higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

LOGIC SYSTEMS N5

(8080295)

9 April 2020 (X-paper)
09:00–12:00

This question paper consists of 5 pages.

207Q1A2009

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
LOGIC SYSTEMS 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. Fully label all circuits.
5. Draw binary registers with the most significant bit (MSB) flip-flop on the left and the least significant bit (LSB) flip-flop on the right.
6. Draw waveforms with the clock input on top followed by the LSB flip-flop output below the clock input and the MSB flip-flop output on the bottom.
7. Write neatly and legibly.

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QUESTION 1

A crane control circuit requires a binary counter which counts as follows:

011_2, 100_2, 101_2 and 110_2

Design a synchronous binary counter that produces the given count cycle. The counter must be self-starting and must exit from any unused state to the starting state within ONE clock pulse. Design and draw the circuit using JK master-slave flip-flops. **[15]**

QUESTION 2

A guillotine safety circuit must generate a count cycle as follows:

2_{10}, 3_{10}, 4_{10} and 5_{10}

Draw the truth table, circuit and the input and output waveforms for an asynchronous binary counter which uses gated reset/set to produce the given count cycle. Use JK master-slave flips in the circuit. The truth table and waveforms must clearly show the reset action. **[15]**

QUESTION 3

3.1 Briefly explain the measurement of total clock pulses. (5)

3.2 Briefly explain the measurement of frequency. (5)

3.3 Briefly explain the measurement of time. (5)

[15]

QUESTION 4

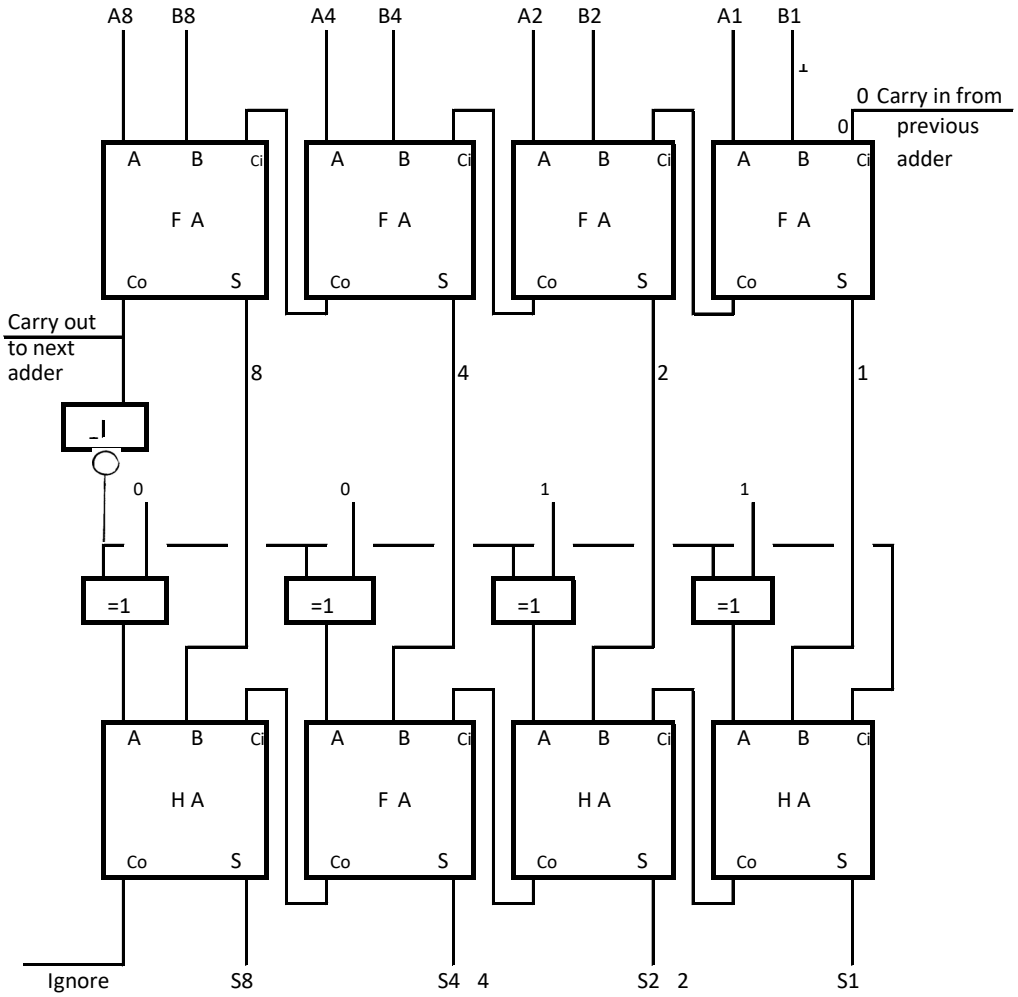
A multiplexor is typically used to convert parallel binary data to series data.

Draw a fully labelled multiplexor circuit that converts FOUR data bits to series data. The circuit must include the complete ring-counter circuit that sequences the parallel data bits onto the single transmission line. **[15]**

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QUESTION 5

5.1 Briefly explain the rules of 8421BCD (NCBD) addition.



(4)

5.2 Name the circuit shown in QUESTION 5.1. (1)

5.3 Redraw the circuit shown in QUESTION 5.1 in the ANSWER BOOK and show clearly on the circuit how 4 + 2 is performed. (10)

[15]

QUESTION 6

6.1 Differentiate between *ROM* and *RAM*. (2 + 2) (4)

6.2 Why are RAMs and ROMs needed in personal computers? (3)

6.3 Briefly explain the term *CD-ROM*. (3)

6.4 What is the purpose of a DVD? (3)

6.5 What is the meaning of the acronym EEPROM? (2)

[15]

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QUESTION 7

7.1 Indicate whether the following printers are IMPACT printers or NONIMPACT printers. Write only 'Impact' or 'Nonimpact' next to the question number (7.1.1–7.1.5) in the ANSWER BOOK.

7.1.1 Type-roll (drum) printer

7.1.2 Inkjet printer

7.1.3 Dot-matrix printer

7.1.4 'Character-at-a-time' printer

7.1.5 Thermal printer

(5 × 1) (5)

7.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (7.2.1–7.2.5) in the ANSWER BOOK.

7.2.1 A drum printer uses a laser to print characters.

7.2.2 A dot-matrix printer prints a complete preformed character at a time.

7.2.3 Plotters are used to print large images onto large sheets of paper.

7.2.4 A thermal printer uses ordinary paper.

7.2.5 Impact-type printers are generally slow printers.

(5 × 1) (5)
[10]

TOTAL: 100

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