higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

(8080262)

30 July 2021 (X-paper)
09:00–12:00

Drawing instruments may be used. Calculators may NOT be used.

This question paper consists of 6 pages.

116Q1G2130

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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. Start each question on a new page.
5. All the sketches and diagrams must be large, clear and neat.
6. Keep questions and subsections of questions together.
7. Questions must be answered in blue or black ink and all drawings must be done in pencil.
8. All calculations must be shown.
9. Write neatly and legibly.

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QUESTION 1

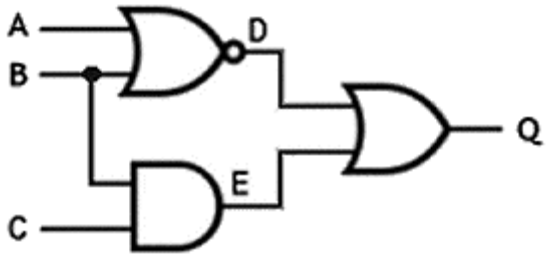
1.1 Complete the following sentences by writing only the missing word or words next to the question number (1.1.1–1.1.3) in the ANSWER BOOK.

When it comes to mathematical calculations, the computer actually performs only two functions, namely 1.1.1… and 1.1.2… .The other functions are obtained by repeated 1.1.3 … or subtraction. (3 × 1) (3)

1.2 Binary arithmetic has fixed rules which have to be adhered to and applied.

Write down the rules for addition. (4)

1.3 Compile a truth table for the following circuit:



(8)

1.4 Convert the following decimal numbers to their binary equivalents. Perform the functions as indicated.

1.4.1 $14_{10} \times 13_{10}$ (5)

1.4.2 $56_{10} \div 4_{10}$ (5)

[25]

QUESTION 2

2.1 Various options are provided as possible answers to the following questions. Choose the answer and write the letter (A–D) next to the question number (2.1.1–2.1.5) in the ANSWER BOOK.

2.1.1 The process of converting received messages into code words is called …

A encoder.
B decoder.
C compression.
D selection.

2.1.2 The last element output of a module 6 counter is …

A inverted.
B not inverted.
C $-\infty$.
D ∞.

2.1.3 In an encoder, each position is to be encoded by a …

A unique binary sequence.
B same binary sequence.
C different digital combination.
D unique analogue sequence.

2.1.4 The device which converts signal from binary codes into output codes is called a/an …

A encoder.
B decoder.
C multiplexer.
D data selector.

2.1.5 Switch position 7 in an encoder may be encoded as …

A 1110.
B 111.
C 1010.
D 1111.

(5 × 1) (5)

2.2 What is the function of each of the following?

2.2.1 Encoder

2.2.2 Decoder

(2 × 2) (4)

2.3 Decode the following coded numbers to their decimal equivalent:

2.3.1 $101001001_{8421BCD}$ (3)

2.3.2 $101001011000_{XS3CODE}$ (3)

2.4 Draw a truth table indicating the conversion of decimal numbers to 5421 BCD code. (10)
[25]

QUESTION 3

3.1 Give FIVE characteristics that are used to compare different memories with one another. (5)

3.2 Give an advantage of a JK flip-flop as compared to SR flip-flop. (2)

3.3 With reference to RS memory elements, answer the following questions:

3.3.1 By using only NAND gates, draw a neat fully labelled circuit diagram of a basic clocked RS memory circuit. (6)

3.3.2 Provide the IEC circuit symbol of the circuit in 3.3.1. (2)

3.3.3 Draw the truth table of the circuit in 3.3.1. (4)

3.4 Inverter is one of the basic logic gates.

With reference to the said logic gate, answer the following questions.

3.4.1 Define an *inverter logic gate.* (2)

3.4.2 Provide the IEC circuit symbol of the logic gate in 3.4.1. (2)

3.4.3 Draw the truth table of the logic gate in 3.4.1. (2)
[25]

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QUESTION 4

4.1	Name four types of shift registers.	(4)
4.2	There are FOUR methods in which data can be applied to a shift register and four ways in which the data will appear at the output of a shift register. Name TWO of the four methods.	(2)
4.3	Draw a serial-in, parallel-out shift register consisting of four D-type master slave flip-flops.	(9)
4.4	Draw a neat, labelled diagram of a 4-bit asynchronous binary counter.	(10)
		[25]

TOTAL: 100

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