higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T860**(E)**(A4)T

APRIL EXAMINATION

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

(8080262)

April 2016 (X-Paper)
9:00–12:00

Calculators must NOT be used.

This question paper consists of 5 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
LOGIC SYSTEMS N2
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

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. ALL the sketches and diagrams must be large, clear and neat.
5. Keep questions and subsections of questions together.
6. Show ALL the steps and calculations.
7. Write neatly and legibly.

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QUESTION 1

1.1 X = 101101_2; Y = 15_{10} and *Z* = 1110_2:

1.1.1 What is the binary sum of X; Y and Z? (4)

1.1.2 Convert the answer in QUESTION 1.1.1 to the decimal number system. (2)

1.1.3 Use binary division to divide X by Y, and convert the final answer to the decimal number system. (5)

1.1.4 What is the binary product for Y and *Z*? (4)

1.1.5 Subtract Z from X, and convert the final answer to the decimal number system. (4)

1.2 Study FIGURE 1 below and answer the questions.

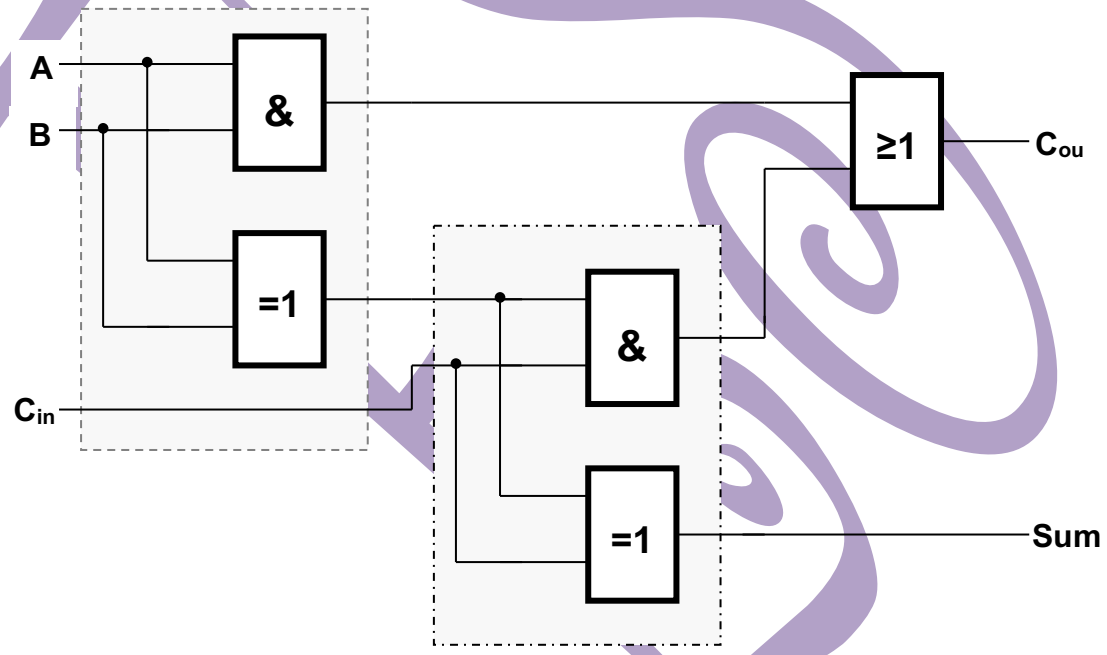


FIGURE 1

1.2.1 Give the name of the arithmetic elements represented by FIGURE 1. (2)

1.2.2 Draw the truth table for the logic circuit in FIGURE 1. (4)

[25]

QUESTION 2

2.1 How many logic gates are used to construct an encoder? (2)

2.2 Briefly explain the purpose of the following coders:

2.2.1 Encoder

2.2.2 Decoder (2 x 2) (4)

2.3 Convert the following numbers to the code as indicated:

2.3.1 158 decimal to its 7421 BCD code

2.3.2 001111001111 2421 BCD code to its decimal equivalent

2.3.3 100101_2 to gray code (3 x 3) (9)

2.4 Draw a neat labelled logic circuit for an 8421 BCD encoder. (10)
[25]

QUESTION 3

3.1 Explain the effect of the following input signals in relation to the output of a flip-flop when they are active:

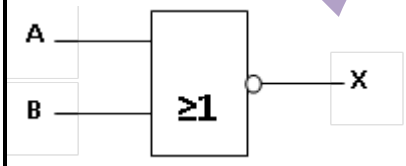
3.1.1 Pre-set

3.1.2 Clear/Pre-reset (2 x 2) (4)

3.2 Draw an IEC symbol for a JK flip-flop which will include the signals in QUESTION 3.1. (4)

3.3 Give FIVE factors to be considered when selecting memories. (5)

3.4 Complete the following table in the ANSWER BOOK in relation to the logic gates:

LOGIC GATE NAME	IEC SYMBOL	TRUTH TABLE
AND	3.4.1 ...	3.4.2 ...
3.4.3 ...		3.4.4 ...
3.4.5 ...	3.4.6 ...	**A B Z** **0 0 0** **0 1 1** **1 0 1** **1 1 0**

(12)
[25]

QUESTION 4

4.1 State FOUR functions of a register. (4)

4.2 How many flip-flops are required to construct a shift register that is capable of storing a six-bit binary number? (2)

4.3 Study FIGURE 2 below and answer the questions.

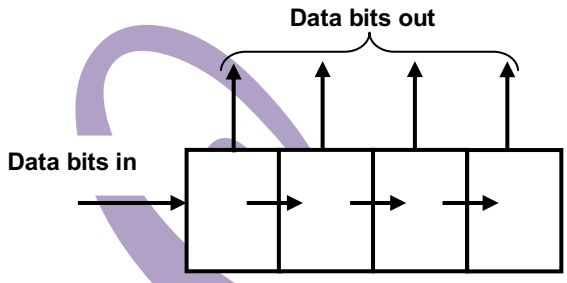


FIGURE 2

4.3.1 What type of shift register is represented by FIGURE 2? (2)

4.3.2 Show, by means of a block diagram, how the shift register in FIGURE 2 can be converted to a parallel-in parallel-out shift register. (4)

4.4 Draw the truth table for a decade/decimal up-counter. (5)

4.5 Make a neat labelled three-bit logic circuit diagram for an up-down counter. (8)
[25]

TOTAL: 100

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