

**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 **THREE (3)** functions of transformer that is used in power supply circuit.

*Senaraikan TIGA (3) fungsi pengubah yang digunakan dalam litar bekalan kuasa.*

[3 marks]  
[3 markah]

CLO1  
C2

- (b) Explain the operation of a Phi( $\pi$ ) filter circuit with the aid of a diagram.

*Terangkan operasi litar penapis jenis Phi( $\pi$ ) dengan bantuan gambarajah.*

[5 marks]  
[5 markah]

CLO2  
C3

- (c) Sketch a complete power supply circuit that includes transformer, bridge rectifier, phi( $\pi$ ) filter, zener diode regulator and fixed resistor voltage divider. Draw expected input and output waveform.

*Lakarkan gambarajah litar skematik unit bekalan kuasa yang lengkap dengan menggunakan litar pengubah, penerus tetimbang, penapis  $\pi$ , pengatur diod zener dan pembahagi voltan resistor tetap. Lukis gelombang masukan dan keluaran.*

[7 marks]  
[7 markah]

**QUESTION 2****SOALAN 2**CLO1  
C1

- (a) List **THREE (3)** types of inductor and capacitor (LC) oscillator circuit.  
*Senaraikan TIGA (3) jenis litar pengayun peraruh dan kapasitor (LC).*

[3 marks]  
[3 markah]

CLO2  
C3

- (b) A Colpitts Oscillator circuit having two capacitors of 10pF and 100pF respectively are connected in parallel with an inductor 10mH. Calculate the oscillation frequency,  $f_o$  and draw the Colpitts Oscillator circuit by using the transistor, inductor, capacitor and resistor.

*Litar pengayun Colpitts mempunyai dua kapasitor masing-masing 10pF dan 100pF yang disambungkan secara selari dengan peraruh 10mH. Kirakan frekuensi ayunan,  $f_o$  dan lukiskan litar pengayun Colpitt dengan menggunakan transistor, induktor, kapasitor dan perintang.*

[6 marks]  
[6 markah]

CLO2  
C3

- (c) Illustrate the tank oscillator circuit that derive its feedback voltage from two series inductor connected parallel with single capacitor. The oscillator use an inverting amplifier. Then, determine the oscillation frequency if the tank circuit use capacitor,  $C_1=15\text{pF}$  with series inductor,  $L_1=20\mu\text{H}$  and  $L_2=60\mu\text{H}$ .

*Ilustrasikan litar tangki pengayun yang memperoleh voltan suapbalik daripada dua peraruh bersiri yang disambung secara selari dengan kapasitor tunggal. Pengayun tersebut menggunakan penguat alikan. Kemudian, tentukan frekuensi ayunan sekiranya litar tangki menggunakan kapasitor,  $C_1=15\text{pF}$  dan peraruh bersiri iaitu  $L_1=20\mu\text{H}$  dan  $L_2=60\mu\text{H}$ .*

[6 marks]  
[6 markah]

QUESTION 3

SOALAN 3

CLO1  
C2

- (a) Identify the frequency response curve for a band-pass filter, high-pass filter and low-pass filter.

*Kenalpasti lengkung sambutan frekuensi untuk penapis lulus jalur, penapis lulus tinggi dan penapis lulus rendah.*

[3 marks]  
[3 markah]

CLO2  
C3

- (b) A Low Pass Filter circuit consisting of a resistor of  $4.7\text{ K}\Omega$  in series with a capacitor of  $47\text{ nF}$  is connected across to  $20\text{V}$  sinusoidal supply. Calculate the output voltage ( $V_{out}$ ) at a frequency of  $200\text{Hz}$  and  $200\text{KHz}$ .

*Litar Penapis Lulus Rendah yang terdiri daripada perintang  $4.7\text{ K}\Omega$  sesiri dengan kapasitor  $47\text{ nF}$  disambungkan pada bekalan sinusoidal  $20\text{V}$ . Kirakan voltan keluaran ( $V_{out}$ ) pada frekuensi  $200\text{Hz}$  dan  $200\text{KHz}$ .*

[6 marks]  
[6 markah]

CLO2  
C3

- (c) Passive filter will accept or reject certain frequencies of a signal. Draw completely the frequency response curves for passive Low Pass Filter and High Pass Filter.

*Penapis Pasif akan menerima atau menolak sesetengah signal frekuensi. Lukis dengan lengkap lengkung sambutan frekuensi untuk Penapis Lulus Rendah dan Penapis Lulus Tinggi*

[6 marks]  
[6 markah]

QUESTION 4

SOALAN 4

CLO1  
C1

- (a) List **THREE (3)** differences between Analogue Signal and Digital Signal

*Senaraikan TIGA (3) perbezaan antara Isyarat Analog dan Isyarat Digital.*

[3 marks]  
[3 markah]

CLO1  
C2

- (b) Identify the block diagram for 4-bit Digital Ramp Converter.

*Kenalpasti gambarajah blok untuk 4 bit Penukar Cerun Digital.*

[5 marks]  
[5 markah]

CLO2  
C3

- (c)

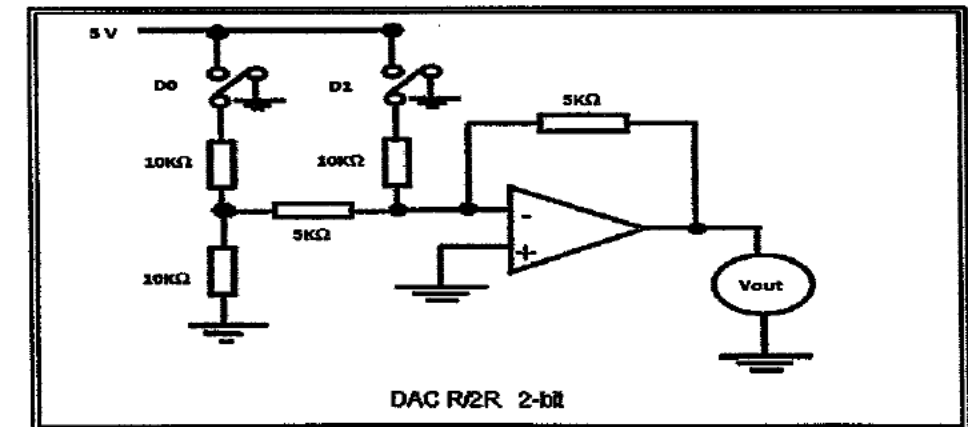


Figure B4(c) / Rajah B4(c)

The circuit in Figure B4(c) refers to a 2-bit DAC based on an R-2R ladder which has a reference voltage of 5 volts. Calculate the analogue output voltage,  $V_a$  if the input codes are 00, 01, 10 and 11

*Litar dalam Rajah B4(c) merujuk kepada 2 bit DAC "R-2R ladder" yang mempunyai voltan rujukan 5 volt. Kirakan voltan keluaran analog,  $V_a$  sekiranya kod masukan adalah 00, 01, 10 dan 11.*

[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**

Express the output voltage equation ( $V_o$ ) with drawing the circuit of Non Inverting Amplifier. Hence calculate the output voltage if  $R_F = 10K$ ,  $R_1 = 5K$  and input voltage =  $1mV_{p-p}$ . Draw the waveforms of the input and output voltage simultaneously.

*Tunjukkan persamaan voltan keluaran dengan melukis litar Penguat Bukan Alikan. Seterusnya kirakan voltan keluaran jika  $R_F=10K$ ,  $R_1= 5K$  dan voltan masukan =  $1mV_{p-p}$ . Lukiskan voltan masukan dan keluaran secara serentak.*

[15marks]  
[15 markah]

**QUESTION 2**

**SOALAN 2**

A 555 timer is connected as an astable multivibrator . Draw a timer circuit with  $R_a = 216\Omega$  ,  $R_b = 72\Omega$  ,  $C = 0.1\mu f$  for electrolytic and  $0.01\mu f$  for ceramic capacitor. Calculate the value of Time High (TH), Time Low (TL), Frequency (F), Duty cycle and sketch the output waveform at pin 3.

*Pemasa 555 disambungkan dalam mode astable. Lukiskan litar pemasa dengan  $R_a = 216\Omega$  ,  $R_b = 72\Omega$  ,  $C = 0.1\mu f$  untuk elektrolitik dan  $0.01\mu f$  untuk kapasitor seramik. Kirakan nilai bagi Tempoh Tinggi, Tempoh Rendah, Frekuensi, Kitar kerja dan lakarkan gelombang keluaran bagi pin 3.*

[15marks]  
[15markah]

**SOALAN TAMAT**

CLO2  
C3

CLO2  
C3