\text{ mH}$ . Sekiranya litar mempunyai nilai voltan seketika iaitu  $V_s = 17 \sin(377t)\text{ V}$ , carikan persamaan nilai arus seketika dan lukiskan gambarajah fasanya. Apakah nilai arus seketika pada  $5.0\text{ ms}$ ?*

[15marks]

[15 markah]

**QUESTION 2**

CLO2  
C3

A coil of inductance  $120\text{ mH}$  are connected in series with a capacitance of  $2\text{ }\mu\text{F}$  and a resistance of  $12\text{ }\Omega$  across a  $50\text{ V}$  and variable frequency supply. Determine the bandwidth of the circuit during the resonance and voltage across each component.

**SOALAN 2**

*Satu gegelung aruhan  $120\text{ mH}$  disambungkan secara siri dengan pemuat  $2\text{ }\mu\text{F}$  dan perintang  $12\text{ }\Omega$  merentasi bekalan  $50\text{ V}$  dan frekuensi bolehubah. Tentukan nilai jalur lebar litar tersebut dalam keadaan resonan dan nilai voltan pada setiap komponen.*

[15 marks]

[15 markah]

**END OF QUESTION**

**SOALAN TAMAT**