KOLEJ YAYASAN PELAJARAN JOHOR
ONLINE FINAL EXAMINATION

COURSE NAME	:	**INDUSTRIAL ELECTRONICS**
COURSE CODE	:	**DKE 3043**
SESSION	:	**DECEMBER 2021**
DURATION	:	**2 HOURS 30 MINUTES**

INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON

1. This examination paper consists of **TWO (2)** part: / PART A (20 Marks) / PART B (80 Marks) /
   *Kertas soalan ini mengandungi **DUA (2)** bahagian:* *BAHAGIAN A (20 Markah)* *BAHAGIAN B (80 Markah)*

2. Students are allowed to refer to resources such as lecture notes, books, internet or any other relevant resources. /
   Pelajar dibenarkan merujuk kepada sumber seperti nota kuliah, buku, internet atau mana-mana sumber yang berkaitan.

3. Answer **ALL** questions in the answer sheet which is **A4** size paper (or other paper with the consent of the relevant lecturer). /
   *Jawab **SEMUA** soalan di dalam kertas jawapan iaitu kertas bersaiz **A4** (atau lain-lain kertas dengan persetujuan pensyarah berkaitan).*

4. Write your details as follows in the upper left conner for each answer sheet: /
   Tulis butiran anda sepertimana berikut di penjuru atas kiri bagi setiap kertas jawapan:

   i. Student Full Name / *Nama Penuh Pelajar*
   ii. Identification Card (I/C) No. / *No. Kad Pengenalan*
   iii. Class Section / *Seksyen Kelas*
   iv. *Course Code* / *Kod Kursus*
   v. *Course Name* / *Nama Kursus*
   vi. *Lecturer Name* / *Nama Pensyarah*

5. Each answer sheet must have a page number written at the bottom right corner. /
   Setiap helai kertas jawapan mesti ditulis nombor muka surat di penjuru bawah kanan.

6. Answers should be handwritten, neat and clear. /
   Jawapan hendaklah ditulis tangan, kemas dan jelas.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

This examination paper consists of **10** printed pages including front page
*Kertas soalan ini mengandungi **10** halaman bercetak termasuk muka hadapa*

PART A / *BAHAGIAN A*

This part consists of **FOUR (4)** questions. Answer **ALL** the questions in an answering booklet.

*Bahagian ini mengandungi **EMPAT (4)** soalan. Jawab **SEMUA** soalan dalam buku jawapan.*

QUESTION 1 / *SOALAN 1*

Referring to **Figure 1** shows a block diagram of a series voltage regulator of a transistor with a feedback signal. Explain the function of each block in the given diagram.

(*5 marks / *markah)

*Merujuk pada **Rajah 1** menunjukkan satu rajah blok pengatur voltan siri transistor dengan isyarat suapbalik. Terangkan fungsi setiap blok di dalam rajah yang diberikan tersebut.*

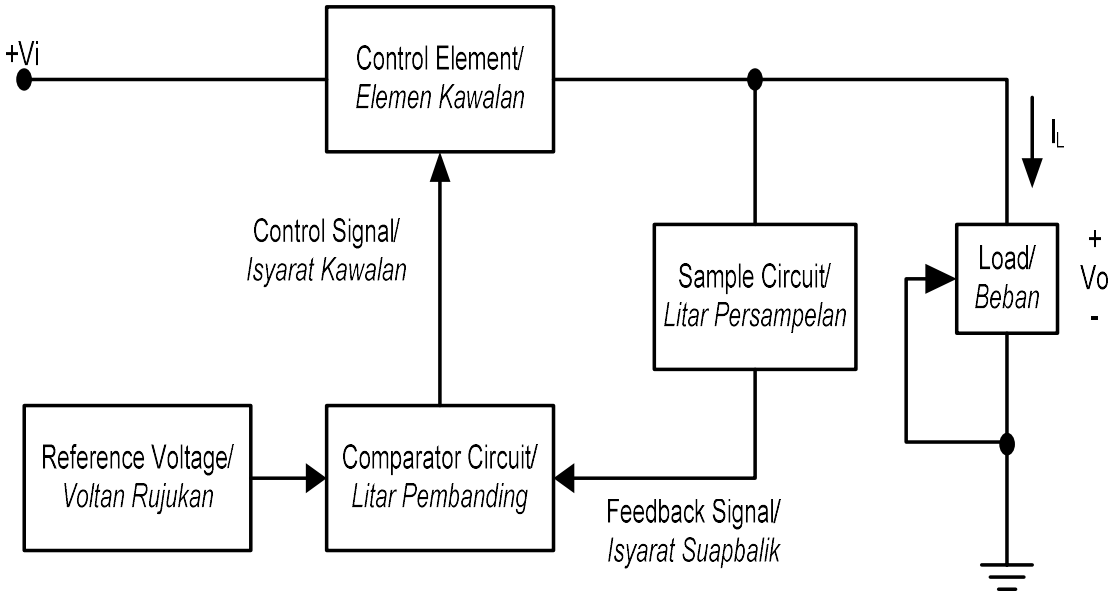

Figure 1 / *Rajah 1*

QUESTION 2 / *SOALAN 2*

Figure 2 shows the internal build of 555 timers. Explain the **five (5)** functions of the pins on the timer.

(*5 marks / *markah)

Rajah 2 *menunjukkan binaan dalaman sebuah pemasa 555. Terangkan* ***lima (5)*** *fungsi pin yang terdapat pada pemasa tersebut.*

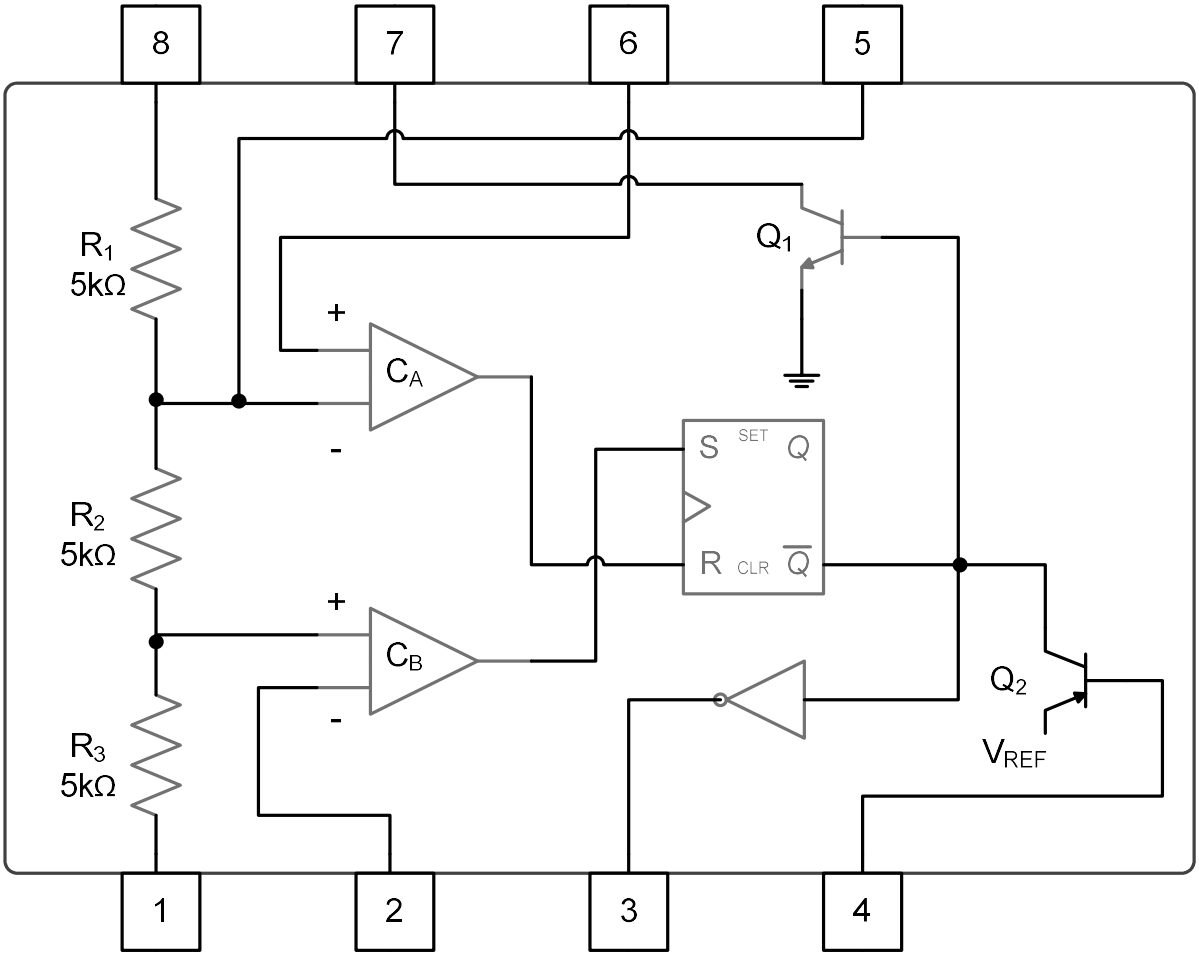

Figure 2 / *Rajah 2*

QUESTION 3 / *SOALAN 3*

Express completely I-V characteristic curve of silicon controlled rectifier, SCR.

(*5 marks / *markah)

Nyatakan dengan lengkap lengkung cirian I-V bagi penerus terkawal silikon, SCR.

QUESTION 4 / *SOALAN 4*

List **four (4)** important parameters for an optocoupler and describe **one (1)** of those parameters.

(*5 marks / *markah)

*Senaraikan **empat (4)** parameter penting bagi sesebuah pengganding opto dan huraikan **satu (1)** daripada parameter tersebut.*

PART B / *BAHAGIAN B*

This part consists of **FOUR (4)** questions. Answer **ALL** the questions in an answering booklet.

*Bahagian ini mengandungi **EMPAT (4)** soalan. Jawab **SEMUA** soalan dalam buku jawapan.*

QUESTION 5 / *SOALAN 5*

Referring to **Figure 5** shows a regulator. Given $\beta_1 = 100$, $\beta_2 = 200$, $V_{BE1} = V_{BE2} = 0.7$ V, $V_Z = 6.3$ V and $V_i = 25$ V. Find:

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a. the value of regulated output voltage, V_O for the regulator circuit.

(6 marks / *markah)*

b. the values of currents I_{R4}, I_{B1}, I_{E1} and I_{C1}

(8 marks / *markah)*

c. the maximum power rating for transistor, Q_1.

(6 marks / *markah)*

*Merujuk kepada **Rajah 5** menunjukkan sebuah pengatur. Diberi $\beta_1 = 100$, $\beta_2 = 200$, $V_{BE1} = V_{BE2} = 0.7$ V, $V_Z = 6.3$ V dan $V_i = 25$ V. Dapatkan:*

a. *nilai voltan keluaran teratur, V_O bagi litar pengatur tersebut.*

b. *nilai arus I_{R4}, I_{B1}, I_{E1} dan I_{C1}*

c. *kadaran kuasa maksimum bagi transistor, Q_1.*

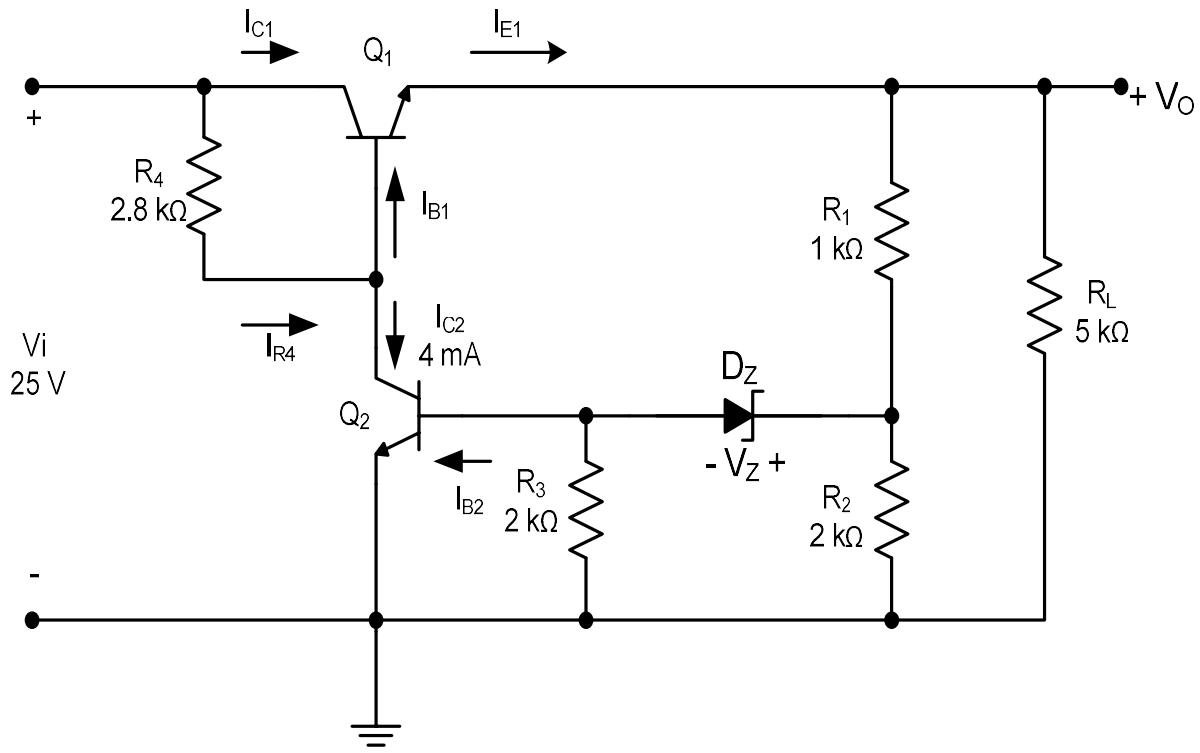

Figure 5 / *Rajah 5*

QUESTION 6 / *SOALAN 6*

Referring to **Figure 6** is unstable multivibrator circuit using 555 timers which generates a square wave frequency, f = 1kHz and the duty cycle is 60%. Given the supply voltage, $+V_{CC}$ = +12V and $I_{C(min)}$ = 1mA. Find:

a. period, T, high duration, T_H, low duration, T_L and pulse width, P_W.

(8 marks / *markah)*

b. capacitor value, C_A.

(6 marks / *markah)*

c. resistors value, R_A and R_B.

(6 marks / *markah)*

*Merujuk pada **Rajah 6** iaitu litar pemberbilang getar tak stabil dengan menggunakan pemasa 555 yang menghasilkan gelombang segiempat yang berfrekuensi, f = 1kHz dan kitar tugas adalah 60%. Diberi voltan bekalan, $+V_{CC}$ = +12V dan $I_{C(min)}$ = 1mA. Dapatkan:*

a. *tempoh, T, tempoh tinggi, T_H, tempoh rendah, T_L dan lebar denyut, P_W.*

b. *nilai pemuat, C_A.*

c. *nilai perintang, R_A dan R_B.*

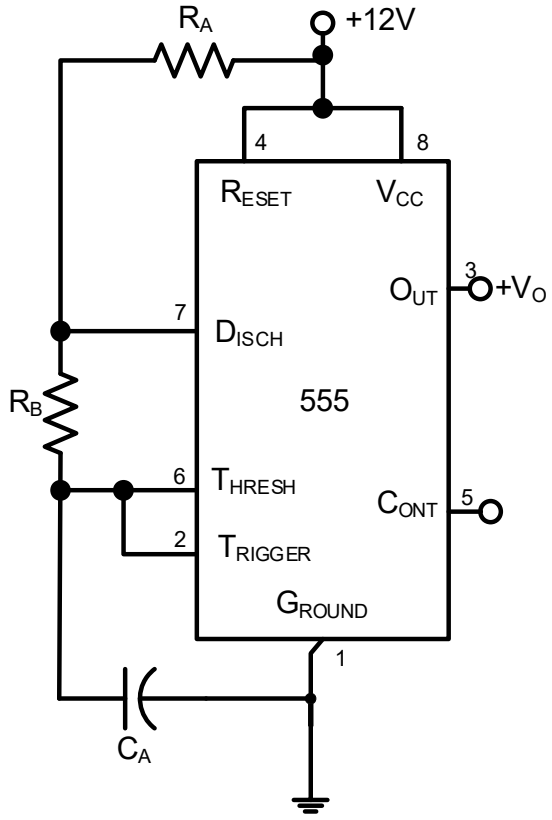

Figure 6 / *Rajah 6*

QUESTION 7 / *SOALAN 7*

Referring to **Figure 7**, given peak input voltage, $V_{i(peak)}$ = 100 V, load resistance, R_L = 10 Ω, resistance, $R_1 = R_2$ = 4.7 kΩ, gate trigger current, I_{GT} = 50 μA, gate trigger voltage, V_{GT} = 1 V and breakover voltage for device P = 20 V. Find:

a. the firing angle.

(6 marks / *markah)*

b. the maximum power of an alternating current across the load, R_L.

(4 marks / *markah)*

c. the percentage of the maximum power supplied to the load at the firing angle in (a).

(10 marks / *markah)*

*Merujuk pada **Rajah Q7**, diberi voltan masukan puncak, $V_{i(puncak)}$ = 100 V, rintangan beban, R_L = 10 Ω, rintangan, $R_1 = R_2$ = 4.7 kΩ, arus picuan get, I_{GT} = 50 μA, voltan picuan get, V_{GT} = 1 V dan voltan pecah lampau bagi peranti P = 20 V. Dapatkan:*

a. *sudut picuan.*

b. *kuasa maksimum arus ulang alik yang terbina merentasi beban, R_L.*

c. *peratusan kuasa maksimum yang dibekalkan ke beban pada sudut picuan dalam (a).*

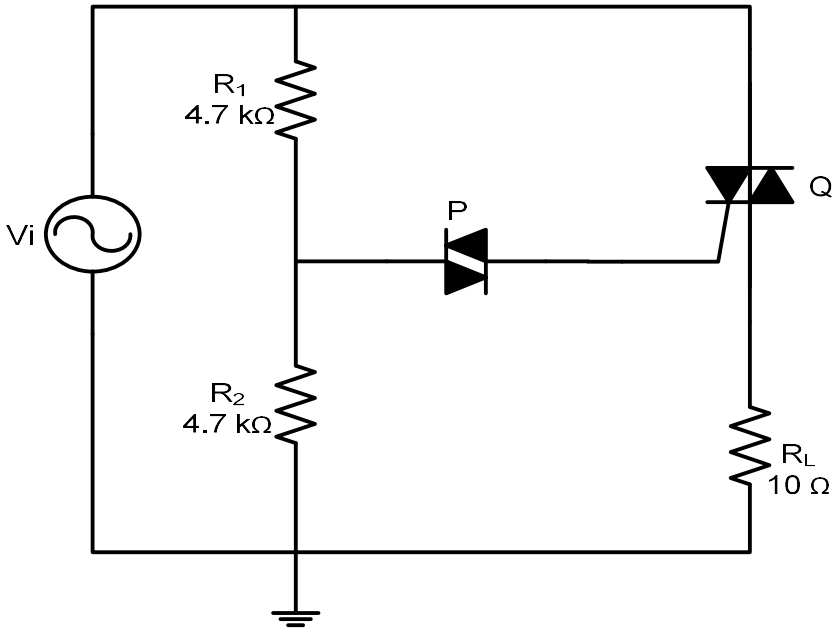

Figure 7 / *Rajah 7*

QUESTION 8 / *SOALAN 8*

The circuit at **Figure 8** shows the light detector circuit. If the diode, D_1 is germanium and the opto coupling circuit has a current transfer ratio, CTR of 50%. Determine:

a. the resistance value of the light dependent resistor, R_{LDR} when the LED starts to malfunction.

(8 marks / *markah)*

b. base current, I_B when the LED starts to malfunction.

(*12 marks / *markah)

*Litar pada **Rajah 8** menunjukkan litar pengesan cahaya. Jika diod, D_1 adalah germanium dan litar gandingan opto mempunyai nisbah arus pindah, CTR sebanyak 50%. Tentukan:*

a. *nilai rintangan perintang peka cahaya, R_{LDR} ketika LED mula tidak berfungsi.*

b. *arus tapak, I_B ketika LED mula tidak berfungsi.*

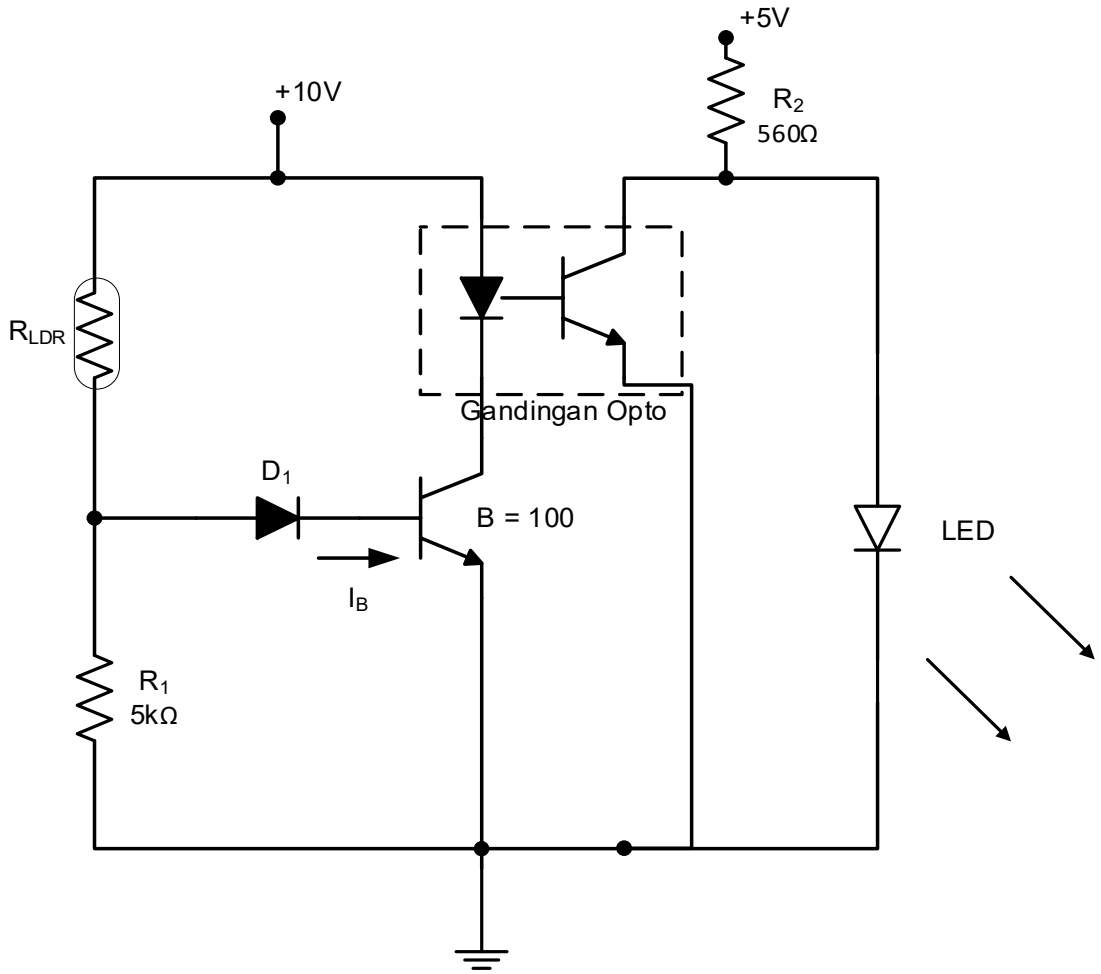

Figure 8 / *Rajah 8*

[100 MARKS / *100 MARKAH*]

END OF QUESTION PAPER / *KERTAS SOALAN TAMAT*