

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T470(E)(A6)T

NATIONAL CERTIFICATE DIGITAL ELECTRONICS N5

(8080365)

6 August 2019 (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.
- 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, for example 10, 1012.
- 5. All sketches must be neat, using a pencil and a ruler and not freehand lines.
- 6. Use only BLUE or BLACK ink.
- 7. Keep subsections of questions together.
- 8. Write neatly and legibly.

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QUESTION 1

Convert each of the following numbers to their binary equivalent and complete the calculation in the binary number system. Follow the instructions in brackets.

- 1.1 $237,7_8 \div A,7_{16}$ (Convert the answer to octal.)
- 1.2 $37,68 \times 10,012$ (Convert the answer to hexadecimal.)
- 1.3 29,5₁₀ 21,7₈ (Use 1'complement and convert the answer to decimal.)

3 × 6) [18

QUESTION 2

Design a synchronous binary counter that can count from 0-9 (0000-1001) that makes use of JK flip-flops and of which the clock is positively triggered.

2.1 Draw the truth table. (11)

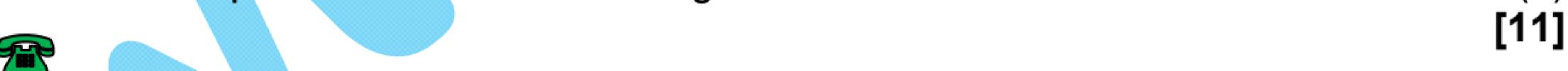
2.2 Make use of Karnaugh maps to simplify. (8)

2.3 Draw the circuit diagram. (6)

[25]

QUESTION 3

- Draw the circuit of an open-collector TTL. Clearly label the pull-up resistor on the diagram. (6)
- 3.2 Name FIVE precautions when handling MOS. (5)



QUESTION 4

A digital-to-analogue converter is such that a digital code may be fed into it serially. The following values are related to this D/A converter.

Input voltage = 2,8 V Time = 1,2 m/s Resistance = 200 k Ω Capacitance = 250 μ F Digital code(N) = 1 024₁₀

Draw the circuit and calculate the output voltage. (8)

4.2 Briefly explain the operation of a staircase ramp analogue-to-digital converter. (5) [13]

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