higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T470**(E)**(A6)T

NATIONAL CERTIFICATE

DIGITAL ELECTRONICS N5

(8080365)

6 April 2018 (X-Paper)
09:00–12:00

This question paper consists of 5 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
DIGITAL ELECTRONICS N5
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. Calculation processes and calculated answers must be given in THREE fractional radix spaces when working into octal and FOUR fractional radix spaces when working into decimal or hexadecimal.
5. Write neatly and legibly.

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QUESTION 1

Convert each of the following numbers to their binary equivalents and complete the calculation in the binary number system (follow the instruction in brackets):

1.1 $135,5_8 \div 21, A_{16}$ (Convert the answer to octal.) (6)

1.2 $1110001,1_2 - 10001110,111_2$

(Use 2's complement and convert the answer to hexadecimal.) (6)

1.3 $B, C_{16} \div 11,2_8$ (Convert the answer to decimal.) (6)

[18]

QUESTION 2

Simplify the following function with the aid of Karnaugh maps and draw the circuit using the NAND gates only:

$F (A, B, C, D) = \sum (0; 2; 4; 5; 6; 7; 8; 10; 12; 14)$ **[18]**

QUESTION 3

3.1 If V_{OH} = 30 V, V_{OL} = 0,8 V, V_{IH} = 2,0 V and V_{IL} = 0,4 V:

Determine the low-level and high-level noise margins. (2)

3.2 Draw the circuit diagram of a TWO-input C-MOS-NOR gate. (6)

3.3 What do the following acronyms stand for in a party-line circuit?

3.3.1 SSI

3.3.2 LSI

3.3.3 VLSI

3.3.4 ULSI

3.3.5 MSI

(5 × 1) (5)

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3.4 Tabulate the difference between TTL and C-MOS by using the following characteristics:

3.4.1 Speed

3.4.2 Power usage

3.4.3 Packing density

(3 × 1) (3)
[16]

QUESTION 4

4.1 Draw a logic diagram for a static RAM cell. (6)

4.2 Name FIVE basic parts of the computer. (5)

4.3 Name, and explain, THREE computer buses that interconnect the different parts. (6)
[17]

QUESTION 5

5.1 Name THREE advantages of the electro-thermal printer. (3)

5.2 Sketch a circuit diagram of an RS 232 port. (4)

5.3 Specify the maximum specification for the RS 232C series input device for the following:

5.3.1 Maximum cable length

5.3.2 Maximum transmission ratio in terms of bits per second

(2 × 1) (2)
[9]

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QUESTION 6

6.1 Determine the output voltage of a digital-to-analoque converter into which digital code can be fed serially if the input voltage = 1 V; time = 1 m/s; R = 100 kΩ; C = 100 µf; the digital code A = 2424. (2)

6.2 Draw a sample-and-hold circuit. (5)

6.3 Define the following characteristics of D/A converters:

6.3.1 Linearity

6.3.2 Threshold

(2 × 2) (4)

[11]

QUESTION 7

7.1 Sketch and fully label a function block diagram of a modem. (10)

7.2 What is the modem in QUESTION 7.1 used for? (1)

[11]

TOTAL: 100

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