

**SULIT**



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI  
KEMENTERIAN PENDIDIKAN MALAYSIA**

**JABATAN KEJURUTERAAN ELEKTRIK**

**PEPERIKSAAN AKHIR**

**SESI JUN 2018**

**DEE3043: ELECTRONIC CIRCUITS**

**TARIKH : 17 NOVEMBER 2018**

**MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)**

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Kertas ini mengandungi **SEBELAS (12)** halaman bercetak.

Bahagian A: Objektif (10 soalan)

Bahagian B: Struktur (4 soalan)

Bahagian C: Esei (2 soalan)

Dokumen sokongan yang disertakan : Tiada

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**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 shows the block diagram of Direct Current (DC) power supply. Identify the input waveform of RC filter.

*Rajah A1 menunjukkan gambarajah blok bekalan kuasa arus terus. Kenal pasti bentuk gelombang masukan bagi penapis RC.*



Figure A1/Rajah A1

- A.
- B.
- C.
- D.

CLO1  
C2

2. Voltage regulation can be accomplished by Zener diode connected in \_\_\_\_\_.  
*Peraturan voltan boleh dicapai oleh diode zener yang dihubungkan secara \_\_\_\_\_.*

- A. parallel with filter output, forward bias.  
*selari dengan keluaran penapis, pincang hadapan.*
- B. parallel with filter output, reverse bias.  
*selari dengan keluaran penapis, pincang terbalik*
- C. series with filter output, forward bias.  
*siri dengan keluaran penapis, pincang hadapan.*
- D. series with filter output, reverse bias.  
*siri dengan keluaran penapis, pincang terbalik.*

CLO1  
C1

3. Select the correct formula to calculate frequency oscillation for Colpitts Oscillator.  
*Pilih formula yang betul untuk mengira frekuensi ayunan bagi Pengayun Colpitts.*

A.  $f_r = \frac{1}{2\pi\sqrt{LC_T}}$

B.  $f_r = \frac{1}{2\pi\sqrt{CL_T}}$

C.  $f_r = \frac{1}{2\pi\sqrt{LC}}$

D.  $f_r = \frac{1}{2\pi\sqrt{RC}}$

CLO2  
C3

4. Calculate the frequency of oscillations of a Hartley Oscillator circuit that have two inductor of 10 mH and 50 mH which are connected in parallel with a capacitor of 200 pF.  
*Kirakan frekuensi pengayun Hartley yang mempunyai dua pemuat bernilai 10 mH and 50 mH yang disambung secara selari dengan pearuh bernilai 200 pF.*

- A. 123.4 kHz
- B. 617.7 kHz
- C. 45.94 kHz
- D. 23.1 kHz

CLO1  
C1

5. The Ideal output impedance for an operational amplifier is .....  
*Ciri unggul untuk galangan keluaran bagi penguat kendalian ialah .....*

- A.  $\infty \Omega$   
 B.  $0 \Omega$   
 C.  $200 \text{ K}\Omega$   
 D.  $1 \text{ M}\Omega$

CLO1  
C2

6. Figure A6 shows the circuit of Summing Amplifier. Given,  $V_1 = 2 \text{ mV}$ ,  $V_2 = 5 \text{ mV}$ ,  $R_1 = 1 \text{ K}\Omega$ ,  $R_2 = 2 \text{ K}\Omega$  and  $R_F = 10 \text{ K}\Omega$ , calculate the output voltage,  $V_{out}$ .

*Rajah A6 ialah litar penguat pencampur. Diberi  $V_1 = 2 \text{ mV}$ ,  $V_2 = 5 \text{ mV}$ ,  $R_1 = 1 \text{ K}\Omega$ ,  $R_2 = 2 \text{ K}\Omega$  and  $R_F = 10 \text{ K}\Omega$ . Dapatkan voltan keluaran,  $V_{out}$ .*

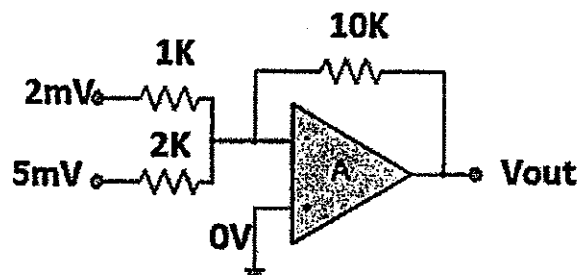


Figure A6 / Rajah A6

- A.  $-45 \text{ mV}$   
 B.  $-20 \text{ mV}$   
 C.  $-25 \text{ mV}$   
 D.  $-23 \text{ mV}$

SULIT

CLO1  
C1

7. Choose the **CORRECT** statement regarding passive filter  
*Pilih pernyataan yang BENAR mengenai penapis jenis pasif*
- A. It require dual power supply.  
*Penapis ini memerlukan dua bekalan kuasa.*
  - B. The input impedance is high  
*Galangan masukan adalah tinggi*
  - C. It is possible to increase the gain.  
*Berkebolehan untuk meninggikan gandaan.*
  - D. The circuit consists of inductor, capacitor and resistor  
*Litar penapis ini terdiri daripada pengaruh, pemuat dan perintang.*

CLO1  
C2

8. Choose the type of filter shown in Figure A8.  
*Pilih jenis litar penapis yang ditunjukkan dalam Rajah A8.*
- A. High pass passive filter/ *Penapis pasif lulus tinggi*
  - B. Low pass passive filter/ *Penapis pasif lulus rendah*
  - C. High pass active filter/ *Penapis aktif lulus tinggi*
  - D. Low pass active filter/ *Penapis aktif lulus rendah*

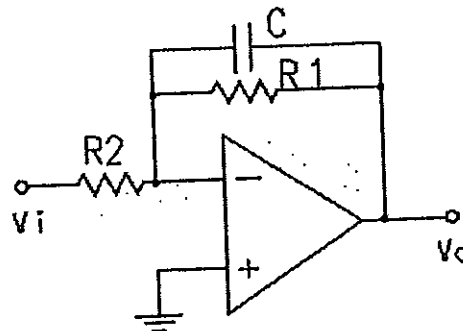


Figure A8/ Rajah A8

CLO1  
C1

9. What is the function of a Digital to Analogue Converter (DAC)?  
*Apakah fungsi Penukar Digital ke analog.*

- A. Convert from analogue signal to digital signal  
*Tukar isyarat analog ke digital*
- B. Convert from digital signal to analogue signal  
*Tukar isyarat digital ke analog*
- C. Convert from digital signal to digital signal  
*Tukar isyarat digital ke digital*
- D. Convert from analogue signal to analogue signal  
*Tukar isyarat analog ke analog*

CLO2  
C3

10. Figure A10 shows the R/2R 4-bit Digital to Analog Converter (DAC) with the value of  $R$  is equal to  $R_f$ . Calculate the  $V_{out}$  when input binary is 0011.

*Rajah A10 menunjukkan penukar 4-bit R/2R Digital ke Analog dimana nilai  $R$  bersamaan dengan nilai  $R_f$ . Kirakan  $V_{out}$  apabila input binari adalah 0011.*

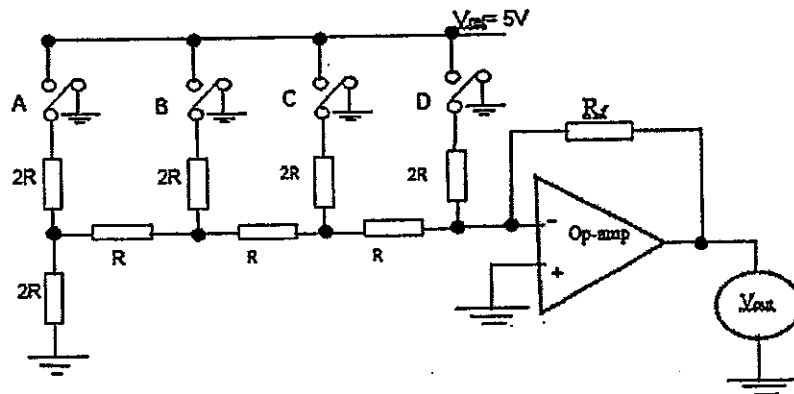


Figure A10/ *Rajah A10*

- A. 0 V
- B. 0.3125 V
- C. 0.6250 V
- D. 0.9375 V

## 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) State the function of transformer, rectifier and filter in construction of Direct Current (DC) Power Supply.

*Nyatakan fungsi pengubah, penerus dan penapis dalam pembinaan Bekalan Kuasa Arus Terus (AT)*

[3 marks]  
[3 markah]

CLO1  
C2

- (b) List **THREE (3)** types of rectifier circuits and explain why bridge rectifier is more popular than the others.

*Senaraikan TIGA (3) jenis litar penerus dan terangkan kenapa penerus tetimbang paling terkenal berbanding yang lain.*

[5 marks]  
[5 markah]

CLO2  
C3

- (c) Referring to Figure B1(c) that shows a bridge rectifier that uses silicon diode. Assume  $V_F = 0.7 \text{ V}$ . Calculate the transformer ratio,  $V_0$  and frequency. Give the suggestion on how to decrease ripple voltage.

*Merujuk kepada Rajah B1 (c) menunjukkan penerus tetimbang menggunakan diod silikon. Anggapkan  $V_F = 0.7 \text{ V}$ . Kirakan nilai untuk; Kirakan nisbah pengubah,  $V_0$  dan frekuensi. Berikan cadangan bagaimana untuk mengurangkan voltan riak.*

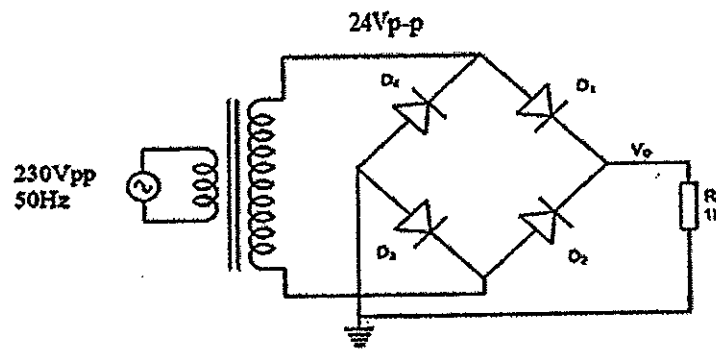


Figure B1(c)/ Rajah B1(c)

[7 marks]  
[7 markah]

## QUESTION 2

### SOALAN 2

CLO1  
C1

- (a) Draw the tank circuit of Colpits oscillator.

*Lukiskan litar tangki untuk Colpits oscillator.*

[3 marks]  
[3 markah]

CLO2  
C3

- b) With aid of the diagram, illustrate the operation of Hartley oscillator.

*Dengan bantuan gambarajah, gambarkan operasi pengayun Hartley.*

[6 marks]  
[6 markah]

CLO2  
C3

- (c) Referring to the oscillator in Figure B2 (c), calculate the frequency and state the type of the Oscillator if  $C_1 = C = 0.2 \mu\text{F}$  and  $L = 100 \text{ mH}$ .

*Merujuk kepada Pengayun Rajah B2 (c), kirakan frekuensi bagi pengayun dan nyatakan jenis litar pengayun sekiranya  $C_1 = C = 0.2 \mu\text{F}$  and  $L = 100 \text{ mH}$ .*



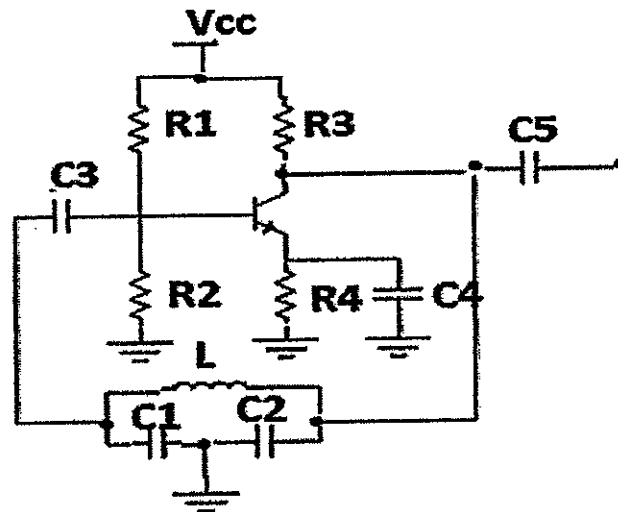


Figure B2(c) / Rajah B2(c)

[6 marks]  
[6 markah]

### QUESTION 3

#### SOALAN 3

- CLO1  
C2 (a) Explain the working principle of filter circuit.  
*Terangkan prinsip kerja litar penapis.*

[3 marks]  
[3 markah]

- CLO2  
C3 (b) Passive filter will accept or reject certain frequencies of signal. Sketch and label the complete frequency response curves for passive Low Pass and Band Pass Filters.

*Penapis pasif akan menerima atau menolak sesetengah isyarat frekuensi. Lakar dan labelkan dengan lengkap lengkung sambutan frekuensi untuk Penapis Lulus Rendah dan Penapis Lulus Jalur.*

[6 marks]  
[6 markah]

CLO2  
C3

- (c) Given  $R = 1.1 \text{ k}\Omega$  and  $C = 0.66 \text{ }\mu\text{F}$ . Calculate the cut off frequency,  $f_c$  and draw Passive high pass filter circuit.

*Diberi  $R = 1.1 \text{ k}\Omega$  dan  $C = 0.66 \text{ }\mu\text{F}$ . Kirakan nilai frekuensi potong,  $f_c$  dan lukiskan litar Penapis Lulus Rendah bagi Penapis Pasif*

[6 marks]  
[6 markah]

**QUESTION 4****SOALAN 4**CLO1  
C1

- (a) List THREE (3) common applications of a Digital to Analogue Converter (DAC)  
*Senaraikan TIGA (3) penggunaan biasa Penukar Digital ke Analog (DAC)*

[3 marks]  
[3 markah]

CLO1  
C2

- (b) Identify the Resistive Divider Circuit and R-2R divider circuit for Digital to Analogue Converter (DAC) by using a suitable diagram.  
*Kenalpasti dengan menggunakan rajah yang bersesuaian litar pembahagi rintangan dan litar pembahagi R-2R untuk Penukar Digital ke Analog (DAC).*

[5 marks]  
[5 markah]

CLO2  
C3

- (c) Calculate the full-scale voltage and the resolution percentage for DAC 8-bit and 10 mV step size.

*Kirakan voltan skala penuh dan peratus resolusi bagi 8-bit DAC dan 10 mV saiz langkah.*

[7 marks]  
[7 markah]

SULIT

## 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

Referring to Figure C1, define the Common Mode Rejection (CMRR) of a non-inverting amplifier. Then, calculate the CMRR and express it in Decibel (dB). Its common mode gain is 0.001.

Merujuk kepada Rajah C1, berikan definisi Nisbah Mod Sepunya Tolakan (CMRR) bagi sebuah penguat bukan balikan. Kemudian, kirakan CMRR dan terbitkan dalam unit Decibel (dB). Gandaan mod sepunya ialah 0.001.

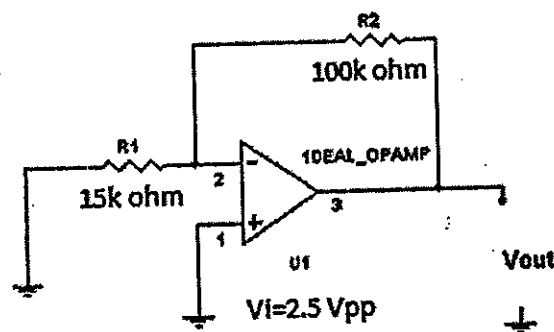


Figure C1/Rajah C1

[15 marks]  
[15 markah]

## QUESTION 2

## SOALAN 2

CLO2  
C3

Draw the schematic diagram circuit of the timer 555 with a astable mode operation. Referring to Figure C2, calculate the value of frequency, duty cycle,  $R_A$  and  $R_B$  if given capacitor  $C_1 = C_2 = 0.068 \mu\text{F}$ .

*Lukis litar rajah skematik pemasa 555 dengan operasi mod astable. Merujuk kepada Rajah C2, kira nilai frekuensi, kitar tugas,  $R_A$  dan  $R_B$  jika diberi kapasitor  $C_1 = C_2 = 0.068 \mu\text{F}$ .*

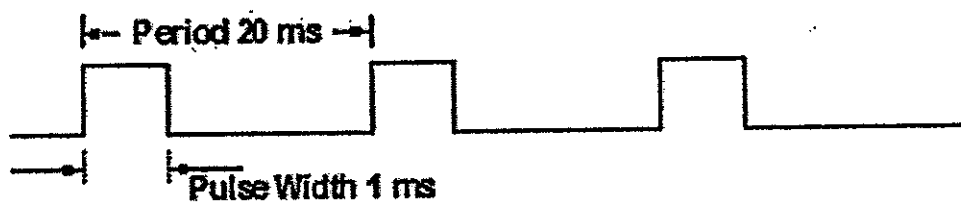


Figure C2/Rajah C2

[15 marks]  
[15 markah]

SOALAN TAMAT