

---

UNIVERSITI SAINS MALAYSIA

Final Examination  
2015/2016 Academic Session

May/June 2016

**JIF 316 - Electronics II**  
*[Elektronik II]*

Duration : 3 hours  
*[Masa : 3 jam]*

---

Please ensure that this examination paper contains **SEVEN** printed pages before you begin the examination.

Answer **ALL** questions. You may answer **either** in Bahasa Malaysia or in English.

Read the instructions carefully before answering.

Each question carries 20 marks.

In the event of any discrepancies in the exam questions, the English version shall be used.

*Sila pastikan kertas peperiksaan ini mengandungi **TUJUH** muka surat yang bercetak sebelum anda menjawab sebarang soalan.*

*Jawab **SEMUA** soalan. Anda dibenarkan menjawab soalan **sama ada** dalam Bahasa Malaysia atau Bahasa Inggeris.*

*Baca setiap arahan dengan teliti sebelum menjawab.*

*Setiap soalan bernilai 20 markah.*

*Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.*

**Answer ALL questions.**

1. (a) Convert
- (i)  $217.36_8$  to its equivalent number binary
  - (ii)  $A4C_{16}$  to base 10
  - (iii)  $00100000.01100101$  to a decimal number
- (15 marks)
- (b) Perform  $1001_2 \times 1011_2$
- (5 marks)
2. (a) Simplify the Boolean expression  $Y = \overline{(\overline{A + B}) \cdot (A + \overline{C})}$  using De Morgan's theorem.
- (5 marks)
- (b) With the help of truth tables, show that
- (i)  $C.A.C. = C.A$
  - (ii)  $B.C.C. = B.C$
- (10 marks)
- (c) Prove that  $(\overline{A}B + C) \cdot (A + B) \cdot C = AC + BC$
- (5 marks)
3. (a) (i) Draw a logic diagram using the OR, AND and NOT gates for the Boolean expression  $Y = \overline{A}B + \overline{A}B$
- (5 marks)
- (ii) Simplify the Boolean expression  $Y = \overline{B}(A + C) + C(\overline{A} + B) + AC$  and draw the corresponding logic diagram.
- (5 marks)

- (b) A search lamp in the prison compound is to be operated using two switches - one at the back door and the another one at the front door. The lamp is ON if
- (i) the front switch is ON and the back switch is OFF
  - (ii) the front switch is OFF and the back switch is ON

The lamp is OFF if

- (i) both switches are OFF
- (ii) both switches are ON

Design a logic circuit that will operate the switches.

(10 marks)

4. (a) Simplify  $Y = A\bar{B}\bar{C} + ABC + \bar{A}\bar{B}C$  using a Karnaugh map.

(5 marks)

- (b) (i) Describe the operation of a S-R flip-flop.  
(Your answer should include the truth table).

(10 marks)

- (ii) Why is the D flip-flop sometimes considered better than the S-R flip-flop? (Your answer should include a brief description on how the D flip-flop works).

(5 marks)

5. (a) What is the clock cycle time for a system that uses a 500 kHz clock?

(5 marks)

(b)

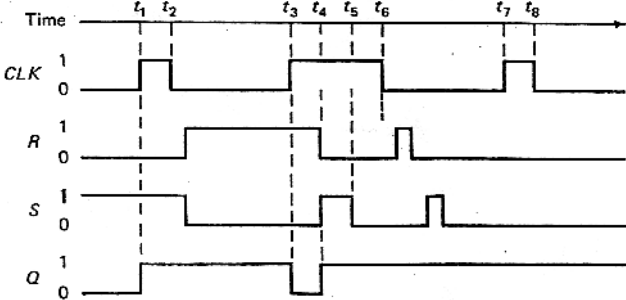


Figure 1

Figure 1 shows the input waveforms R, S, and CLK applied to a clocked RS latch. Explain the output waveform Q.

(15 marks)

**Jawab SEMUA soalan.**

1. (a) Tukarkan
- (i)  $217.36_8$  kepada nombor binary yang berpadanan
  - (ii)  $A4C_{16}$  ke tapak 10
  - (iii)  $00100000.01100101$  kepada nombor desimal
- (15 markah)
- (b) Laksanakan  $1001_2 \times 1011_2$
- (5 markah)
2. (a) Permudahkan ungkapan Boolean  $Y = \overline{(A+B)} \cdot (A+\overline{C})$  dengan menggunakan teorem De Morgan.
- (5 markah)
- (b) Dengan bantuan jadual kebenaran, tunjukkan bahawa
- (i)  $C.A.C. = C.A$
  - (ii)  $B.C.C. = B.C$
- (10 marks)
- (c) Buktikan bahawa  $(\overline{A}B + C) \cdot (A+B) \cdot C = AC + BC$
- (5 markah)
3. (a) (i) Lukiskan rajah logik menggunakan pintu logik OR, AND dan NOT untuk ungkapan Boolean  $Y = \overline{A}B + \overline{A}B$
- (5 markah)
- (ii) Permudahkan ungkapan Boolean  $Y = \overline{B}(A+C) + C(\overline{A}+B) + AC$  dan lukiskan rajah logik yang berpadanan.
- (5 markah)

- (b) Suatu lampu carian di dalam kawasan penjara dikawal oleh dua suis - satu suis di pintu belakang dan satu lagi di pintu depan. Lampu tersebut akan menyala jika
- (i) suis pintu depan ditekan 'ON' dan suis belakang 'OFF'
  - (ii) suis pintu depan 'OFF' dan suis belakang 'ON'

Lampu carian akan 'OFF' jika

- (i) kedua-dua suis adalah 'OFF'
- (ii) kedua-dua suis adalah 'ON'

Reka bentuk suatu litar logik yang akan mengawal lampu carian tersebut mengikut syarat-syarat di atas.

(10 markah)

4. (a) Permudahkan  $Y = ABC\bar{C} + ABC + \bar{A}BC$  dengan menggunakan peta Karnaugh.

(5 markah)

- (b) (i) Huraikan operasi suatu flip-flop S-R.  
(Jawapan anda harus mempunyai jadual kebenaran).

(10 markah)

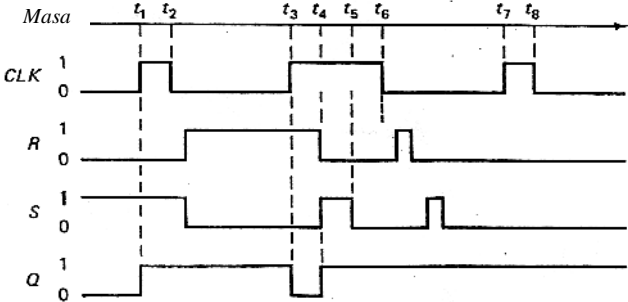
- (ii) Mengapa flip-flop jenis D kadang-kala dianggap lebih baik daripada flip-flop S-R? (Jawapan anda harus mengandungi huraian bagaimana suatu flip-flop jenis D beroperasi).

(5 markah)

5. (a) Apakah masa pusingan jam bagi suatu sistem yang menggunakan jam 500 kHz?

(5 markah)

(b)



Rajah 1

Rajah 1 menunjukkan bentuk gelombang input R, S, dan CLK yang dikenakan ke atas latch RS. Terangkan bentuk gelombang output Q.

(15 markah)