SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI JUN 2015

DEE3043 ELECTRONICS CIRCUITS

TARIKH : 29 OKTOBER 2015
MASA :2.30 PM - 4.30 PM (2 JAM)

Kertas ini mengandungi **TIGABELAS (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)

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. If the alternating current (ac) supply is 60 Hz, what is the ripple frequency of the half-wave rectifier?

   Sekiranya bekalan kuasa arus ulangalik (au) ialah 60 Hz, apakah nilai keluaran frekuensi riak bagi penerus gelombang separuh?

   A. 30 Hz
   B. 50 Hz
   C. 60 Hz
   D. 120 Hz

CLO1
C2

2. Refer to Figure A2, why the output voltage is 0V?

   Merujuk kepada Rajah A2, mengapakah bacaan voltan keluaran 0V?

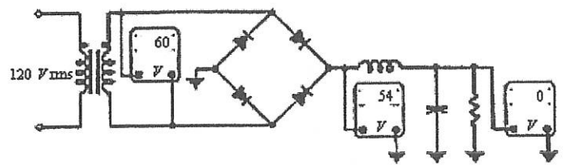


Figure A2 / *Rajah A2*

   A. one of the diodes is open
      satu daripada diod dibuka

   B. a diode is shorted
      diod dipintaskan

C. an open transformer secondary
pengubah pendua dibuka

D. the filter capacitor is shorted
penapis kapasitor dipintaskan

CLO1
C1

3. Refer to the circuit in Figure A3, name the type of oscillator circuit.
Merujuk kepada litar dalam Rajah A3, namakan jenis litar pengayun.

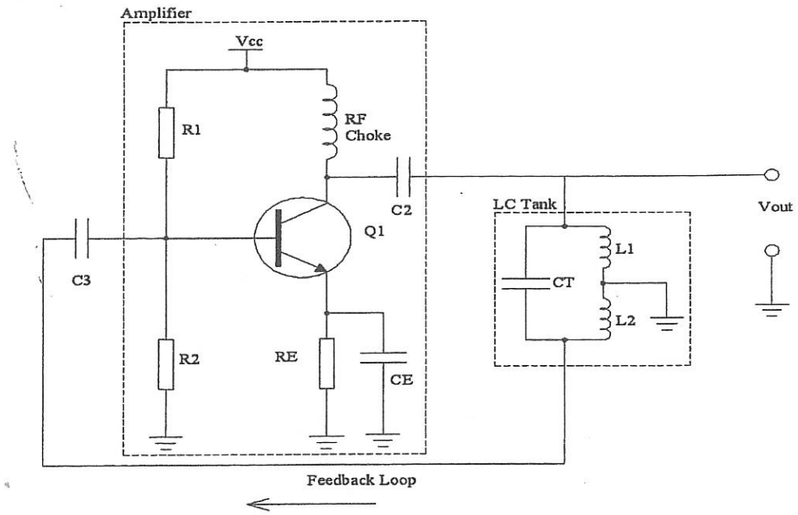


Figure A3 / *Rajah A3*

A. Hartley Oscillator
B. Colpitts Oscillator
C. Armstrong Oscillator
D. Crystal Oscillator

CLO2
C3

4. Calculate the frequency of oscillations of a Colpitts Oscillator circuit that have two capacitors of 20μF and 10μF which are connected in parallel with an inductor of 15mH.
Kirakan frekuensi pengayun Colpitts yang mempunyai dua kapasitor bernilai 20μF dan 10μF yang disambung secara selari dengan inductor bernilai 15mH.

A. 500.17 Hz
B. 499.0 Hz
C. 503.17 Hz
D. 502.2 Hz

CLO1
C1

5. Based on Figure A5, pin number 6 represents
Merujuk kepada Rajah A5, pin nombor 6 mewakili

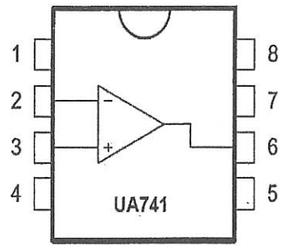


Figure A5/ Rajah A5

A. Inverting input
Masukkan alikan

B. Non – inverting input
Masukan bukan alikan

C. Output
Keluaran

D. Bekalan voltan
Supply voltage

CLO1
C2

6. Identify the output waveform produced by Schmitt Trigger when the input as in Figure A6.
Tentukan gelombang keluaran yang dihasilkan oleh Schmitt Trigger apabila masukan adalah seperti Rajah A6.

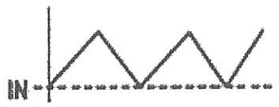
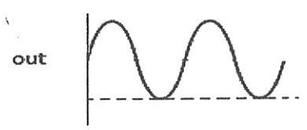


Figure A6 / *Rajah A6*

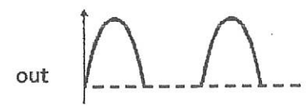
A.

B.



C.

D.



CLO1
C1

7. Choose the **CORRECT** statement of a filter.
*Pilih pernyataan yang **BETUL** berkaitan penapis.*

i) Two types of filter are passive and active filter
Dua jenis penapis adalah penapis aktif dan pasif

ii) Passive implementations of linear filter are based on combinations of resistors, inductors and capacitors
Pasif dibina menggunakan penapis lelurus berdasarkan gabungan perintang, kapasitor dan pemuat

iii) Active filters are implemented using a combination of passive and active.
Penapis aktif dibina hasil gabungan penapis pasif dan aktif

iv) Active filters can achieve resonance without the use of inductors
Penapis aktif boleh menghasilkan resonan tanpa menggunakan pemuat

A. i, ii

B. i, ii , iii

C. ii, iii , iv

D. i, ii, iii, iv

CLO1
C2

8. The following statements of the active filter are true, **EXCEPT:**
*Semua pernyataan di bawah adalah benar berkaitan penapis aktif **KECUALI:***

A. It requires dual power supply
Memerlukan dua bekalan kuasa

B. Input impedance is high
Galangan masukan tinggi

C. Output impedance is low
Galangan keluaran rendah

D. It is not possible to increase the gain
Tidak sesuai untuk meningkatkan gandaan

CLO1
C1

9. What is the function of Analogue to Digital Converter (ADC)
Apakah fungsi bagi Penukar Analog ke Digital

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 analogue signal to analogue signal
Tukar isyarat analog ke analog

D. Convert from digital signal to digital signal
Tukar isyarat digital ke digital

CLO2
C3

10. A four bit Digital to analogue converter (DAC) produces an output voltage, Vout = 10mV for a digital input of 0001. Calculate the full scale output for the converter.

Sebuah 4-bit DAC menghasilkan voltan keluaran, Vout = 10mV untuk masukan digital 0001. Kirakan keluaran skala penuh bagi penukar tersebut.

A. 50mV
B. 100mV
C. 150mV
D. 200mV

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) Draw and label a DC power supply unit block diagram.

Lukis dan labelkan blok unit bekalan kuasa arus terus (AT.)

[3 marks]
[*3 markah*]

CLO1
C2

(b) From Figure B1(a) & (b) , draw the respective output voltage waveforms of these two power supply circuits and explain the function of filter in Figure B1 (b).
Dari rajah B1(a) & (b), lakarkan gelombang voltan keluaran bagi kedua-dua litar unit bekalan kuasa tersebut dan terangkan fungsi penapis di dalam Rajah B1 (b).

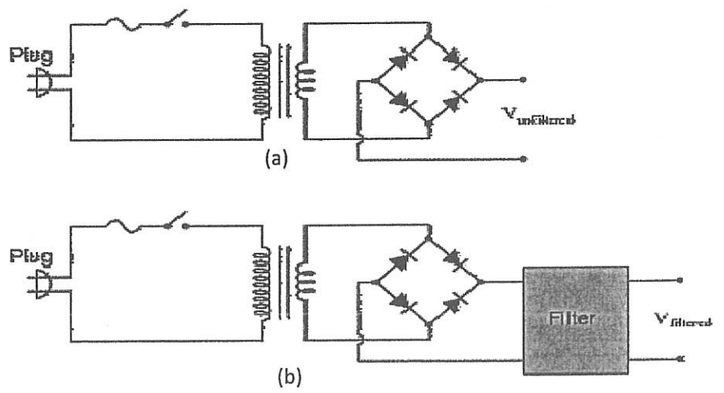


Figure B1/*Rajah B1*

[5 marks]
[5 markah]

CLO2 C3

(c) Explain the operation of Half Wave Rectifier by using a suitable diagram.

Jelaskan kendalian litar penerus gelombang separuh dengan bantuan gambarajah.

[7 marks]
[7 markah]

QUESTION 2

SOALAN 2

CLO1 C1

(a) Name **THREE (3)** types of LC feedback oscillator.

*Namakan **TIGA (3)** jenis pengayun LC suapbalik .*

[3 marks]
[3 markah]

CLO2 C3

(b) Explain the operation of Hartley oscillator by using a suitable diagram .

Terangkan operasi pengayun Hartley dengan bantuan gambarajah.

[6 marks]
[6 markah]

(c) Calculate the frequency of circuit shown in Figure B2(c) if C1=0.27uF, C2=0.47uF and L1=0.6mH.

Kirakan nilai frekuensi bagi litar pengayun Rajah B2(c), jika C1 = 0.27uF, C2 = 0.47uF dan L1 = 0.6mH.

[6 marks]
[6 markah]

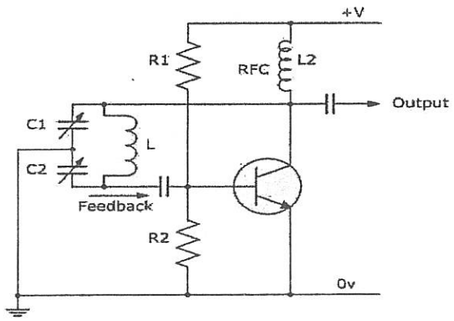


Figure B2(c) / *Rajah B2(c)*

QUESTION 3

SOALAN 3

CLO1 C2

(a) List **THREE (3)** advantages for passive filter.

*Senaraikan **TIGA (3)** kelebihan untuk penapis pasif.*

[3 marks]
[3 markah]

CLO2 C3

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

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

[6marks]
[6 markah]

CLO2 C3

(c) Given R=100Ω and C=0.047uF. Draw RC Low Pass Filter circuit and calculate the cut-off frequency.

Diberi R = 100Ω dan C = 0.047uF. Lukiskan Penapis Lulus Rendah RC dan kira frekuensi potong.

[6 marks]
[6 markah]

QUESTION 4

SOALAN 4

CLO1 C1

(a) Give **THREE (3)** purposes of using Digital Analog Converter (DAC).

*Berikan **TIGA (3)** tujuan menggunakan penukar Digital ke Analog (DAC).*

[3 marks]
[3 markah]

CLO1
C2

(b) Sketch block diagram of a 4-bits DAC with resistor network and summing amplifier. Identify **TWO (2)** types of DAC circuit.

*Lakarkan rajah blok bagi DAC 4-bit yang menggunakan perintang dan penguat penjumlah. Kenalpasti **DUA (2)** jenis litar DAC.*

[5 marks]
[5 markah]

CLO2
C3

(c)

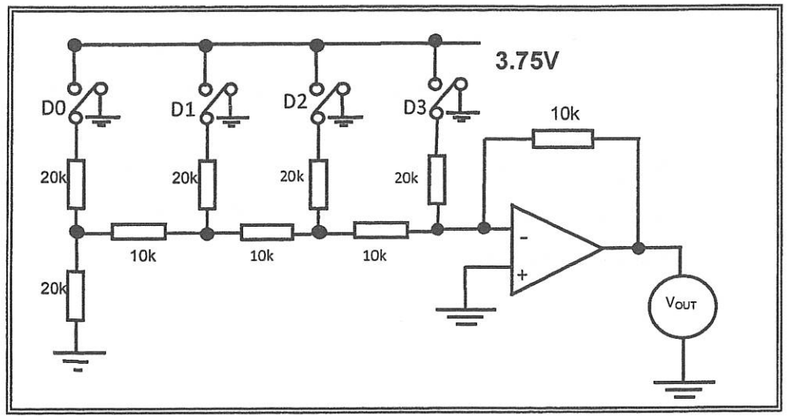


Figure B4(c) / *Rajah B4(c)*

The circuit in Figure B4(c) refers to a 4-bit DAC based on an R-2R ladder which has a reference voltage of 3.75 volts. Calculate the analog output voltage, Va if the input codes are 0001, 1010 and 1111.

Litar dalam Rajah B4(c) merujuk kepada 4 bit DAC "R-2R ladder"yang mempunyai voltan rujukan 3.75 V. Kirakan voltan keluaran analog, Va sekiranya kod masukan adalah 0001, 1010 dan 1111.

[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

Calculate the voltage gain in decibels (dB) unit of the amplifier in Figure C1, given the resistor values of R_1 = 560kΩ and R_2 = 1.5kΩ. If resistor, R_1 is in open condition, explain what happen to the output of the amplifier and sketch the input and output waveforms.

Kira gandaan voltan dalam unit decibels (dB) bagi penguat dalam Rajah C1, diberi nilai rintangan R_1 = 50kΩ and R_2 = 1.5kΩ. Jika rintangan R_1 dalam keadaan terbuka, terangkan apakah yang berlaku pada keluaran penguat tersebut dan lakarkan gelombang masukan dan keluarannya.

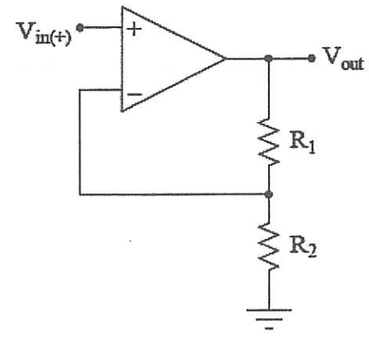


Figure C1/*Rajah C1*

[15 marks]
[15 markah]

QUESTION 2

SOALAN 2

CLO2
C3

Draw the schematic diagram of the timer 555 with an astable mode operation. Sketch the output waveform at Pin 3. Calculate the time high, T_H and time low, T_L, the frequency of the output and the percentage of duty cycle if R_1=2.2kΩ, R_2=4.7kΩ and C_1=0.022μF.

Lukiskan litar skematik bagi pemasa 555 dengan 'astable mode'. Lakarkan gelombang keluaran pada Pin 3. Kirakan tempoh menaik, T_H dan tempoh menurun,T_L , frekuensi keluaran dan peratus kitar kerja jika R_1=2.2kΩ, R_2=4.7kΩ dan C_1=0.022μF.

[15 marks]

[15 markah]

SOALAN TAMAT