

SULIT



**KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

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

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI II : 2023/2024

DEE30043: ELECTRONIC CIRCUITS

TARIKH : 26 MEI 2024

MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **ENAM (6)** halaman bercetak.

Bahagian A: Subjektif (4 soalan)

Bahagian B: Esei (1 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 80 MARKS
BAHAGIAN A: 80 MARKAH

INSTRUCTION:

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

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan subjektif. Jawab SEMUA soalan.

QUESTION 1
SOALAN 1

- CLO1 a) List **FOUR (4)** main components needed to develop DC Power Supply circuit.

Senaraikan EMPAT (4) komponen utama yang diperlukan untuk membina litar Bekalan Kuasa DC.

[4 marks]

[4 markah]

- CLO1 b) By using a suitable diagram, explain briefly the feedback network of the Colpitts and Hartley Oscillator.

Dengan bantuan gambarajah, terangkan dengan ringkas rangkaian supbalik pengayun Colpitts dan Hartley.

[6 marks]

[6 markah]

- CLO1 c) With the aid of a labeled DC Power Supply block diagram, sketch the output waveform of each block.

Dengan bantuan gambarajah blok Bekalan Kuasa DC yang telah dilabelkan, lakarkan gelombang keluaran pada setiap blok tersebut.

[10 marks]

[10 markah]

QUESTION 2

SOALAN 2

- CLO1 a) Identify the block diagram of an Oscillator Circuit with complete labeling.

Kenalpasti rajah blok Litar Pengayun berserta label yang lengkap.

[4 marks]

[4 markah]

- CLO1 b) Compare **THREE (3)** differences between Astable and Bistable Multivibrator mode in 555Timer.

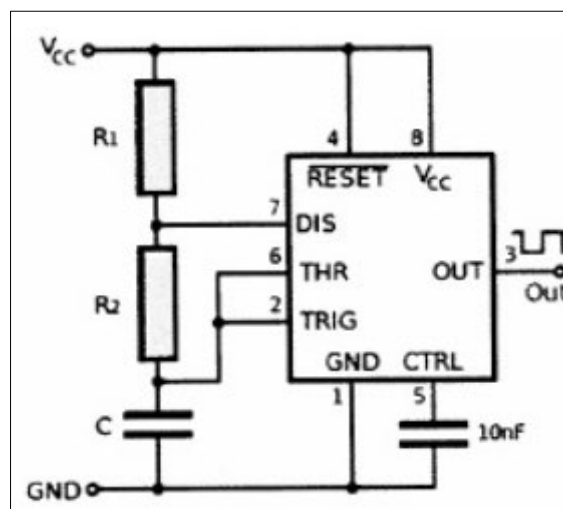
*Bandingkan **TIGA (3)** perbezaan di antara Litar Pemasa 555 mod Astable dan Bistable Multivibrator.*

[6 marks]

[6 markah]

- CLO1 c) Based on Figure A2(c), given the duty cycle value of the circuit is 60%, $T_{low} = 1.386ms$, and $C1=C2 = 0.1\mu F$, calculate the value of R_2 , R_1 , frequency (f) and Time High (T_{High}) for this circuit.

*Berdasarkan rajah A2(c), diberi nilai kitaran tugas litar ialah 60%,
 $T_{low} = 1.386ms$, dan $C1=C2 = 0.1\mu F$, kira nilai R_2 , R_1 , Frekuensi (f) dan Masa Tinggi (T_{High}) litar tersebut.*



[10 marks]

[10 markah]

Figure A2 (c) / Rajah A2 (c)

QUESTION 3**SOALAN 3**

- CLO1 a) State **FOUR (4)** types of LC oscillator.
- Nyatakan **EMPAT (4)** jenis Pengayun LC.*
- [4 marks]
[4 markah]
- CLO1 b) Compare **THREE (3)** differences between Passive and Active Filter Circuit.
- Bandingkan **TIGA (3)** perbezaan di antara litar Penapis Pasif dan Aktif.*
- [6 marks]
[6 markah]
- CLO1 c) With the aid of a suitable diagram, calculate the Cut-off Frequency, f_c point of Inverting Active High Pass Filter, with the resistor, $R=150K\Omega$ and the capacitor, $C=2.2\mu F$.
- Dengan bantuan gambarajah, kirakan nilai Frekuensi Cut-off, f_c bagi litar Penapis Aktif Lulus Tinggi dengan nilai perintang, $R=150K\Omega$ dan pemuat, $C=2.2\mu F$.*
- [10 marks]
[10 markah]

QUESTION 4**SOALAN 4**

- CLO1 a) Identify **TWO (2)** circuit of Analog to Digital Converter, ADC and Digital to Analog, DAC respectively.
- Kenalpasti **DUA (2)** litar Penukar Isyarat Analog ke Digital, ADC dan Penukar Digital ke Analog, DAC masing-masing.*
- [4marks]
[4 markah]
- CLO1 b) Compare **THREE (3)** differences between Analog to Digital Converter, ADC and Digital to Analog Converter, DAC.
- Bandingkan **TIGA (3)** perbezaan di antara litar penukar isyarat analog kepada digital, ADC dan litar penukar isyarat digital ke analog, DAC.*
- [6 marks]
[6 markah]
- CLO1 c) By drawing a 4-bit R2R ladder circuit diagram with given values of $R_f = R = 1\text{ k}\Omega$ and $V_{ref} = 5\text{V}$, calculate the output voltage for input of 1001_2 , 1011_2 and 1000_2 .
- Dengan melukiskan gambajah Litar Tangga R2R 4-bit yang diberi nilai $R_f=R=1\text{K}\Omega$ dan $V_{ref} = 5\text{V}$, kirakan voltan keluaran untuk masukan 1001_2 , 1011_2 dan 1000_2 .*
- [10 marks]
[10 markah]

SECTION B: 20 MARKS
BAHAGIAN B: 20 MARKAH

INSTRUCTION:

This section consists of **ONE (1)** essay question. Answer the question.

ARAHAN:

*Bahagian ini mengandungi **SATU (1)** soalan esei. Jawab soalan berikut.*

QUESTION 1

SOALAN 1

CLO1

A Differential Amplifier is an Op-Amp circuit that combines an Inverting Amplifier and Non-Inverting Amplifier. Calculate the value of Voltage Output, V_{out} by drawing a Differential Amplifier with the input voltage at the inverting pin, $V_1 = 5V$ and input voltage 2, $V_2 = 7V$, Input Resistor at V_1 , $R_1 =$ Input Resistor at V_2 , $R_2 = 200\Omega$ and Resistor feedback, $R_F = R_G = 60K\Omega$. Write the meaning of the Common-Mode Gain, A_{CM} and the Common Mode Rejection Ratio, CMRR of an Operational Amplifier. Then calculate the CMRR of the circuit in dB if the A_{CM} is 0.003.

Penguat Pembezaan ialah litar Op-Amp yang menggabungkan Penguat Alikan dan Penguat Bukan Alikan. Kirakan nilai Voltan Keluaran, V_{out} dengan melukiskan litar Penguat Pembezaan yang mempunyai voltan masukan pada pin Alikan, $V_1 = 5V$ dan voltan masukan 2, $V_2 = 7V$, rintangan masukan pada V_1 , $R_1 =$ rintangan masukan pada V_2 , $R_2 = 200\Omega$ dan rintangan suapbalik, $R_F = R_G = 60K\Omega$. Tuliskan maksud Gandaan Mod Sepunya, A_{CM} dan Nisbah Penolakan Mod Sepunya, CMRR bagi Penguat Kendalian. Kemudian kirakan CMRR untuk litar ini dalam unit dB jika diberi A_{CM} ialah 0.003.

[20 marks]

[20 markah]

SOALAN TAMAT

SULIT

BIL	LIST OF FORMULA
1.	$f = \frac{1}{2\pi RC\sqrt{2N}}$
2.	$f = \frac{1}{2\pi\sqrt{LC}}$
3.	$CMRR = \frac{A_D}{A_C}$
4.	$CMRR_{dB} = 20 \log_{10} \frac{A_D}{A_C}$
5.	$A_V = \frac{V_O}{V_i}$
6.	$A_V = -\frac{R_f}{R_{in}}$
7.	$A_V = 1 + \frac{R_f}{R_g}$
8.	$V_o = -\left[\frac{R_f}{R_1}(V_1) + \frac{R_f}{R_2}(V_2) + \dots + \frac{R_f}{R_n}(V_n)\right]$
9.	$V_o = \frac{R_2}{R_1}(V_2 - V_1)$
10.	$V_o = -R_f C \frac{dV_{in}}{dt}$
11.	$V_o = -\frac{1}{R_{in}C} \int V_{in} dt$
12.	$T = 1.1 RC$
13.	$T_H = 0.693(R_A + R_B)C$
14.	$T_L = 0.693(R_B)C$
15.	$T = T_H + T_L$ $T = 0.693 (R_A + 2R_B)C$

BIL	LIST OF FORMULA
16.	$f = \frac{1}{T_H + T_L}$ $f = \frac{1.44}{(R_A + 2R_B)C}$
17.	$\%Duty\ Cycle = \frac{T_H}{T_H + T_L} \times 100$ $\%Duty\ Cycle = \frac{R_A + R_B}{R_A + 2R_B} \times 100$
18.	$X_C = R = \frac{1}{2\pi f_c C}$ $f_c = \frac{1}{2\pi RC}$ $A_{V\ dB} = 20 \text{ Log } \frac{V_o}{V_i}$
19.	$V_o = - \left[\frac{R_F}{R} (V_1) + \frac{R_F}{2R} (V_2) + \frac{R_F}{4R} (V_3) + \dots + \frac{R_F}{2^{(N-1)}R} (V_N) \right]$
20.	$V_o = - \frac{V_{ref}}{2^n} \times B_{in} \times \frac{R_f}{R}$
21.	$Total\ steps = 2^n - 1$
22.	$\% \text{ resolution} = \frac{Step\ size}{Full\ scale} \times 100\%$ $\% \text{ Resolution} = \frac{1}{2^n - 1} \times 100\%$
23.	$T_C = Step\ size \times T$ $Conversion\ time = Number\ of\ steps \times T$