SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI DISEMBER 2017

DEE3043 : ELECTRONIC CIRCUITS

TARIKH : 02 APRIL 2018
MASA : 2.30 PETANG - 4.30 PETANG (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 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. A zener diode is used for _____
Diod zener digunakan untuk _____

A. Voltage Regulation
Mengatur Voltan

B. Rectification
Melurus

C. Noise Suppression
Tekanan Bunyi

D. Blocking AC
Menyekat AT

CLO1
C2

2. The block 'X' in **Figure A2** is to _____
*Blok 'X' pada **Rajah A2** adalah untuk* _____

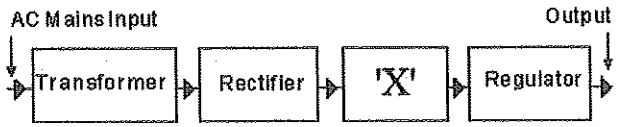


Figure A2 / *Rajah A2*

A. Filter RF radiation from the output of the power supply
Penapis RF radiasi daripada keluaran bekalan kuasa

B. Smooth the rectified waveform from the rectifier
Melicinkan bentuk gelombang daripada penerus

C. Act as a 50 Hz tuned circuit
Bertindak sebagai litar talaan 50 Hz

D. Restore voltage variations
Simpanan semula variasi voltan

CLO1
C1

3. An oscillators converts _____
Pengayun menukarkan _____

A. power into DC power
kuasa kepada kuasa AT

B. power into AC power
kuasa kepada kuasa AU

C. mechanical power into AC power
kuasa mekanikal kepada kuasa AU

D. power AC to power DC
kuasa AU kepada kuasa AT

CLO2
C3

4. In an LC oscillator, if the value of L is increased four (4) times, the frequency of oscillation is _____
Dalam pengayun LC, jika nilai L meningkat sebanyak empat (4) kali, maka kekerapan ayunan adalah sebanyak _____

A. Increased 2 times
Meningkat 2 kali

B. Decreased 4 times
Berkurang 4 kali

C. Increased 4 times
Meningkat 4 kali

D. Decreased 2 times
Berkurang 2 kali

CLO1
C1

5. The Op-amp can amplify _____
Penguat kendalian boleh menguatkan _____

A. AC signals only
isyarat AU sahaja

B. DC signals only
isyarat AT sahaja

C. both AC and DC signals
kedua-dua isyarat AU dan AT

D. neither DC nor AC signals
bukan kedua-dua isyarat AU dan AT

CLO1 C2

6. Calculate the charging and discharging time of 0.5μF capacitor in **Figure A6.**
*Kirakan masa cas dan discas bagi kapasitor 0.5μF dalam **Rajah A6.***

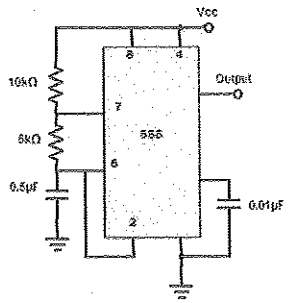


Figure A6 / *Rajah A6*

A. Charging time=2ms; Discharging time=5ms.
Masa cas=2ms; Masa discas=5ms.

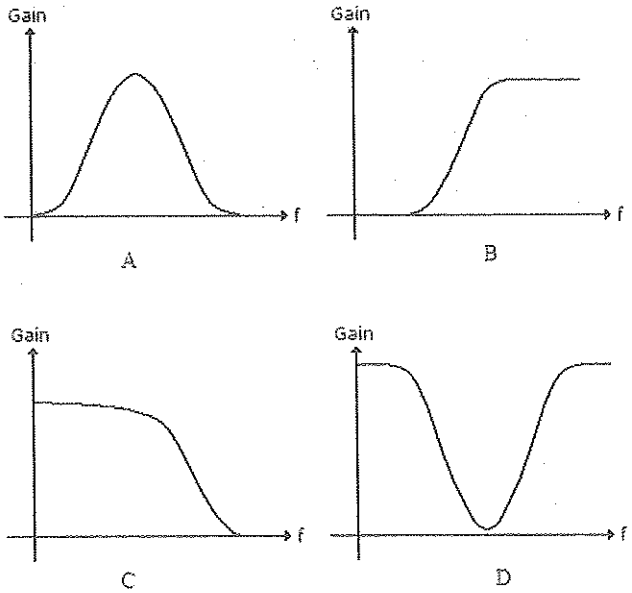
B. Charging time=5ms; Discharging time=2ms.
Masa cas=5ms; Masa discas=2ms.

C. Charging time=3ms; Discharging time=5ms.
Masa cas=3ms; Masa discas=5ms.

D. Charging time=5ms; Discharging time=3ms.
Masa cas=5ms; Masa discas=3ms.

CLO1 C1

7. Identify the frequency response curve for a high-pass filter.
Kenal pasti frekuensi sambutan bagi penapis laluan tinggi.



CLO1
C2

8. Refer to the given **Figure A8**. This is a _____ filter, and it has a cutoff frequency of _____.
*Rujuk **Rajah A8** yang diberikan. Ini ialah penapis _____, dan mempunyai nilai potongan frekuensinya ialah _____.*

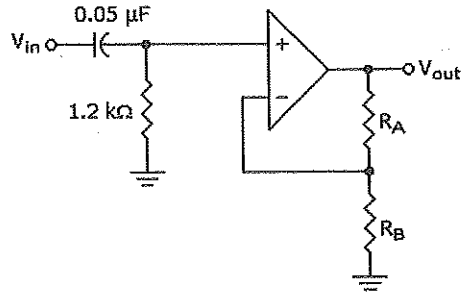


Figure A8 / *Rajah A8*

A. high-pass, 21 Hz
laluan tinggi, 21 Hz

B. low-pass, 21 Hz
laluan rendah, 21 Hz

C. high-pass, 2.65 kHz
laluan tinggi, 2.65 kHz

D. low-pass, 2.65 kHz
laluan rendah, 2.65 kHz

CLO1
C1

9. The relationship between analog voltage represented by two adjacent digital codes, or the analog step size, is the:
Perkaitan di antara voltan analog yang diwakili dua penghampiran kod digital, atau saiz langkah analog ialah :

A. quantization
kuantisasi

B. accuracy
k*etepatan*

C. resolution
resolusi

D. monotonicity
Monotonisiti

CLO2
C3

10. A binary-weighted digital-to-analog converter has a feedback resistor R_f of 12 kΩ. If 50 μA of current is through the resistor, the voltage out of the circuit is:
Satu penukar digital ke analog berwajaran binari mempunyai perintang suapbalik, R_f 12 kΩ. Jika arus 50 μA melalui perintang tersebut, voltan yang keluar dari litar adalah:

A. 0.6V C. 0.1V

B. -0.6V D. -0.1V

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

CLO1
C1

(a) List **THREE (3)** types of regulator circuit
*Senaraikan **TIGA (3)** jenis litar pengatur.*

[3 marks]
[3 markah]

CLO1
C2

(b) A basic Direct Current (DC) power supply consists of five main sections. Draw the diagram block of Direct Current (DC) power supply and explain the function for each diagram block.
Bekalan kuasa arus terus mempunyai lima bahagian utama. Lukiskan gambarajah blok bekalan kuasa arus terus tersebut dan terangkan setiap fungsi gambarajah blok itu.

[5 marks]
[5 markah]

CLO2
C3

(c) **Figure B1(c)** shows the circuit diagram for a basic Direct Current (DC) power supply. Name and illustrate the operation of the circuit.
***Rajah B1(c)** menunjukkan litar diagram untuk litar asas bekalan kuasa arus terus. Nama dan gambarkan operasi litar tersebut.*

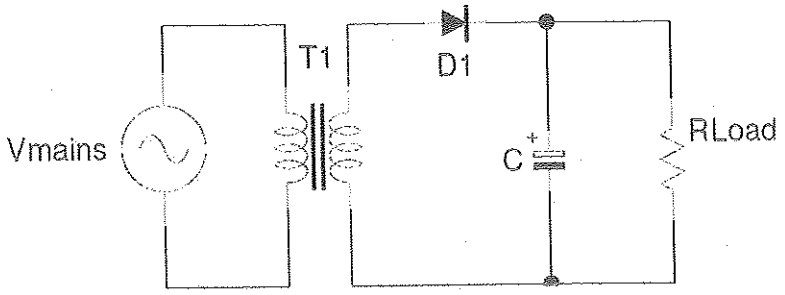


Figure B1(c) / *Rajah B1(c)*

[7 marks]
[7 markah]

QUESTION 2

SOALAN 2

CLO1
C1

(a) List **THREE (3)** types of sinusoidal oscillator circuits.
*Senaraikan **TIGA (3)** jenis litar pengayun sinusoidal.*

[3 marks]
[3 markah]

CLO2
C3

(b) A Colpitts Oscillator circuit having two capacitors of 10pF and 20pF respectively are connected in parallel with an inductor. Given that the frequency of oscillations of the circuit is 1MHz. Calculate the value of inductor L1.
Litar pengayun Colpitts yang mempunyai dua kapasitor bernialai 10pF dan 20pF masing-masing disambung secara selari dengan induktor. Diberi frekuensi ayunan litar ialah 1MHz. Kirakan nilai induktor L1.

[6 marks]
[6 markah]

CLO2
C3

(c) The Hartley oscillator achieves positive feedback by using an inverting amplifier plus the 180° phase shift across a parallel resonant circuit. If the following components are given R_{in}= 4.7kΩ, R_F = 10kΩ, C1=10uF, L1=L2=0.1mH, Op-amp IC 741. Calculate the oscillator frequency.
Pengayun Hartley mencapai suapbalik positif dengan menggunakan penukar penguat ditambah peralihan fasa 180° merentasi litar selari resonan. Sekiranya diberi komponen berikut Rin = 4.7kΩ, RF = 10kΩ, C1= 10uF, L1 = L2 = 0.1mH, penguat kendalian IC 741. Kirakan nilai frekuensi pengayun.

[6 marks]
[6 markah]

QUESTION 3
SOALAN 3

CLO1
C2

(a) If the R = 200Ω and C = 0.47uF, calculate the frequency cut-off for low pass filter.
Jika R =200Ω dan C= 0.47uF, kirakan frekuensi potong untuk penapis laluan rendah.

[3 marks]
[3 markah]

CLO2
C3

(b) Sketch the active low pass and high pass filter circuit.
Lakar litar penapis aktif lulus rendah dan lulus tinggi.

[6 marks]
[6 markah]

CLO2
C3

(c) Sketch frequency response curve for a high pass and band pass filter.
Lakar lengkungan sambutan frekuensi bagi penapis lulus tinggi dan lulus jalur.

[6 marks]
[6 markah]

QUESTION 4
SOALAN 4

CLO1
C1

(a) Describe the differences between an A/D converter and a D/A converter.
Terangkan perbezaan antara penukar A/D dan penukar D/A.

[3 marks]
[3 markah]

CLO1
C2

(b) Identify with diagram a 4 bit R-2R digital to analogue converter circuit.
Kenalpasti dengan gambarajah litar penukar digital kepada analog 4 bit R-2R

[5 marks]
[5 markah]

CLO2
C3

(c) Sketch the schematic diagram for a Digital Ramp Converter (DRC) and briefly explain the operation of the circuit.
Lakar gambar rajah skematik untuk penukar cerun digital dan terangkan dengan ringkas tentang operasi litar tersebut.

[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.*

CLO2
C3

QUESTION 1

SOALAN 1

Operational amplifier (Op-Amp) is an integrated circuit that contains several levels and a differential amplifier configuration. With the aid of op-amp block diagram and explain briefly each of the stages. Calculate the output voltage of the circuit in **Figure C1**, if R1=R2=R3=2KΩ, Rf = 40KΩ, V1=0.10V, V2=-0.5V, and V3=1.5V.

*Penguat kendalian (Op Amp) adalah suatu rangkaian terintegrasi yang mempunyai beberapa tahap dan konfigurasi penguat yang berlainan. Dengan bantuan gambarajah blok op-amp terangkan secara ringkas setiap peringkat. Kira voltan keluaran litar dalam **Rajah C1**, jika* R1=R2=R3=2KΩ, Rf = 40KΩ, V1=0.10V, V2=-0.5V, dan V3=1.5V.

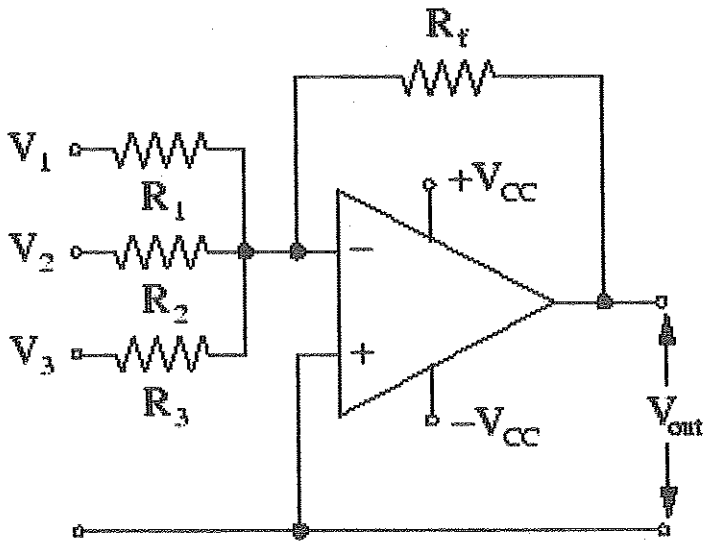


Figure C1/ *Rajah C1*

[15 marks]

[15 markah]

CLO2
C3

QUESTION 2
SOALAN 2

Sketch a timer circuit with connected in monostable operating modes. Given the component values of astable mode, Ra = 2KΩ, Rb = 4KΩ and C = 0.1μf. Calculate the value of period high (TH), period low (TL), period (T), frequency (F), % duty cycle (%D) and sketch output waveform at pin no 2 or 6.

Lukiskan litar pemasa mod monostabil. Diberi nilai komponen-komponen bagi mod astabil, Ra = 2KΩ, Rb = 4KΩ dan C = 0.1μf. Kirakan nilai bagi tempoh tinggi (TH), tempoh rendah (TL), tempoh (T), frekuensi (F), % kitar kerja (%D) dan lakarkan gelombang keluaran pada pin 2 atau 6.

[15 marks]
[15 markah]

SOALAN TAMAT