

**T860(E)(N19)T
NOVEMBER EXAMINATION**

NATIONAL CERTIFICATE

LOGIC SYSTEMS N3

(8080273)

**19 November 2014 (Y-Paper)
13:00–16:00**

Calculators may NOT be used.

This question paper consists of 8 pages.

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Write neatly and legibly.
-

D lower voltage level.

1.1.2 The output of a 2-input OR gate is 0 only when ...

- A both inputs are 0.
- B either input is 1.
- C both inputs are 1.
- D either input is 0.

1.1.3 The two's complement of 1000_2 is:

- A 0111
- B 0101
- C 1000
- D 0001

1.1.4 An output of full adder is in the form of ...

- A sum.
- B carry
- C sum and carry.
- D difference.

1.1.5 8421 codes are also known as:

- A Gray code
- B ASCII code
- C Excess 3 code
- D BCD code

1.1.6 A single transistor can be used to build one of which following digital logic gates?

- A AND gates
- B OR gates
- C NOT gates
- D NAND gates

- A J = 1, K = 1
- B J = 1, K = 0
- C J = 0, K = 1
- D J = 0, K = 0

1.1.9

On the third clock pulse, a 4-bit Johnson sequence is $Q_0 = 1$, $Q_1 = 1$, $Q_2 = 1$, and $Q_3 = 0$. On the fourth clock pulse, the sequence is ...

- A $Q_0 = 1$, $Q_1 = 1$, $Q_2 = 1$, $Q_3 = 1$
- B $Q_0 = 1$, $Q_1 = 1$, $Q_2 = 0$, $Q_3 = 0$
- C $Q_0 = 1$, $Q_1 = 0$, $Q_2 = 0$, $Q_3 = 0$
- D $Q_0 = 0$, $Q_1 = 0$, $Q_2 = 0$, $Q_3 = 0$

1.1.10

Which is the type of memory for information that does not change on your computer?

- A RAM
- B ROM
- C ERAM
- D RW/RAM

(10 × 1) (10)

1.2

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.2.1–1.2.9) in the ANSWER BOOK.

1.2.1

ASCII is an abbreviation for the American Standard Convention for Intelligent Interchange.

(1)

1.2.2

Master/slave J-K flip-flops are called pulse-triggered or level-triggered devices because input data is read during the entire time the clock pulse is at a LOW level.

(1)

1.2.3

ROMs are used to store data that generally cannot be easily changed.

(1)

1.2.4

Parallel load means to load all flip-flops at the same time.

(1)

- 1.3 Choose an item/a word from COLUMN B that matches a description in COLUMN A. Write only the letter (A–E) next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

COLUMN A	COLUMN B
1.3.1 It is the time which elapses from the time the input signal first reaches 10% of its maximum until the output signal first reaches 90% of its maximum.	A rising time B falling time C delay time D storing time E switch-on time
1.3.2 It is the time which elapses from the time the input pulse reaches 10% of its maximum to the time the output pulse reaches 10% of its maximum.	
1.3.3 It is the time required for the pulse to rise from 10 to 90% of its maximum.	
1.3.4 It is the time required for the pulse to drop from 90 to 10% of its maximum.	
1.3.5 It is the time which elapses from the time the input pulse reaches 90% of its maximum to the time the output pulse reaches 90% of its maximum.	

(5 × 1)

(5)
[25]

TOTAL SECTION A: 25

2.2.3 $100_{10} - 40_{16}$ (use of two's complement)

(3 x 4) (12)

2.3 Use the Hamming code to add parity bits to this word 1000 before it is ready for transmission.

(5)

2.4 Draw a logic circuit for a 2421 BCD encoder.

(6)

2.5 Convert the binary number 11011000 to 4221 BCD decimal equivalent.

(2)
[30]

QUESTION 3

3.1 Study and analyse FIGURE 1 below and answer the questions.

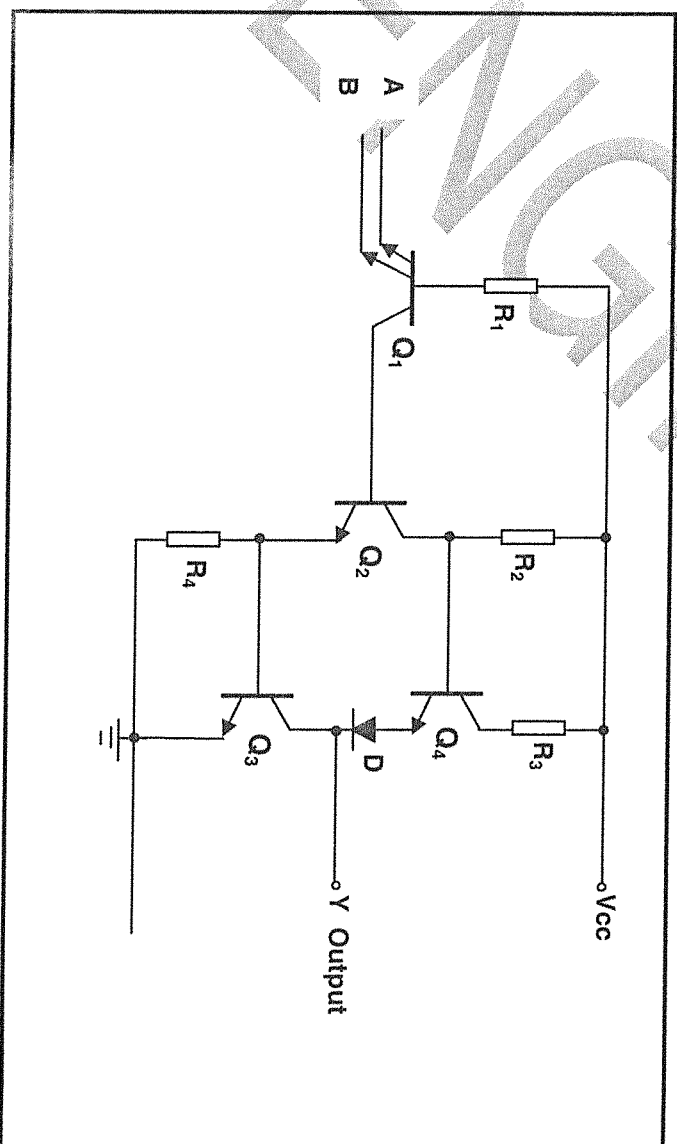


FIGURE 1

QUESTION 4

4.1 FIGURE 2 below is an IEC symbol for a clocked J-K flip-flop. Study it and answer the questions.

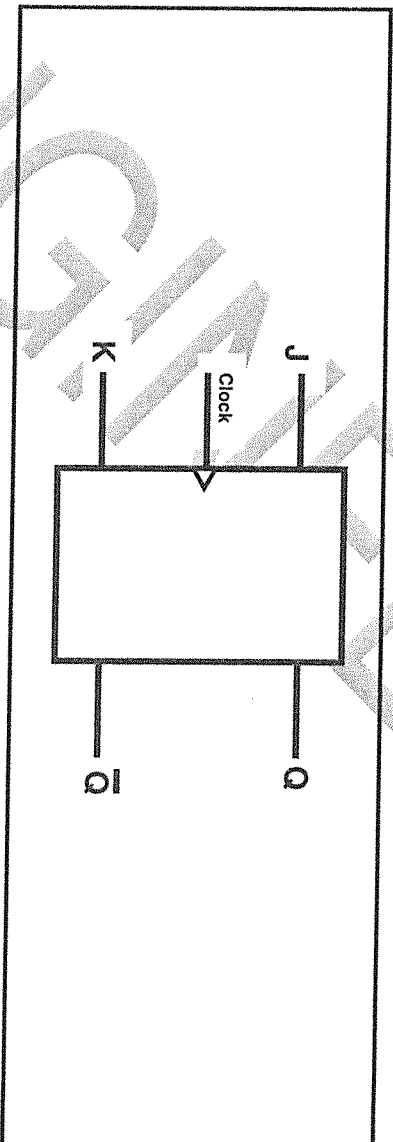


FIGURE 2

4.1.1 What is a flip-flop?

(2)

4.1.2

Write the truth table for FIGURE 2 above that is triggered by the positive-going edge of the clock signal.

(4)

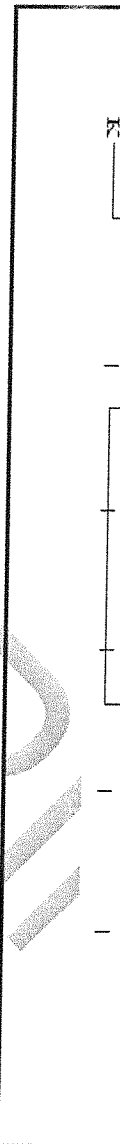


FIGURE 3

- 4.2 ROM is a class of storage medium used in computers and other electronic devices. (4)

4.2.1 What is ROM? (2)

4.2.2 Is ROM a volatile memory? Explain. (1 x 2) (3) [15]

QUESTION 5

5.1 What are the **THREE** functions of a shift register? (6)

5.2 Draw a series-in, series-out shift register consisting of four D-type master slave flip-flops. (5)

5.3 Draw the timing diagram of a synchronous decade up-counter. (4) [15]

TOTAL SECTION B: 75
GRAND TOTAL: 100