

SULIT



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

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI DISEMBER 2016

DEE3043: ELECTRONICS CIRCUIT

TARIKH : 06 APRIL 2017

MASA : 8.30 AM – 10.30 AM (2 JAM)

Kertas ini mengandungi **DUABELAS (12)** 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)

SULIT

SECTION A : 10 MARKS
BAHAGIAN A : 10 MARKAH

INSTRUCTION:

This section consists of **TEN (10)** objective questions. Mark your answers in the OMR form provided.

ARAHAN:

*Bahagian ini mengandungi **SEPULUH (10)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.*

CLO1
C1

1. Identify the correct answer based on the block diagram of power supply as the Figure A1.

Kenalpasti jawapan yang betul berdasarkan rajah blok bekalan kuasa seperti Rajah A1.

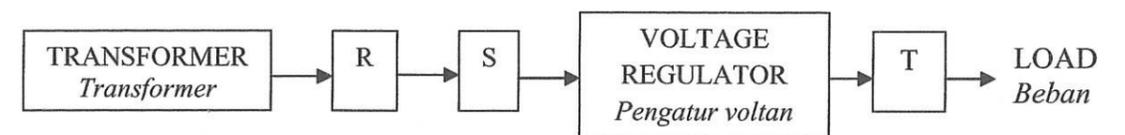


Figure A1/ Rajah A1

	R	S	T
A.	Rectifier <i>Penerus</i>	Filter <i>Penapis</i>	Voltage divider <i>Pembahagi voltan</i>
B.	Filter <i>Penapis</i>	Rectifier <i>Penerus</i>	Voltage divider <i>Pembahagi voltan</i>
C.	Voltage divider <i>Pembahagi voltan</i>	Rectifier <i>Penerus</i>	Filter <i>Penapis</i>
D.	Filter <i>Penapis</i>	Voltage divider <i>Pembahagi voltan</i>	Rectifier <i>Penerus</i>

CLO1
C2

2. _____ is the most effective way to reduce the ripple occurring after filtering.

_____ sangat berkesan mengurangkan riak yang wujud selepas penapis.

- A. Single diode voltage regulator
Pengatur voltan diod tunggal
- B. Zener diode voltage regulator
Pengatur voltan diod Zener
- C. Serial transistor voltage regulator
Pengatur voltan transistor bersiri
- D. IC voltage regulator
Pengatur voltan IC

CLO1
C1

3.

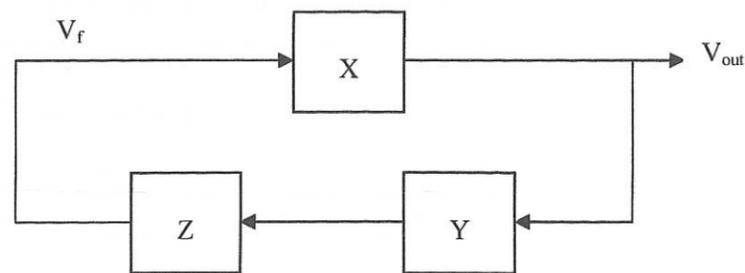


Figure A3 / Rajah A3

Figure A3 shows the block diagram for oscillator. Block X represents _____.

Rajah A3 menunjukkan rajah blok bagi pengayun. Blok X mewakili _____.

- A. Filter circuit
Litar penapis
- B. Timing circuit
Litar pemasa
- C. Amplifier circuit
Litar penguat
- D. Feedback circuit
Litar suapbalik

CLO2
C3

4. Tank circuit for an oscillator is having two capacitors of 24nF and 270nF respectively are connected in parallel with an inductor of 5mH. Determine the frequency of oscillations of the circuit.

Litar tangki untuk sebuah pengayun mempunyai dua kapasitor masing-masing bernilai 24nF dan 270nF disambung secara selari dengan sebuah peraruh bernilai 5mH. Tentukan frekuensi ayunan litar tersebut.

- A. 4.15kHz
- B. 15.16kHz
- C. 4.15MHz
- D. 15.16MHz

CLO1
C1

5. Which of the following characteristics **DOES NOT** necessarily apply to an operational amplifier?

Ciri manakah antara yang berikut TIDAK diperlukan oleh penguat kendalian?

- A. High gain
Gandaan yang tinggi
- B. Low power
Kuasa yang rendah
- C. High input impedance
Galangan masukan yang tinggi
- D. Low output impedance
Galangan keluaran yang rendah

CLO1
C2

6. A timer is connected in Astable mode. Calculate the Time High when $R_1=8k\Omega$, $R_2=2.5k\Omega$, $C_1=0.1\mu F$ and given $C_2=0.01\mu F$ is used as a noise diverter.

Pemasa telah disambungkan dalam mod astable. Kira Masa Tinggi apabila $R_1=8k\Omega$, $R_2 = 2.5k\Omega$, $C_1 0.1\mu F$ dan diberi $C_2 = 0.01\mu F$ digunakan sebagai pengalih bunyi.

- A. 0.017ms
- B. 0.073ms
- C. 0.728ms
- D. 0.173ms

CLO1
C1

7. A level drop of -3dB means _____
Paras menurun pada -3dB bermaksud _____
- A. The output signal is attenuated to 0.70% of the input signal value
Isyarat keluaran dilemahkan sebanyak 0.70% daripada nilai isyarat masukan.
- B. The output signal is attenuated to 7.07% of the input signal value
Isyarat keluaran dilemahkan sebanyak 7.07% daripada nilai isyarat masukan.
- C. The output signal is attenuated to 70.70% of the input signal value
Isyarat keluaran dilemahkan sebanyak 70.70% daripada nilai isyarat masukan.
- D. The output signal is attenuated to 707.07% of the input signal value
Isyarat keluaran dilemahkan sebanyak 707.07% daripada nilai isyarat masukan.

CLO1
C2

8. The Active Low Pass Filter is known as _____
Penapis Aktif Lulus Rendah dikenali sebagai _____
- A. The filter passes frequencies signals above cut off frequency while rejecting higher frequencies signals.
Penapis membenarkan isyarat frekuensi diatas paras frekuensi potong serta menghalang isyarat prekuensi tinggi.
- B. The filter passes frequencies signals above cut off frequency while rejecting lower frequencies signals.
Penapis membenarkan isyarat frekuensi diatas paras frekuensi potong serta menghalang isyarat prekuensi rendah.
- C. The filter passes frequencies signals below cut off frequency while rejecting lower frequencies signals.
Penapis membenarkan isyarat frekuensi di bawah paras frekuensi potong serta menghalang isyarat prekuensi rendah.
- D. The filter passes frequencies signals below cut off frequency while rejecting higher frequencies signals.
Penapis membenarkan isyarat frekuensi di bawah paras frekuensi potong serta menghalang isyarat prekuensi tinggi.

CLO1
C1

- 9.
- Using two different value of resistors
Menggunakan dua nilai perintang yang berbeza
 - Has high accuracy and precision
Mempunyai ketepatan dan kejituan yang tinggi
 - Converting digital signal to analogue signal
Menukar isyarat digital kepada isyarat analog.

Identify the converter described in the above statement.

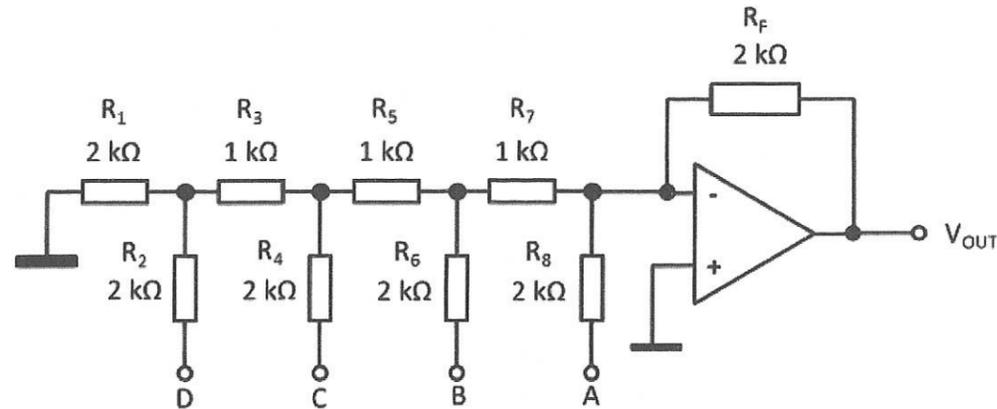
Kenalpasti penukar yang dinyatakan dalam pernyataan di atas.

- A. R/2R Ladder
Tangga R/2R
- B. Binary Weighted
Pemberat binari
- C. Digital ramp converter
Penukar digital tanjakan
- D. Successive approximation converter
Penukar penghampiran berturutan

CLO2
C3

10. This configuration of op-amps and resistors can produce an analog output voltage equal to the binary input, ABCD. The voltage levels for logic '0' is represented by 0V and logic '1' is represented by -5V. Calculate the output voltage for an input of 0111.

Konfigurasi litar penguat kendalian dan perintang ini akan menghasilkan voltan keluaran analog yang bersamaan dengan masukan binari, ABCD. Aras voltan untuk logik '0' ialah 0V dan logik '1' ialah -5V. Kirakan voltan keluaran untuk masukan 0111.



- A. 1.094V
- B. 2.188V
- C. 4.375V
- D. 8.750V

SECTION B : 60 MARKS
BAHAGIAN B : 60 MARKAH

INSTRUCTION:

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

ARAHAN:

Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.

QUESTION 1

SOALAN 1

CLO1
C1

- (a) State **THREE (3)** types of rectifier.

*Nyatakan **TIGA (3)** jenis penerus.*

[3 marks]

[3 markah]

CLO1
C2

- (b) Explain the operation of a serial transistor voltage regulator circuit with the aid of a diagram.

Terangkan operasi litar pengatur voltan transistor sesiri dengan bantuan gambarajah.

[5 marks]

[5 markah]

CLO2
C3

- (c) Referring to Figure B1(c), calculate the ripple voltage of the waveform. Then, sketch a diagram of π LC filter circuit and explain briefly the operations of the circuit.

Merujuk kepada Rajah B1(c), kirakan voltan riak bagi gelombang tersebut. Kemudian, lakarkan rajah bagi penapis π LC dan terangkan operasi litar berkenaan.

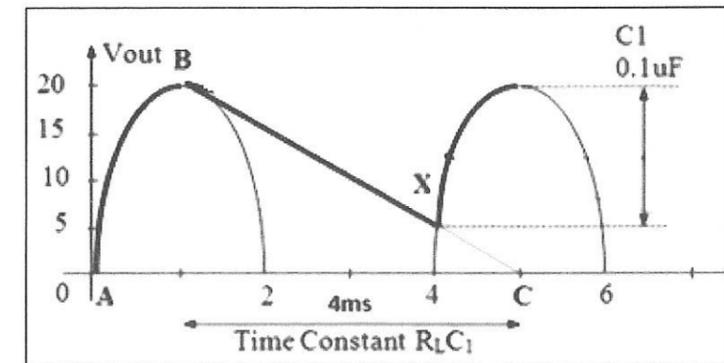


Figure B1(c) / Rajah B1(c)

[7 marks]

[7 markah]

QUESTION 2

SOALAN 2

- CLO1
C1 (a) Write **THREE (3)** differences between LC oscillator and RC oscillator.
Tuliskan TIGA (3) perbezaan antara Pengayun LC dan Pengayun RC.
- [3 marks]
[3 markah]
- CLO2
C3 (b) Given the value of components at frequency generated circuit, $L = 2\text{mH}$ and $C1 = C2 = 0.01\mu\text{F}$, calculate the oscillation frequency, f_o for the Colpitts Oscillator.
Diberi nilai komponen pada litar penjanaan frekuensi, $L = 2\text{mH}$ dan $C1 = C2 = 0.01\mu\text{F}$, kirakan frekuensi ayunan, f_o bagi Pengayun Colpitts.
- [6 marks]
[6 markah]
- CLO2
C3 (c) Sketch the electrical equivalent circuit of a Crystal Oscillator. If, $R_h = 600\Omega$, $L_h = 0.08\text{ H}$, $C_h = 0.003\text{ pF}$ and $C_m = 8\text{ pF}$. Calculate the serial resonance frequency for the oscillator.
Lakarkan litar setara elektrik bagi Pengayun Hablur. Jika, $R_h = 600\Omega$, $L_h = 0.08\text{ H}$, $C_h = 0.003\text{ pF}$ dan $C_m = 8\text{ pF}$. Kirakan frekuensi resonan sesiri untuk pengayun ini.
- [6 marks]
[6 markah]

QUESTION 3

SOALAN 3

- CLO1
C2 (a) With the aid of the suitable circuits, compare the passive low pass filter and active low pass filter.
Dengan bantuan litar yang sesuai, bandingkan penapis jenis lulus rendah pasif dan penapis lulus rendah aktif.
- [3 marks]
[3 markah]
- CLO2
C3 (b) Calculate the cut off frequency, f_c and sketch the frequency response curve for a high pass filter that consists of 82pF capacitor connected in series with $240\text{K}\Omega$ resistor.
Kirakan frekuensi potong, f_c dan lakarkan lengkung sambutan frekuensi bagi penapis lulus tinggi yang terdiri daripada kapasitor 82pF yang disambungkan sesiri dengan perintang $240\text{K}\Omega$.
- [6 marks]
[6 markah]
- CLO2
C3 (c) Calculate and show the bandwidth if the circuit of High Pass Filter consist of $C = 15\text{nF}$ and $R = 10\text{K}\Omega$ and the circuit of Low Pass Filter consist of $C = 500\text{pF}$ and $R = 10\text{K}\Omega$.
Kira dan tunjukkan lebar jalur sekiranya litar penapis lulus tinggi terdiri daripada $C = 15\text{nF}$ and $R = 10\text{K}\Omega$ and the circuit of Low Pass Filter consist of $C = 500\text{pF}$ and $R = 10\text{K}\Omega$.
- [6 marks]
[6 markah]

QUESTION 4

SOALAN 4

CLO1
C1(a) List **THREE (3)** main parts of Digital Ramp Converter.*Senaraikan TIGA (3) bahagian utama Penukar Tanjakan Digital.*

[3 marks]

[3 markah]

CLO1
C2

(b) With the aid of circuit diagrams, compare between 2 bits Binary Weighted Resistor circuit and 2 bits R-2R Ladder circuit for Digital-to-Analog Converter (DAC).

Dengan bantuan rajah litar, bandingkan litar Perintang Pemberat Perduaan 2 bit dan litar R-2R Ladder 2 bit Penukar Digital-ke-Analog (DAC).

[5 marks]

[5 markah]

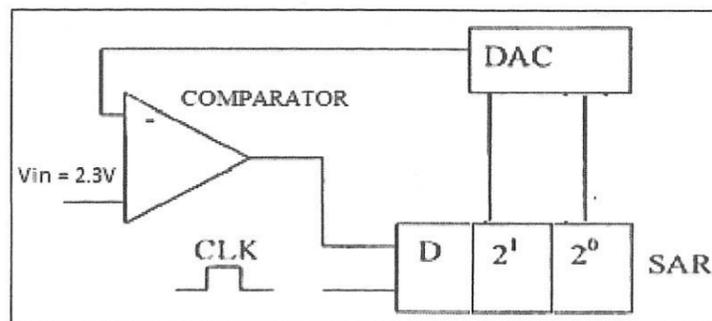
CLO2
C3(c) Referring to Figure B4(c), calculate the digital value of $V_{in} = 2.3V$ if the step size is 1.5V.*Merujuk Rajah B4(c), kirakan nilai digital bagi $V_{in} = 2.3V$ sekiranya saiz langkahnya ialah 1.5V.*

Figure B4(c) / Rajah B4(c)

[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
C3Compare the **THREE(3)** ideal to the practical characteristics of operational amplifier.Describe the Common Mode Rejection Ratio (CMRR) and calculate CMRR when feedback resistor (R_f) = 100k Ω , Resistor R_1 = 10 k Ω and Common mode gain = 0.001.*Bandingkan TIGA(3) ciri-ciri unggul dan praktikal penguat kendalian. Huraikan Nisbah Tolakan Mod Sepunya (CMRR) dan kirakan CMRR apabila perintang suapbalik = 100k Ω , perintang tetap R_1 = 10 k Ω and gandaan mod sepunya = 0.001.*

[15marks]

[15 markah]

QUESTION 2

SOALAN 2

CLO2
C3

Draw a 555 Astable Multivibrator completely with a frequency of 1 KHz and a mark to space ratio of 2:1. A 10nF capacitor is used in the circuit. Show all the calculations to construct the multivibrator.

Lukiskan litar lengkap pembilang getar astabil 555 dengan frekuensi 1 KHz dan nisbah ruang 2:1. Kapasitor 10nF digunakan. Tunjukkan semua pengiraan untuk membina pembilang getar.

[15 marks]

[15 markah]

SOALAN TAMAT