higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T920**(E)**(A3)T

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

(8080262)

3 April 2019 (X-Paper)
09:00–12:00

Calculators may 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. Start each question on a NEW page.
4. Number the answers according to the numbering system used in this question paper.
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 with a PENCIL.
8. ALL calculations must be shown.
9. Write neatly and legibly.

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QUESTION 1

1.1 To which radix do the following number systems belong:

1.1.1 Decimal system

1.1.2 Binary system

(2 × 1) (2)

1.2 Perform the following calculations in the binary number system then convert the final answer to decimal number system. Show ALL conversions and calculations clearly.

1.2.1 $33_{10} + 15_{10}$

1.2.2 $1\ 1001_2 \times 5_{10}$

1.2.3 $13_{10} - 3_{10}$

(3 × 5) (15)

1.3 Draw an IEC symbol and truth table that would satisfy the following Boolean equation:

1.3.1 $Y = \overline{AB}$

1.3.2 $Y = \overline{A + B}$

(2 × 4) (8)

[25]

QUESTION 2

2.1 What is meant by a weighted code? (2)

2.2 Give the BCD values of 175 in:

2.2.1 2421 BCD

2.2.2 8421 BCD

2.2.3 Excessive 3

(3 × 3) (9)

2.3 What is the function of the following:

2.3.1 Encoder

2.3.2 Decoder

(2 × 2) (4)

2.4 Draw a truth table indicating the conversion of a BCD to excess-3 code. (10)

[25]

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QUESTION 3

3.1 Give five types of secondary memories. (5)

3.2 Various options are given as possible answers to the following questions. Choose the answer and write the letter (A–D) next to the question number (3.2.1–3.2.5) with its motivation in the ANSWER BOOK.

3.2.1 How is a J-K flip-flop made to toggle?

A J = 0, K = 0
B J = 1, K = 0
C J = 0, K = 1
D J = 1, K = 1

3.2.2 In J-K flip-flop, 'no change' condition appears when?

A J = 0, K = 0
B J = 1, K = 0
C J = 0, K = 1
D J = 1, K = 1

3.2.3 The truth table for an S-R flip-flop has how many VALID entries?

A 1
B 2
C 3
D 4

3.2.4 If Q = 0 on flip flops, the output is said to be:

A Set
B Reset
C Previous state
D Current state

3.2.5 The output of latches will remain in set/reset until…

A the trigger pulse is given to change the state.
B any pulse is given to go into previous state.
C they don't get any pulse anymore.
D None of those mentioned

(5 × 3) (15)

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3.3 Study FIGURE 1 below and draw the appropriate logic circuit that is associated with it.

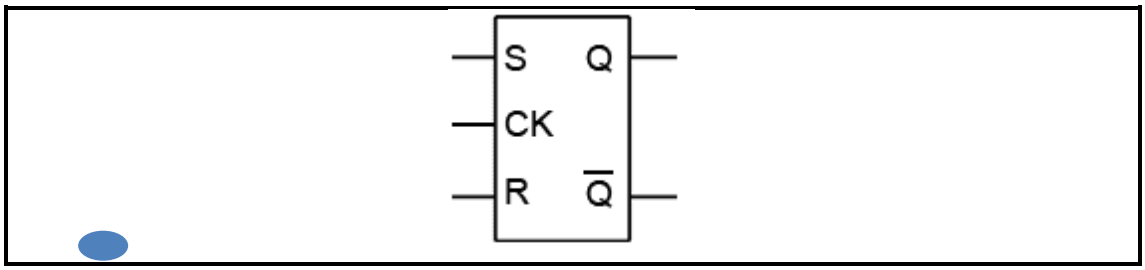


FIGURE 1

(5)
[25]

QUESTION 4

4.1 What is the difference between parallel-in/parallel-out and series-in/parallel-out shift registers? (4)

4.2 Draw a parallel-in parallel-out shift register consisting of four D-type master slave flip-flops. (8)

4.3 Draw a neat labelled diagram and a truth table of a 4-bit asynchronous decade up counter consisting of JK flip-flops. (13)
[25]

TOTAL: 100

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