



**UNIVERSITI KUALA LUMPUR**  
**MALAYSIA FRANCE INSTITUTE**

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**FINAL EXAMINATION**  
**JANUARY 2011 SEMESTER**

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| <b>SUBJECT CODE</b>  | <b>: FLD 20402</b>                            |
| <b>SUBJECT TITLE</b> | <b>: DIGITAL SYSTEM</b>                       |
| <b>LEVEL</b>         | <b>: DIPLOMA</b>                              |
| <b>DURATION</b>      | <b>: 12.30pm – 2.30pm</b><br><b>(2 HOURS)</b> |
| <b>DATE / TIME</b>   | <b>: 10 MAY 2011</b>                          |

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper **CAREFULLY**.
  2. This question paper is printed on both sides of the paper.
  3. Please write your answers on the answer booklet provided.
  4. Answers should be written in blue or black ink except for sketching, graphic and illustration.
  5. This question paper consists of **TWO (2)** sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.
  6. Answer all questions in English.
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THERE ARE 7 PRINTED PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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**SECTION A (Total: 60 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) Convert the following numbers of different number system into the stated number system (show your step of conversion):
- i.  $175_8$  to decimal number  
(2 marks)
  - ii.  $1063_8$  to binary number  
(2 marks)
  - iii.  $2597_8$  to BCD number  
(2 marks)
  - iv.  $9CAF_{16}$  to Binary and Octal number  
(4 marks)
  - v.  $1011011001100111_2$  to Octal and Hexadecimal number.  
(4 marks)
  - vi.  $23456_{10}$  to Binary, Octal and Hexadecimal number.  
(6 marks)

## Question 2

(a) Draw the logic gate and its truth table for the gates below:

i. 2 input **Exclusive-NOR (Ex-NOR)** gate

(3 marks)

ii. 3 input **NAND** gate

(3 marks)

(b) **Figure 1** shows the combinational logic gates with 3 input variables A, B and C.

i. Determine the Boolean Equation for the output X.

(2 marks)

ii. Simplify the Boolean Equation either using Karnaugh Mapping procedure or Boolean reduction for the output X.

(3 marks)

iii. Draw the simplified logic circuit.

(3 marks)

iv. Determine the output waveform for X in **Figure 2**.

(6 marks)

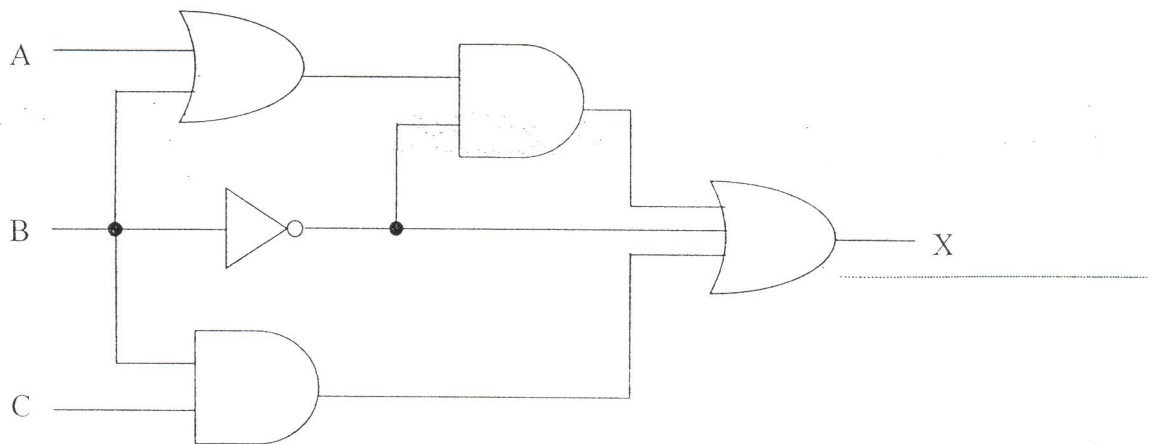


Figure 1

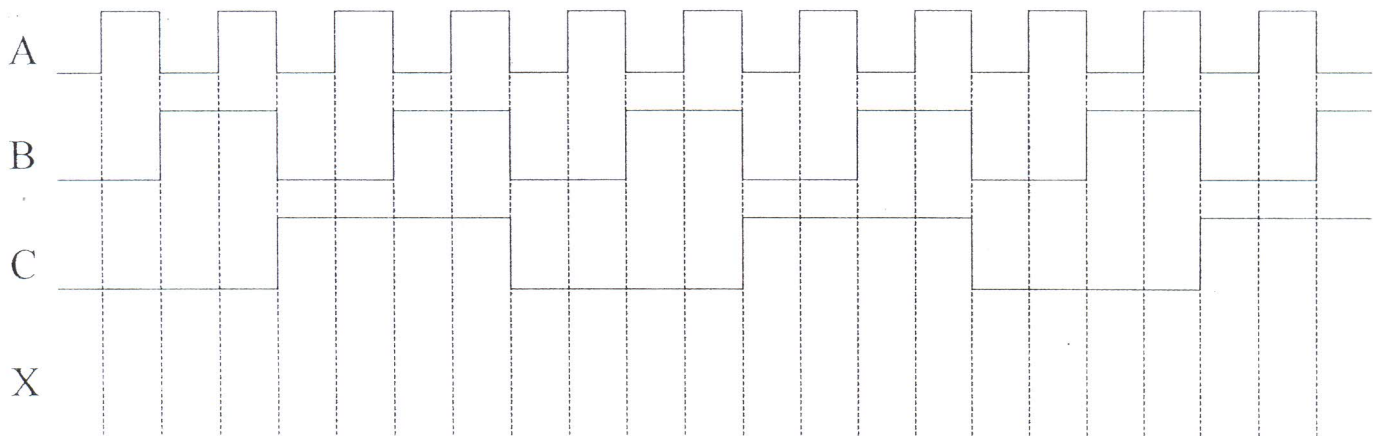


Figure 2

## Question 3

Figure 3 shows two T type flip Flops.

- (a) Draw the truth table of this flip flop. (3 marks)
- (b) Construct the flip flop using NANDs gate. (5 marks)
- (c) State the main function of this flip flop. (2 marks)
- (d) Determine the output waveform of QA. (5 marks)
- (e) Determine the output waveform of QB. (5 marks)

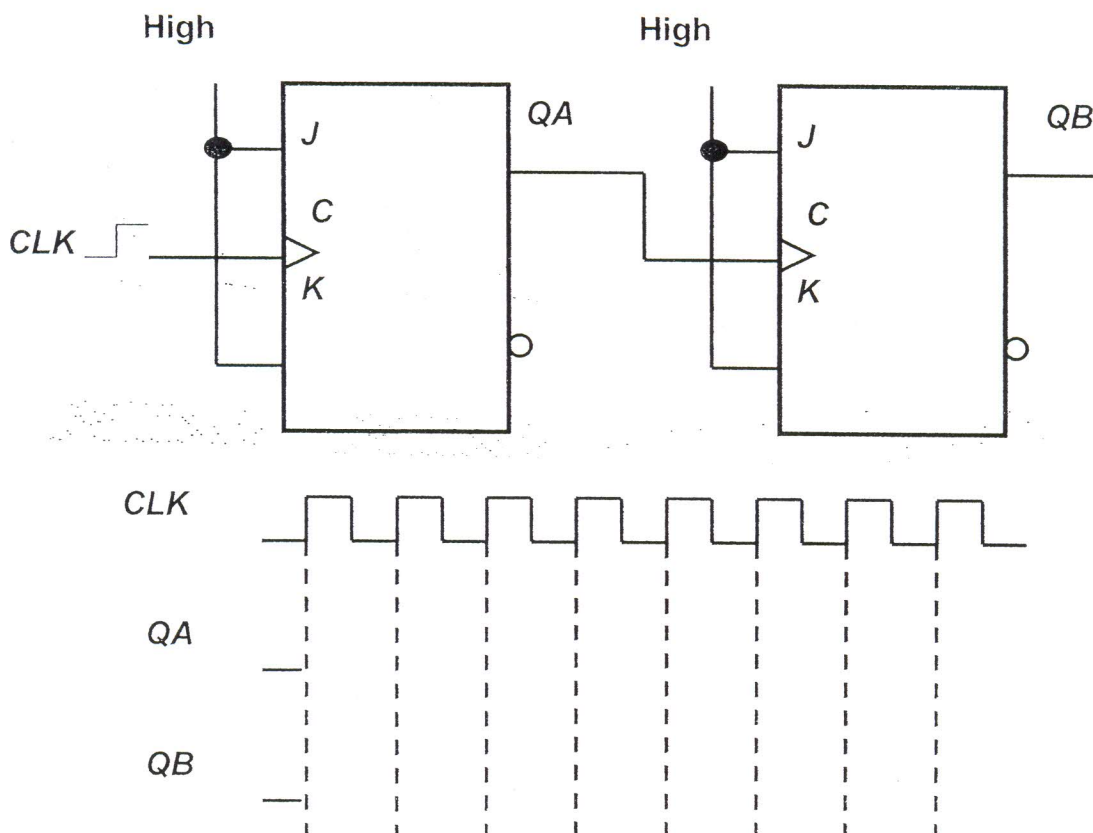


Figure 3

**SECTION B (Total: 40 marks)****INSTRUCTION: Answer TWO (2) questions only****Please use the answer booklet provided.****Question 4**

Design a half adder;

- (a) Construct the truth table (6 marks)
- (b) Indicate the sum-of-product expressions (4 marks)
- (c) Determine the Karnaugh Map (6 marks)
- (d) Draw the circuit. (4 marks)

## Question 5

**Figure 4** shows a chemical plant system that needs a microprocessor-driven alarm system to warn of critical condition in one of its chemical tanks. The tank has four switches that monitor temperature (T), pressure (P), fluid level (L), and weight (W). **Table 1** shows the conditions that will notify the microprocessor to activate an alarm when any of the following conditions arise.

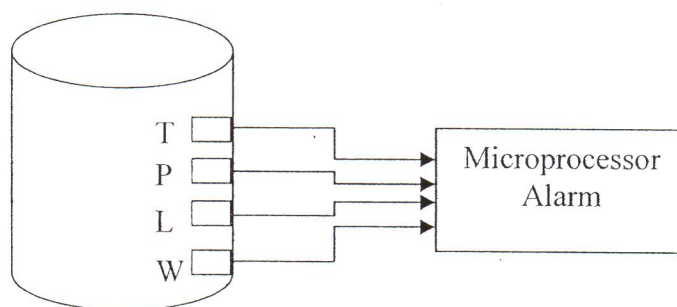


Figure 4

Table 1

| CONDITION | Temperature (T) | Pressure (P) | Fluid level (L) | Weight (W) |
|-----------|-----------------|--------------|-----------------|------------|
| 1         | HIGH            | HIGH         | HIGH            | don't care |
| 2         | HIGH            | don't care   | LOW             | HIGH       |
| 3         | LOW             | HIGH         | LOW             | don't care |
| 4         | HIGH            | don't care   | LOW             | LOW        |

- Determine the Boolean equation to activate the alarm system.  
(5 marks)
- Simplify the Boolean equation using Karnaugh Map  
(5 marks)
- Simplify the Boolean equation using Boolean algebra.  
(5 marks)
- Draw the simplify logic gate circuit.  
(5 marks)



## Question 6

Figure 5 shows a counter circuit.

- (a) Define a positive edge triggered clock and a negative edge triggered clock.  
(2 marks)
- (b) Determine the type of this counter.  
(2 marks)
- (c) Determine the sequence of states in a truth table.  
(5 marks)
- (d) Draw the complete timing diagram for 8 clock pulses.  
(5 marks)
- (e) Modify this circuit, so that the switch up-counter can control the count from 0-1-2-3-4-5-6-0-1-2-3-4-5-6 and so on.  
(6 marks)

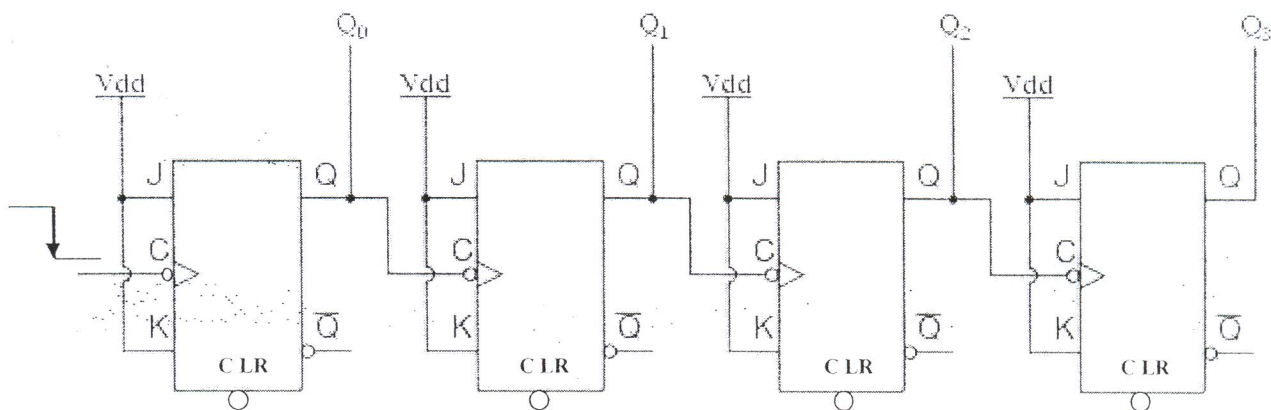


Figure 5

END OF QUESTION PAPER