POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

DEE1012: MEASUREMENT

TARIKH : 7 APRIL 2016
MASA : 8.30 AM – 10.30 AM (2 JAM)

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

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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.*
terminologies

QUESTION 1
SOALAN 1

CLO1 C1 (a) Define measurement.
Beri definisi Pengukuran.

[3 marks]
[*3 markah*]

CLO1 C2 (b) Explain the terminology of scale and range.
Terangkan terminologi bagi skala dan julat.

[6 marks]
[*6 markah*]

CLO1 C2 (c) Explain the characteristics of measurement for accuracy and precision.
Terangkan ciri-ciri ketepatan dan kejituan dalam pengukuran.

[6 marks]
[*6 markah*]

QUESTION 2
SOALAN 2

CLO1 C1 (a) Describe basic principle of DC and AC Meter.
Jelaskan prinsip asas Meter AT dan AU.

[3 marks]
[3 *markah*]

CLO2 C3

(b) Calculate the value of the multiplier resistance for the multiple range DC voltmeter circuit shown in Figure B 2(b) if Im= 100μA and Rm = 10kΩ.

Kirakan nilai perintang pelbagai untuk julat pelbagai dalam litar meter volt AT dalam Rajah B 2(b) jika diberi Im= 100μA dan Rm = 10kΩ.

[6 marks]

[*6 markah*]

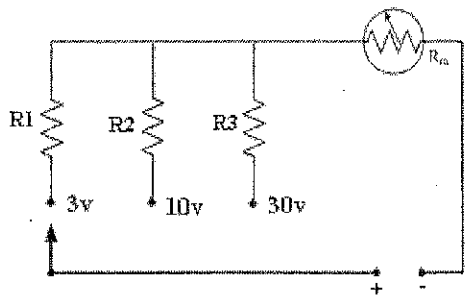

Figure B 2(b)/ Rajah B 2(b)

CLO2 C3

(c) With the aid of a diagram, describe the basic construction and operating principle of Permanent Magnet Moving Coil (PMMC).

Dengan bantuan gambarajah, jelaskan binaan asas dan prinsip operasi bagi Magnet Kekal Gelung Bergerak (MKGB).

[6 marks]

[6 *markah*]

QUESTION 3
SOALAN 3

CLO1 C1

(a) Describe the basic functions of analogue and digital oscilloscope.

Jelaskan fungsi-fungsi asas osiloskop analog dan digital.

[3 marks]

[3 *markah*]

CLO2 C3

(b) Refer to Figure B 3(b), determine the peak to peak voltage (V_{PP}), the peak voltage (V_P) and frequency if the Volt/div control is adjusted at 0.5V and Time/div control is adjusted at 50μs.

Merujuk kepada Rajah B 3(b) , *tentukan nilai voltan puncak ke puncak (V_{PP}), voltan puncak (V_P) dan frekuensi jika pelaras Volt/div dilaraskan pada 0.5V dan pelaras Time/div dilaraskan pada 50μs.*

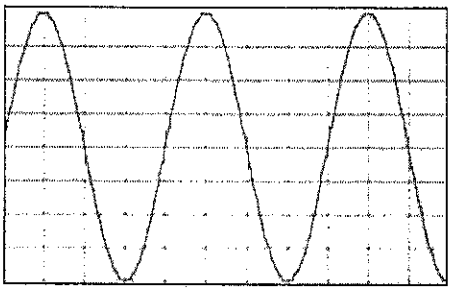

Figure B 3(b)/ *Rajah* B 3(b)

[6 marks]

[6 *markah*]

CLO2
C3

(c) An oscilloscope with Volt/div and Time/div is set to 5mV/div and 20μsec/div respectively and is used to measure two input signals. Figure B3(c) shows the displayed waveform. Calculate Peak to peak voltage (Vpp), period 1 cycle(T) and phase angle (θ) for both waveform A and B.

Osiloskop dengan Volt/div dan Time/div ditetapkan pada 5mV/div and 20μsec/div dan ia digunakan untuk mengukur dua isyarat masukan. Rajah B3(c) ditunjukkan dalam gelombang yang dipaparkan. Kirakan Voltan puncak ke puncak (Vpp), Tempoh 1kitar lengkap (T) dan beza fasa (θ) *untuk gelombang A dan B.*

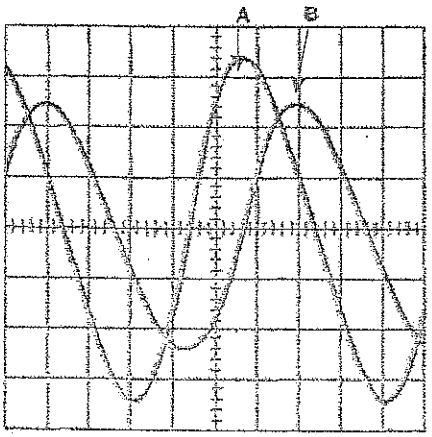

Figure B3(c) / *Rajah B3(c)*

[6 marks]
[6 *markah*]

QUESTION 4
SOALAN 4

CLO1 C1

(a) Define power meters.
Beri definisi Meter Kuasa.

[3 marks]
[3 *markah*]

CLO1 C3

(b) Describe basic principle of analogue wattmeter with construction of electrodynamometer.
Jelaskan prinsip asas meter watt analog dengan binaan meter dynamo Elektro.

[5 marks]
[5 *markah*]

CLO2 C3

(c) Illustrate the application of clamp meters in measuring alternating current with a suitable diagram.
Ilustrasikan pengunaan meter clamp dalam mengukur arus ulang alik dengan gambarajah yang sesuai.

[7 marks]
[7 *markah*]

SECTION C: 30 MARKS
BAHAGIAN C: 30 MARKAH

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

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

QUESTION 1
SOALAN 1

CLO2
C3

Permanent Magnet Movement Coil(PMMC) instrument with an internal resistance of 10Ω and a full scale deflection current of 10mA is to be used in the design of multirange DC voltmeter with voltage ranges of 0-10V and 0-25V. Sketch the circuit and express the equations of multiplier resistor. From the equations, calculate the value of the multiplier resistors.

Sebuah instrumen Gegelung Bergerak Magnet Kekal (GBMK) dengan rintangan dalaman 10Ω dan pesongan semasa skala penuh 10mA digunakan dalam rekabentuk meter voltan AT pelbagai julat dengan julat voltan 0-10V dan 0-25V . Lukiskan litar tersebut dan nyatakan persamaan perintang pendarab . Dari persamaan, kira nilai perintang pendarab.

[15marks]

[*15 markah*]

QUESTION 2
SOALAN 2

CLO2
C3

A stable Wheatstone bridge consists of a network of four resistance arms which are R1, R2, R3 and RX. A current is applied to two opposite junctions. The current detector is connected to the other two junctions. Given that the value of R1 = 4kΩ, R2 = 12kΩ and R3 = 8kΩ. Draw and label the Wheatstone bridge completely. Express the bridge balance equation for RX and calculate the value of RX. If R2 is two times the value of R1, find the new value of Rx.

Tetimbang Wheatstone stabil terdiri daripada satu rangkaian yang mempunyai empat rintangan iaitu R1, R2, R3 dan Rx. Arus dikenakan ke atas dua persimpangan bertentangan. Pengesan arus disambungkan kepada dua persimpangan lain. Diberi nilai R1 = 4kΩ, R2 = 12kΩ dan R3 = 8kΩ. Lukis dan labelkan tetimbang Wheatstone dengan lengkap. Nyatakan persamaan bagi perintang Rx dan kira nilai Rx. Jika R2 adalah dua kali ganda nilai R1, cari nilai Rx yang baru.

[15 marks]

[*15 markah*]

SOALAN TAMAT