POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

DEE 3043: ELECTRONIC CIRCUITS

TARIKH : 03 APRIL 2016
MASA : 2.30 PM – 4.30 PM (2 JAM)

Kertas ini mengandungi **TIGA BELAS (13)** 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.*

QUESTION 1

CLO1
C1

(a) Sketch a schematic diagram of RC filter that consists of an input filter capacitor (C1), a series resistor (R1), and an output filter capacitor (C2).
Lakarkan litar skematik penapis RC yang mempunyai kapasitor penapis masukan(C1), perintang siri (R1) dan kapasitor penapis keluaran (C2)

[3 marks]
[3 markah]

CLO1
C2

(b) Draw a bridge rectifier circuit and explain its operation.
Lukiskan litar penguat tetimbang dan terangkan kendaliannya.

[5 marks]
[5 markah]

CLO2
C3

(c) Find the average value of each voltage in Figure 1(c).
Kirakan voltan purata bagi setiap Rajah 1(c).

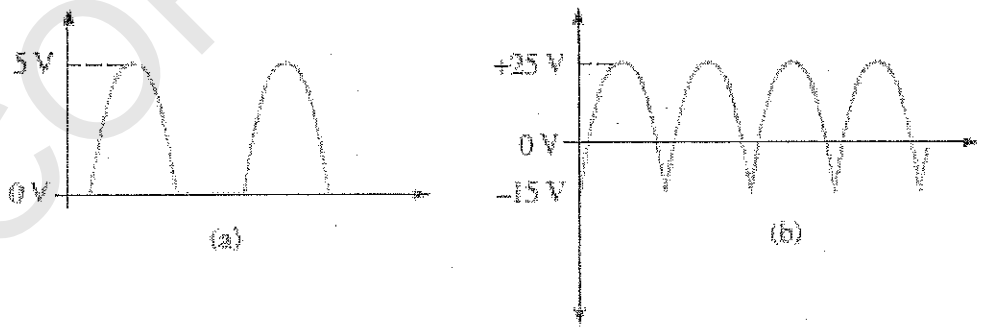

Figure 1(c)/Rajah 1(c)

[7 marks]
[7 markah]

CLO1
C1

QUESTION 2

(a) Define an oscillator circuit.

Takrifkan litar pengayun.

[3 marks]

[3 markah]

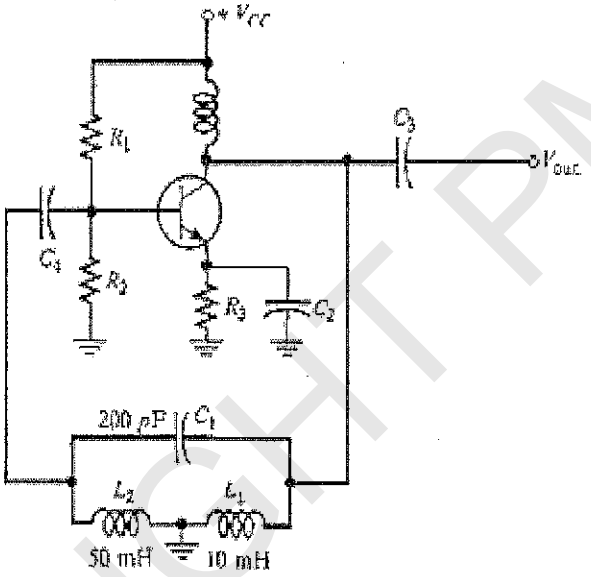

Figure B2(b)/*Rajah B2(b)*

CLO2
C3

(b) State the type of oscillator in Figure B2(b) and calculate its operating frequency.

Nyatakan jenis litar pengayun dalam Rajah B2(b) dan kirakan frekuensi operasi litar.

[6 marks]

[6 markah]

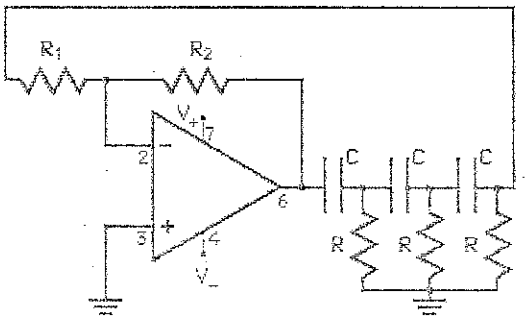

Figure B2(c)/*Rajah B2(c)*

CLO2 C3

(c) State the type of oscillator in Figure B2(c). Given the value of R= 1.3KΩ and C = 0.5μF, calculate its operating frequency.

Nyatakan jenis litar pengayun dalam Rajah B2(c). Diberi nilai R= 1.3KΩ dan C = 0.5μF, *kirakan frekuensi operasi litar.*

[6 marks]

[6 markah]

QUESTION 3

CLO1 C2

(a) Explain the advantages of op-amp active filter as compared to passive filters.

Terangkan kelebihan litar penapis op-amp aktif berbanding litar pasif.

[3 marks]

[3 markah]

CLO2 C3

(b) Sketch and label the schematic diagram of a passive Low Pass Filter circuit. Calculate the cut-off frequency if R=60Ω and C=21μF. Express the gain of the circuit in decibels (dB) when Vo = 400mV and Vi = 1.2V.

Lakar dan labelkan rajah skematik penapis pasif laluan rendah, kirakan frekuensi potong jika R=60Ω and C=21μF. Nyatakan gandaan litar tersebut dalam unit decibels (dB) apabila Vo = 400mV and Vi = 1.2V.

[6 marks]

[6 markah]

CLO2 C3

(c) Sketch and explain the operation of an op amp high pass filter. If a first order high pass filter has a 47kΩ resistor and 220pF capacitor, calculate the cut off frequency?

Lakar dan terangkan operasi penapis op amp laluan tinggi dengan rintangan 47kΩ dan kapasitor 220pF, kirakan frekuensi potong litar itu?

[6 marks]

[6 markah]

QUESTION 4

CLO1
C1

(a) State the function of an analog to digital converter and list **TWO (2)** of its circuits.
*Nyatakan fungsi penukar analog ke digital dan senaraikan **DUA (2)** contoh litarnya.*

[3 marks]
[3 markah]

CLO1
C2

(b) Calculate the number of steps of an 8 bit analog to digital converter (ADC) that has the input range from 0 – 10V. What is the voltage of each steps of the output?

Kira bilangan langkah keluaran apabila penukar analog ke digital (ADC) 8 bit menggunakan julat masukan 0 – 10V. Berapakah nilai voltan yang diwakili oleh setiap langkah keluaran tersebut?

[5 marks]
[5 markah]

CLO2
C3

(c) For a 3 bit R-2R ladder DAC in Figure 4c, when input is 110 with +V = +5V, calculate the value of Va, Vb, Vc and Vout?

Bagi litar penukar digital ke analog R-2R 3 bit dalam Rajah 4c, apabila masukan ialah 110 dengan +V = +5V, kirakan nilai Va, Vb, Vc dan V keluaran.

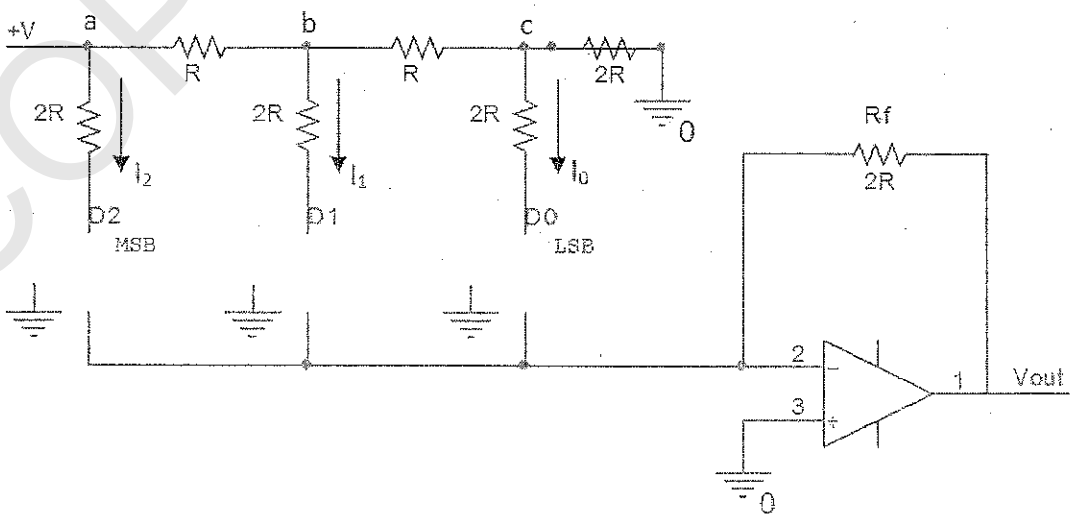

Figure 4c / *Rajah 4c*

[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

Figure C1 shows a three-stage Operational Amplifier (op-amp) circuit with voltage gains of +10 at Amplifier 1, –18 at Amplifier 2 and –27 at Amplifier 3. Calculate the value of R1, R2, and R3 if feedback resistor (Rf) is 270 KΩ for all three circuits. What is the output voltage of the circuit if the input voltage (Vin) is 150 μV?

Rajah C1 menunjukkan litar penguat kendalian tiga peringkat yang membekalkan gandaan voltan +10 pada Penguat 1, –18 pada Penguat 2dan –27pada Penguat 3. Kira nilai R1, R2, R3 sekiranya nilai perintang suapbalik (Rf) adalah 270KΩ untuk semua peringkat. Apakah nilai voltan keluaran bagi litar sekiranya voltan masukan (Vin) adalah 150 μV?

[15 marks]
[*15 markah*]

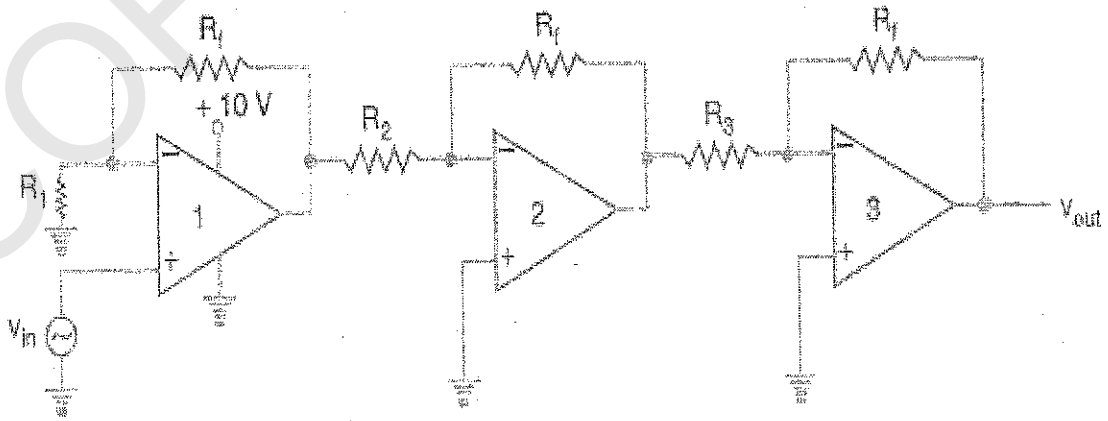

Figure C1 / *Rajah C1*

QUESTION 2

SOALAN 2

CLO2
C3

A 555 timer for an astable mode produce a square wave output. Construct a schematic circuit of 555 timer that is shown in Figure C2. Based on the output waveform given, calculate the value of RA and RB if C = 1μF.

Pemasa 555 untuk mod astable mengeluarkan gelombang keluaran segiempat.Bina litar skematik bagi pemasa 555 seperti Rajah C2. Kirakan nilai RA dan RB jika nilai C = 1μF berdasarkan rajah yang diberi.

[15 marks]
[*15 markah*]

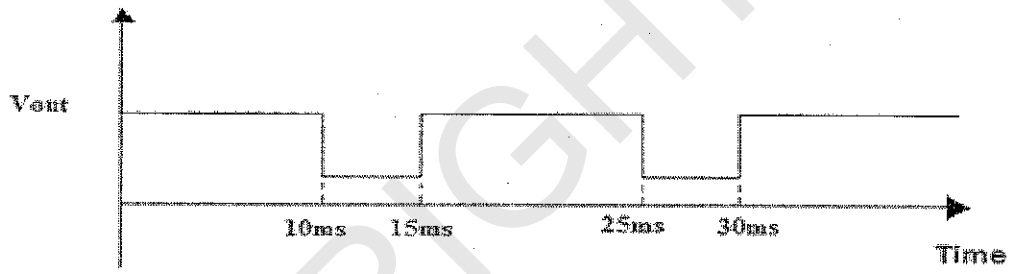

Figure C2/*Rajah C2*

SOALAN TAMAT