

SULIT



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)

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.

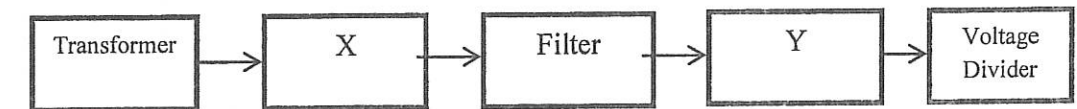


Figure A1/Rajah A1

Figure A1 shows a block diagram of a DC power supply. What is Y?
 Rajah A1 menunjukkan rajah blok bagi bekalan kuasa AT. Apakah Y?

- A. Secondary input
Masukan sekunder
- B. The rectifier
Penerus
- C. Voltage regulator
Pengatur voltan
- D. The ac input
Masukan au

CLO1
C2

2. The advantage of a full-wave bridge rectifier is:
Kelebihan penerus tetimbang gelombang penuh adalah:

- A. It uses the whole transformer secondary for the entire ac input cycle
Ia menggunakan seluruh pengubah sekunder untuk keseluruhan kitaran masukan AT
- B. It costs less than other rectifiers
Kosnya kurang berbanding penerus lain
- C. It cuts off half of the ac wave cycle
Ia memotong separuh kitaran gelombang AU
- D. It does not need a regulator
Ia tidak memerlukan pengatur

CLO1
C1

3. Refer to Figure A3. This circuit is known as:
Merujuk kepada Rajah A3. Litar ini dikenali sebagai:

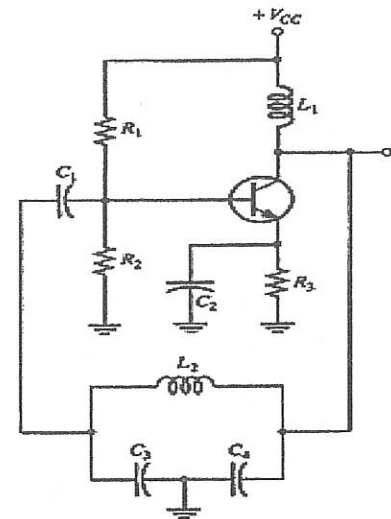


Figure A3/Rajah A3

- A. Clapp oscillator
Pengayun Clapp
- B. Armstrong oscillator
Pengayun Armstrong
- C. Colpitts oscillator
Pengayun Colpitts
- D. Hartley oscillator
Pengayun Hartley

CLO2
C3

4. Calculate the frequency of oscillation of the phase-shift oscillator shown in Figure A4.
Kirakan frekuensi ayunan bagi pengayun anjakan fasa seperti di Rajah A4.

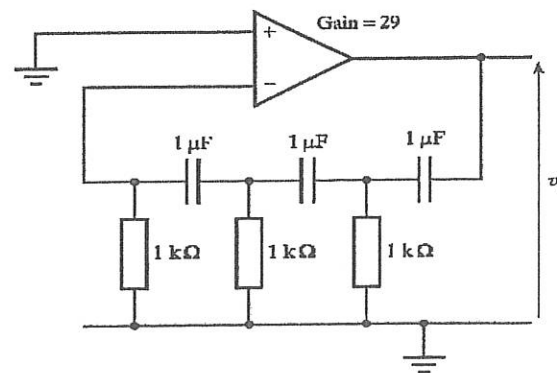


Figure A4/Rajah A4

CLO1
C1

5. Find the CMRR for an amplifier with a differential gain of 40 and a common mode gain of 0.02.
Cari nilai CMRR bagi amplifler dengan gandaan pembezaan 40 dan gandaan mod biasa 0.02

- A. 98 dB
- B. 66 dB
- C. 54 dB
- D. 49 dB

CLO1
C2

6. What is the pulse width of the waveform at the output of the circuit in Figure A6.
Apakah lebar denyut bagi gelombang keluaran litar dalam Rajah A6.

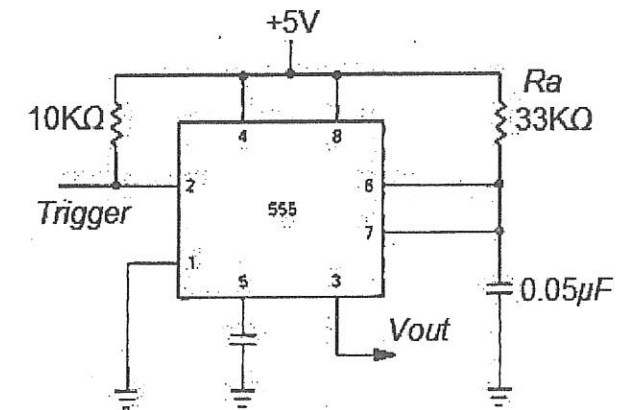
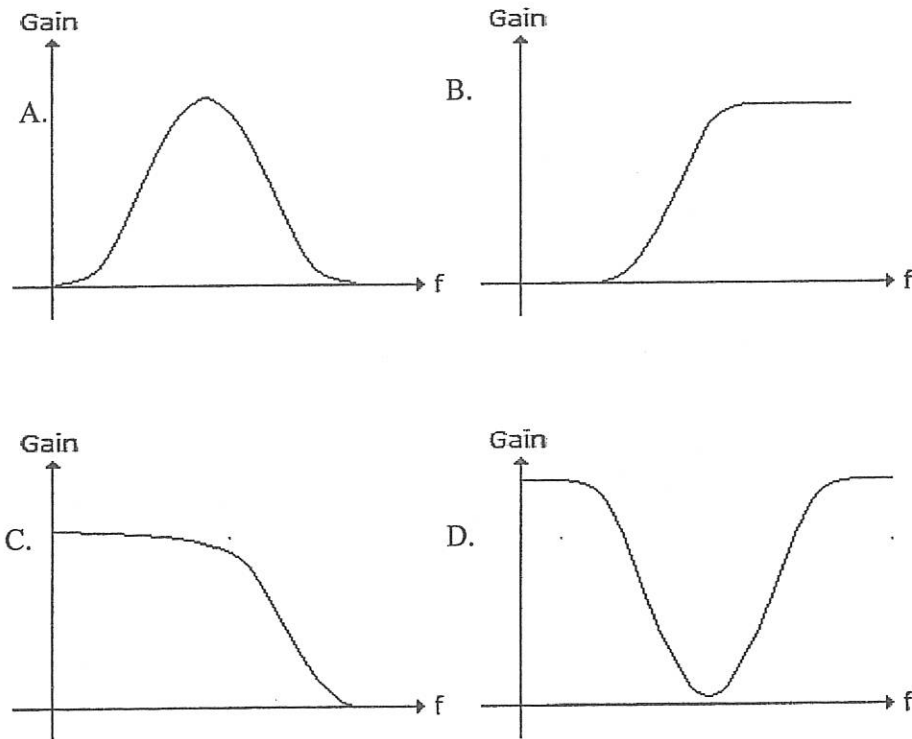


Figure A6/Rajah A6

- A. 1.65 ms
- B. 1.82 ms
- C. 4.98 ms
- D. 5.46 ms

CLO1
C1

7. Identify the frequency response curve for a band-pass filter.
Kenalpasti lengkung sambutan frekuensi bagi penapis lebar jalur.



CLO1
C2

8. Refer to Figure A8. This circuit is known as a _____ filter, and the value of f_c is _____.
Merujuk kepada Rajah A8. Litar ini dikenali sebagai penapis _____, dan nilai f_c adalah _____.

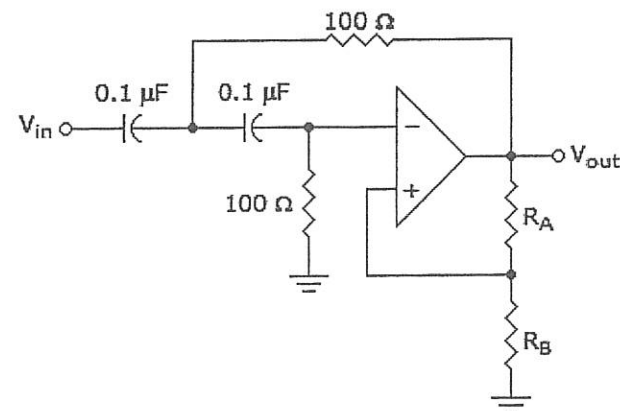


Figure A8/Rajah A8

CLO1
C1

9. The circuit which is used to perform D/A conversion is the Litar yang digunakan untuk melakukan penukaran D/A adalah
- A. digitizer
 - B. decoder
 - C. encoder
 - D. multiplexer

CLO2
C3

10. Which of the following is NOT a common method to translate an analog voltage to a binary number?
Antara berikut yang manakah BUKAN merupakan kaedah biasa untuk menterjemahkan voltan analog kepada nombor perdua?

- A. successive-approximation
- B. weighted current source
- C. flash
- D. pipelined

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).

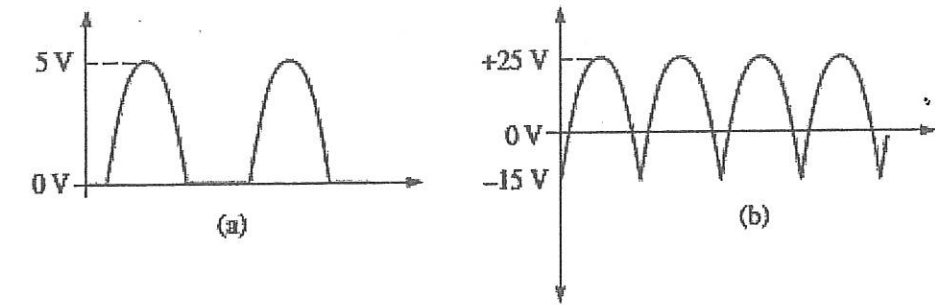


Figure 1(c)/Rajah 1(c)

[7 marks]

[7 markah]

CLO1
C1

QUESTION 2

- (a) Define an oscillator circuit.

Takrifkan litar pengayun.

[3 marks]

[3 markah]

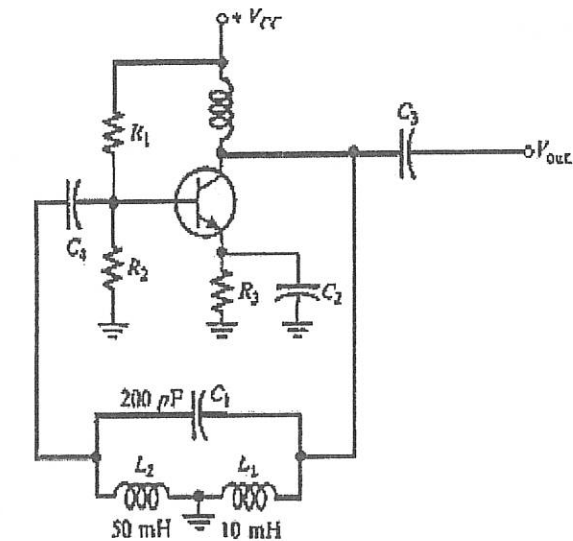


Figure B2(b)/Rajah B2(b)

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]

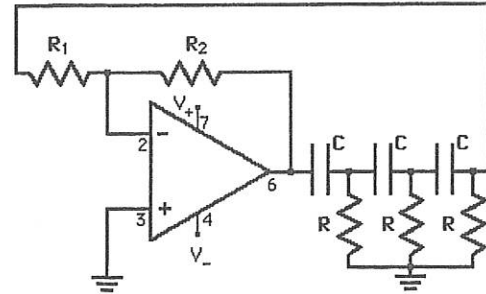


Figure B2(c)/Rajah B2(c)

- CLO2
C3 (c) State the type of oscillator in Figure B2(c). Given the value of $R = 1.3\text{K}\Omega$ and $C = 0.5\mu\text{F}$, calculate its operating frequency.

Nyatakan jenis litar pengayun dalam Rajah B2(c). Diberi nilai $R = 1.3\text{K}\Omega$ dan $C = 0.5\mu\text{F}$, 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 $R = 60\Omega$ and $C = 21\mu\text{F}$. Express the gain of the circuit in decibels (dB) when $V_o = 400\text{mV}$ and $V_i = 1.2\text{V}$.

Lakar dan labelkan rajah skematik penapis pasif laluan rendah, kirakan frekuensi potong jika $R = 60\Omega$ and $C = 21\mu\text{F}$. Nyatakan gandaan litar tersebut dalam unit decibels (dB) apabila $V_o = 400\text{mV}$ and $V_i = 1.2\text{V}$.

[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 $47\text{k}\Omega$ resistor and 220pF capacitor, calculate the cut off frequency?

Lakar dan terangkan operasi penapis op amp laluan tinggi dengan rintangan $47\text{k}\Omega$ 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 $0 - 10\text{V}$. 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 $0 - 10\text{V}$. 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 $+V = +5\text{V}$, calculate the value of V_a , V_b , V_c and V_{out} ?

Bagi litar pemutar digital ke analog R-2R 3 bit dalam Rajah 4c, apabila masukan ialah 110 dengan $+V = +5V$, kirakan nilai V_a , V_b , V_c dan $V_{keluaran}$.

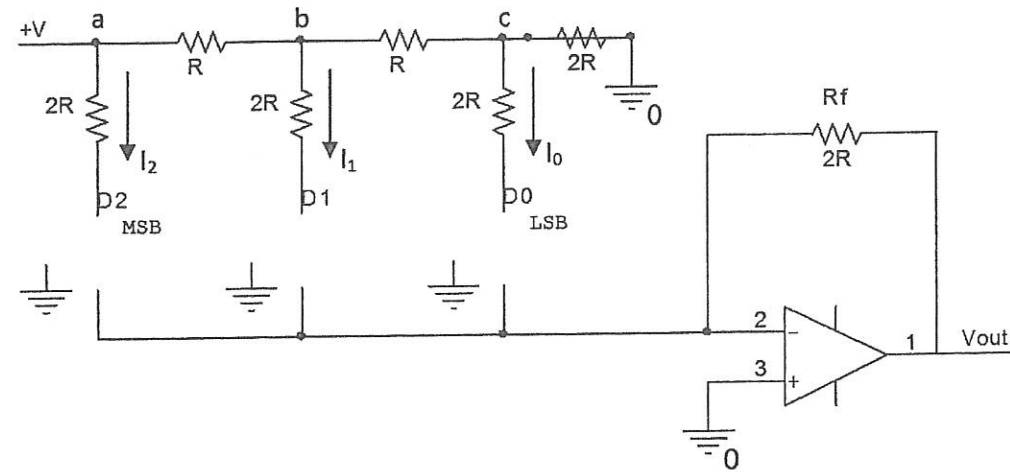


Figure 4c / Rajah 4c

[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 R_1 , R_2 , and R_3 if feedback resistor (R_f) is $270\text{ K}\Omega$ for all three circuits. What is the output voltage of the circuit if the input voltage (V_{in}) is $150\text{ }\mu\text{V}$?

Rajah C1 menunjukkan litar penguat kendalian tiga peringkat yang membekalkan gandaan voltan +10 pada Penguat 1, -18 pada Penguat 2 dan -27 pada Penguat 3. Kira nilai R_1 , R_2 , R_3 sekiranya nilai perintang suapbalik (R_f) adalah $270\text{ K}\Omega$ untuk semua peringkat. Apakah nilai voltan keluaran bagi litar sekiranya voltan masukan (V_{in}) adalah $150\text{ }\mu\text{V}$?

[15 marks]
[15 markah]

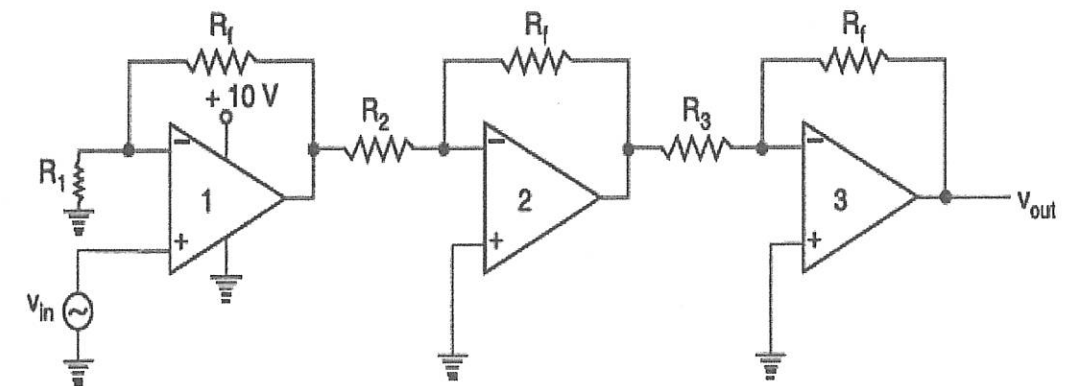


Figure C1 / Rajah C1

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 R_A and R_B if $C = 1\mu\text{F}$.

Pemasa 555 untuk mod astable mengeluarkan gelombang keluaran segiempat. Bina litar skematik bagi pemasa 555 seperti Rajah C2. Kirakan nilai R_A dan R_B jika nilai $C = 1\mu\text{F}$ berdasarkan rajah yang diberi.

[15 marks]
[15 markah]

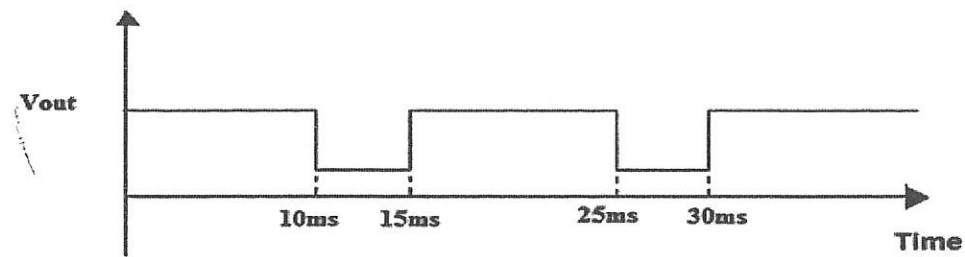


Figure C2/Rajah C2

SOALAN TAMAT