



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.

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, 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 $37,6_8 \times 10,01_2$ (Convert the answer to hexadecimal.)
- 1.3 $29,5_{10} - 21,7_8$ (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

- 3.1 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)
-  **[11]**

QUESTION 4

- 4.1 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 kΩ
 Capacitance = 250 μF
 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]**