

**SECTION B : 60 MARKS****BAHAGIAN C : 60 MARKAH****INSTRUCTION:**

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions provided.

**ARAHAN:**

*Bahagian ini mengandungi EMPAT (4) soalan struktur. Jawab SEMUA soalan yang disediakan.*

**QUESTION 1****SOALAN 1**CLO1  
C1

- a) Define the Primary sensing element.  
*Huraikan maksud 'elemen penderiaan utama'*

[3 marks]

[3 markah]

CLO1  
C2

- b) Explain the **THREE (3)** types of errors.  
*Terangkan tiga jenis ralat.*

[6 marks]

[6 markah]

CLO1  
C2

- c) By referring Figure B1(c), classify all the situations.  
*Rujuk rajah B1(c), kelaskan untuk semua keadaan.*

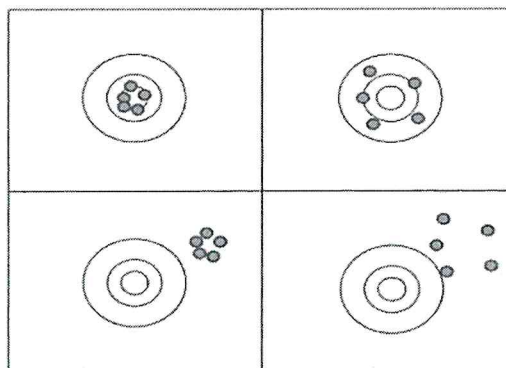


Figure B1(c)/ Rajah B1(c)

[6 marks]

[6 markah]

**QUESTION 2****SOALAN 2**CLO1  
C1

- a) List **THREE (3)** types of damping curves.  
*Senaraikan TIGA (3) jenis lengkok redaman.*

[3 marks]

[3 markah]

CLO2  
C3

- b) Draw a circuit of a two range dc voltmeter series type  
*Lukis dan label binaan bagi voltmeter at jenis siri dengan dua julat*

[6 marks]

[6 markah]

CLO2  
C3

- c) List **THREE (3)** differences between an analogue and digital multi meter.  
*Senaraikan TIGA (3) perbezaan antara analog dan digital multimeter.*

[6 marks]

[6 markah]

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

- a) State the application of oscilloscope.  
*Nyatakan kegunaan osiloskop.*

[3 marks]

[3 markah]

CLO2  
C3

- b) Calculate the peak voltage, the peak- to-peak voltage, periodic time and frequency of the waveform shown in Figure B3(b). Given, the vertical scale is 0.2 volts/div and time scale is 50 $\mu$ s/div.

Kirakan voltan puncak, voltan puncak-ke-puncak, tempoh masa dan frekuensi bagi bentuk gelombang yang ditunjukkan pada Rajah B3(b). Diberi skala menegak adalah 0.2 volt/div dan skala masa adalah 50 $\mu$ s/div.

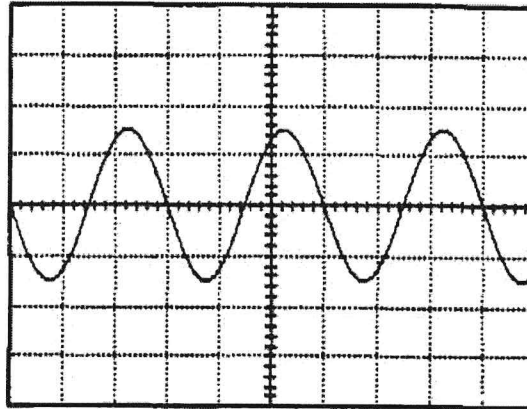


Figure B3(b)/ Rajah B3(b)

[6 marks]

[6 markah]

CLO2  
C3

- c) A sinusoidal waveform in Figure B3(c) displayed by an oscilloscope has a vertical scale of 0.2 volts per division and the time base of 2 ms per division. Calculate the peak-to-peak value, peak value and RMS value of this waveform.

Satu gelombang sinus di dalam Rajah B3(c) dipaparkan pada sebuah osiloskop mempunyai skala menegak iaitu 0.2 volts per bahagian dan skala tempoh adalah 2 ms per bahagian. Kirakan nilai puncak-ke-puncak, nilai puncak dan nilai RMS bagi bentuk gelombang tersebut.

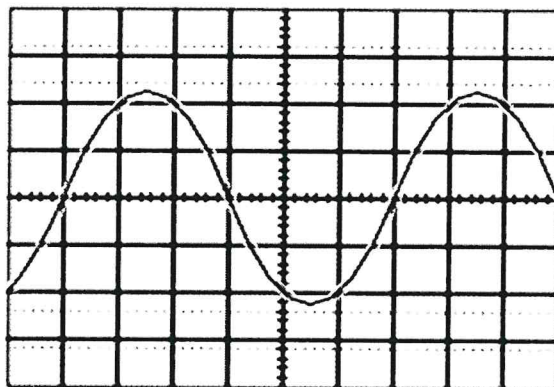


Figure B3(c)/ Rajah B3(c)

[6 marks]

[6 markah]

**QUESTION 4****SOALAN 4**

- CLO1  
C1 a) List **THREE (3)** types of power meter.  
*Senaraikan **TIGA (3)** jenis meter kuasa.*
- [3 marks]  
[3 markah]
- CLO1  
C2 b) Determine the cost to run a heater (1322W) for 24 hours if the energy cost is 9 cent per kilowatt-hour.  
*Tentukan kos untuk pemanas (1322W) beroperasi selama 24 jam jika kos tenaga ialah 9 sen per kilowatt –jam.*
- [5 marks]  
[5 markah]
- CLO2  
C3 c) Draw the construction of a kiloWatt-hour (kWh) meter (induction type).  
*Lukis pembinaan meter kiloWatt-jam (kWj) (jenis induksi).*
- [7 marks]  
[7 markah]

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

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

**ARAHAN:**

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

**QUESTION 1****SOALAN 1**

CLO2  
C3

A series type ohmmeter is built with a Permanent Moving Coil (PMMC) instrument with full scale deflection (FSD) =  $500\mu\text{A}$ , the internal resistance,  $R_m = 1\text{K}\Omega$ , supply voltage,  $E_b = 10\text{V}$ , series resistor,  $R_1 = 20\text{K}\Omega$ , zero adjustment resistance,  $R_2 = 200\Omega$ . Determine the value of resistance measured at 0.25, 0.5, 0.75 and 0.9 of FSD.

*Ohmmeter jenis siri dibina menggunakan meter Gegelung Bergerak Magnet Kekal (GBMK) dengan pesongan skala penuh =  $500\mu\text{A}$ , rintangan dalam meter  $R_m = 1\text{K}\Omega$ , sumber bekalan  $E_b = 10\text{V}$ , perintang siri  $R_1 = 20\text{K}\Omega$ , perintang pelaras sifar  $R_2 = 200\Omega$ . Tentukan nilai perintang yang diukur jika pesongan pada 0.25, 0.5, 0.75 dan 0.9 daripada skala penuh.*

[15 marks]

[15 markah]

**QUESTION 2****SOALAN 2**CLO2  
C3

List **TWO (2)** applications of Wheatstone Bridge circuit. By using a suitable diagram, express the balance equation for Wheatstone bridge. Calculate  $R_x$  when it is in a balanced condition, given the value of  $E = 10V$ , ratio arms resistances with  $R_1 = 10k\Omega$ ,  $R_2 = 15k\Omega$  and standard arm resistance with  $R_3 = 12k\Omega$ .

*Senaraikan **DUA (2)** aplikasi penggunaan litar Tetimbang Wheatstone. Berdasarkan kepada rajah yang sesuai, nyatakan persamaan seimbang bagi Tetimbang Wheatstone. Kirakan nilai  $R_x$  apabila tetimbang dalam keadaan seimbang, diberi nilai  $E = 10V$ , rintangan lengan nisbah dengan  $R_1 = 10k\Omega$ ,  $R_2 = 15k\Omega$  dan rintangan lengan piawai dengan  $R_3 = 12k\Omega$ .*

[15 marks]

[15 markah]

**SOALAN TAMAT**