



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)

PERPUSTAKAAN POLITEKNIK MUKAH SARAWAK (NASKAH PERCUMA)	
No. Perolehan	BP 00004487
No. Pengelasan	621-3076 ICE SESI II 2023/2024
Tarikh	19.10.2024



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.

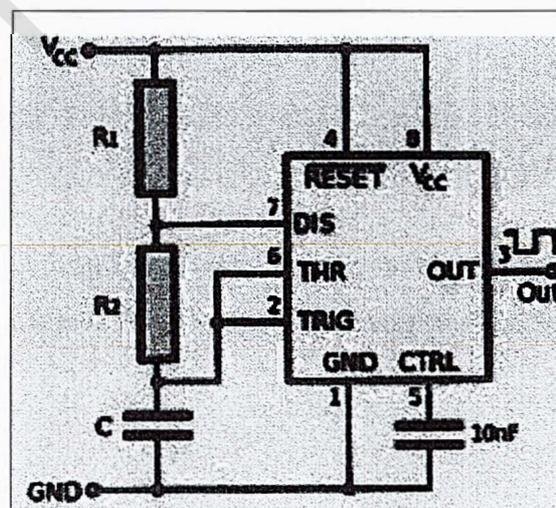
Bandingkan TIGA (3) perbezaan di antara Litar Pemasakan 555 mod Astable dan Bistable Multivibrator.

[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 $C_1=C_2 = 0.1\mu F$, 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 $C_1=C_2 = 0.1\mu F$, 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, $C=2.2pF$.

Dengan bantuan gambarajah, kirakan nilai Frekuensi Cut-off, f_c bagi litar Penapis Aktif Lulus Tinggi dengan nilai perintang, $R=150K\Omega$ dan pemuat, $C=2.2pF$.

[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 gambajarah 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

Sl.	LIST OF FORMULA
16.	$f = \frac{1}{T_H + T_L}$ $f = \frac{1.44}{(R_A + 2R_B)C}$
17.	$\% \text{Duty Cycle} = \frac{T_H}{T_H + T_L} \times 100$ $\% \text{Duty Cycle} = \frac{R_A + R_B}{R_A + 2R_B} \times 100$
18.	$X_C = R = \frac{1}{2\pi f_c C}$ $f_c = \frac{1}{2\pi RC}$ $A_{v \text{ dB}} = 20 \text{ Log } \frac{V_o}{V_i}$
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.	$\text{Total steps} = 2^n - 1$
22.	$\% \text{ resolution} = \frac{\text{Step size}}{\text{Full scale}} \times 100\%$ $\% \text{ Resolution} = \frac{1}{2^n - 1} \times 100\%$
23.	$T_C = \text{Step size} \times T$ $\text{Conversion time} = \text{Number of steps} \times T$



No.	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.	$T = T_H + T_L$ $T = 0.693 (R_A + 2R_B)C$

