



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : DIGITAL ELECTRONICS
COURSE CODE : DKE 1083
EXAMINATION : APRIL 2019
DURATION : 2 HOURS 30 MINUTES

INSTRUCTION TO CANDIDATES

1. This examination paper consists of **FIVE (5)** Questions.

2. Answer **ALL** Questions.

3. Please check to make sure that this examination pack consist of:
 - i. Question Paper
 - ii. Answer Booklet
 - iii. Attachment 1

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

*This examination paper consists of **8** printed pages including front page*

This paper contains of **FIVE(5)** questions. Answer **ALL** questions. Answer the questions in Answer Booklet.

*Kertas soalan ini mengandungi **LIMA (5)** soalan. Jawab **SEMUA** soalan. Sila jawab dalam buku jawapan.*

QUESTION 1 / SOALAN 1

- a. Describe briefly the terms below:

Terangkan dengan ringkas istilah-istilah berikut:

- i. analog quantity / *kuantiti analog.*
- ii. digital representations / *perwakilan digital.*

(2 marks/ *markah*)

- b. Convert the hexadecimal number $17A_{16}$ to the following numbers or codes.

Show the method conversion.

- i. Decimal number
- ii. Binary number
- iii. Octal number
- iv. Gray code
- v. BCD 8421
- vi. Excess-3

Tukarkan nombor perenambelas $17A_{16}$ kepada sistem nombor atau kod berikut. Tunjukkan kaedah pengiraan.

- i. *Nombor perpuluhan (desimal)*
- ii. *Nombor perduaan (binari)*
- iii. *Nombor pertapanan (oktal)*
- iv. *Kod gray*
- v. *BCD 8421*
- vi. *Excess-3 (lebih tiga)*

(18 marks/ *markah*)

QUESTION 2 / SOALAN 2

- a. Simplify the following expression using deMorgan theorem and Boolean Algebra.

Ringkaskan persamaan-persamaan berikut menggunakan teorem deMorgan dan Aljabar Boolean.

- i. $X = [(AB' (A+B))']'$
- ii. $Y = [A + B' (AB' + A'B) (A+B)]'$
- iii. $Z = (ABC)' (A + B + C)'$

(9 marks/ markah)

- b. A combination circuit has 3 inputs A, B, C and output F. F is true for the following input combination. (False = 0, True = 1)

- A is False, B is True
- A is False, C is True
- A, B and C are False
- A, B and C are True

- i. Restate a truth table for the system based on the information.
- ii. Give the simplified Boolean equation of SOP using Karnaugh Map.
- iii. Illustrate logic circuit for the system.

Sebuah litar gabungan mempunyai 3 masukan A, B, C dan keluaran F. F adalah benar bagi gabungan masukan berikut. (Salah = 0, Benar = 1)

- A adalah Salah, B adalah Benar
- A adalah Salah, C adalah Benar
- A, B dan C adalah Salah
- A, B dan C adalah Benar

- i. Nyatakan semula menggunakan jadual kebenaran bagi sistem tersebut berdasarkan maklumat.
- ii. Berikan persamaan Boolean yang ringkas bagi SOP menggunakan Peta Karnaugh.
- iii. Ilustrasikan litar logik bagi sistem tersebut.

(11 marks/ markah)

QUESTION 3 / SOALAN 3

a. Figure Q3 (a) shows the logic symbol for the half-adder.

- i. Develop the truth table.
- ii. Determine the logic expression for Σ and Cout.
- iii. Implement Σ and Cout using multiplexer (MUX).

Rajah Q3 (a) menunjukkan simbol logik bagi satu penambah separuh.

- i. *Bina jadual kebenaran.*
- ii. *Tentukan ungkapan logik untuk Σ dan Cout.*
- iii. *Laksanakan Σ dan Cout dengan menggunakan pemultipleks (MUX).*

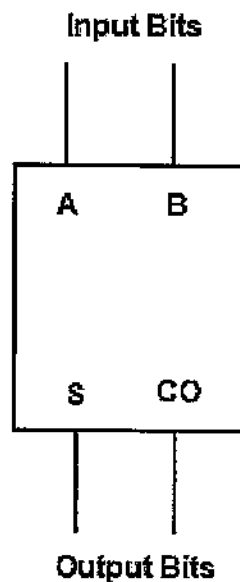


Figure Q3 (a) / Rajah Q3 (a)

(11 marks/ markah)

- b. Express each decimal number in binary as 8 bit sign-magnitude, 1'st complement and 2'nd complement for numbers.

Tunjukkan bagi setiap nombor desimal dengan menggunakan 8 bit tanda magnitud bagi pelengkap 1 dan pelengkap 2 bagi nombor berikut.

- i. $-52_{10} - 12_{10}$
- ii. $-34_{10} + 40_{10}$
- iii. $+45_{10} - 25_{10}$

(9 marks/ markah)

QUESTION 4 / SOALAN 4

- a. Construct the logic circuit for SR flip flop using NOR gates and state the different between the circuits using NAND gates.

Binakan litar logik bagi flip flop SR menggunakan get TAK-ATAU dan nyatakan perbezaan bagi litar yang menggunakan get TAK-DAN.

(6 marks/ markah)

- b. i. State **two (2)** differences between synchronous and asynchronous counters.

Berikan dua (2) perbezaan di antara pembilang segerak dan pembilang tak segerak.

(4 marks/ markah)

- ii. Refer to **Figure Q4 (b)**, complete the output waveform at **Attachment 1** for the counter circuit given. Assume the initial condition is LOW.

Rujuk Rajah Q4 (b), lengkapkan gelombang keluaran pada Lampiran 1 bagi litar pembilang yang diberikan. Anggap keluaran awal adalah RENDAH.

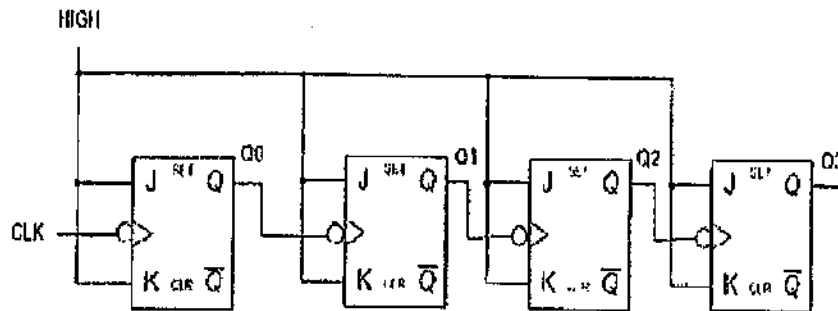


Figure Q4 (b) / Rajah Q4 (b)

(10 marks/ markah)

QUESTION 5 / SOALAN 5

- a. Explain **three (3)** the main difference between TTL and CMOS circuitry.

Terangkan tiga (3) perbezaan utama di antara litar TTL dan CMOS.

(6 marks/ markah)

- b. A certain IC gate has an $I_{CCL} = 2.8 \mu\text{A}$ and $I_{CCH} = 1.5 \mu\text{A}$. Determine the average power dissipation if V_{CC} is 5.5 V. Calculate the speed power product if the propagation delay is 3 ns.

Sebuah IC get mempunyai $I_{CCL} = 2.8 \mu\text{A}$ dan $I_{CCH} = 1.5 \mu\text{A}$. Tentukan pelepasan kuasa purata jika $V_{CC} = 5.5 \text{ V}$. Kirakan kuasa laju produk jika lengah perambatan adalah 3 ns.

(6 marks/ markah)

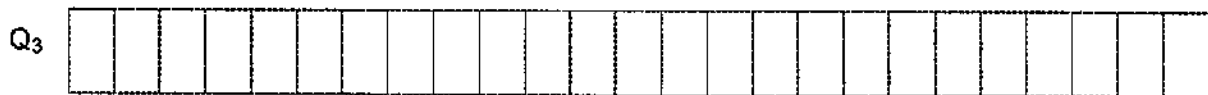
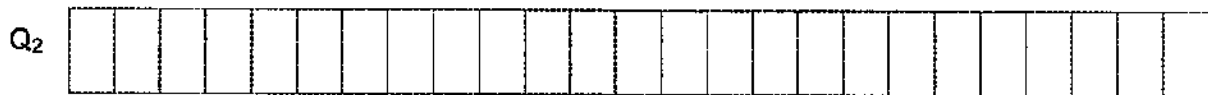
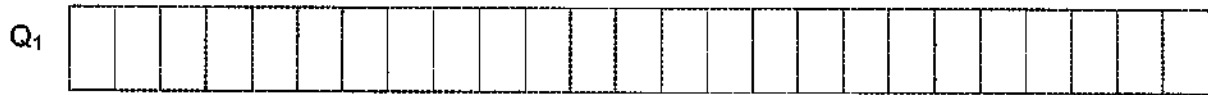
c. State the following term.

Nyatakan istilah berikut.

- i. Propagation delay / *Lengah perambatan*
- ii. Noise immunity / *Immuniti hingar*
- iii. Fan-Out / *Rebak keluar*
- iv. Power supplies in IC / *Bekalan kuasa dalam IC*

(8 marks/ *markah*)

ATTACHMENT 1



[100 MARKS / 100 MARKAH]

END OF QUESTION PAPER / KERTAS SOALAN TAMAT

