higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## LOGIC SYSTEMS N5

## 1 December 2023

**This marking guideline consists of 6 pages.**

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## QUESTION 1

| | 4 A | 2 B | 1 C | $J_A$ ✓ | $K_A$ | $J_B$ ✓ | $K_B$ | $J_C$ ✓ | $K_C$ |
|---|---|---|---|---|---|---|---|---|---|
| → → ↓ | 0 | 0 | 1 | 0 | Ø | 1 | Ø | Ø | 0 |
| ↑ ↓ | 0 | 1 | 1 | 1 | Ø | Ø | 1 | Ø | 0 |
| ↑ ↓ | 1 | 0 | 1 | Ø | 0 | 1 | Ø | Ø | 0 |
| ↑ ← ← | 1 | 1 | 1 | Ø | 1 | Ø | 1 | Ø | 0 |
| ↑ ← ← | 0 | 0 | 0 | 0 | Ø | 0 | Ø | 1 | Ø |
| ↑ ← ← | 0 | 1 | 0 | 0 | Ø | Ø | 1 | 1 | Ø |
| ↑ ← ← | 1 | 0 | 0 | Ø | 1 | 0 | Ø | 1 | Ø |
| ↑ ← ← | 1 | 1 | 0 | Ø | 1 | Ø | 1 | 1 | Ø |

| $Q_n \rightarrow Q_n + 1$ | J | K |
|---|---|---|
| 0 → 0 | 0 | Ø |
| 0 → 1 | 1 | Ø |
| 1 → 0 | Ø | 1 |
| 1 → 1 | Ø | 0 |

$J_A$

| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | 0 | 0 | Ø | Ø |
| 1 | 0 | 1 | Ø | Ø |

$J_A = BC$

$K_A$

| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | Ø | Ø | 1 | 1 |
| 1 | Ø | Ø | 1 | 0 |

$K_A = B + /C$

$J_B$

| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | 0 | Ø | Ø | 0 |
| 1 | 1 | Ø | Ø | 1 |

$J_B = C$

$K_B$

| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | Ø | 1 | 1 | Ø |
| 1 | Ø | 1 | 1 | Ø |

$K_B = 1$

$J_C$

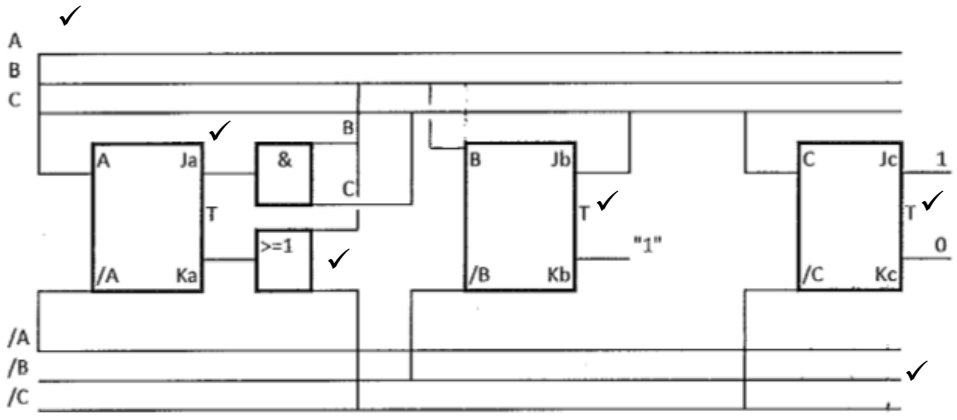
| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |
| 1 | Ø | Ø | Ø | Ø |

$J_C = 1$ ✓

$K_C$

| /c \ /A/B | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | Ø | Ø | Ø | Ø |
| 1 | 0 | 0 | 0 | 0 |

$K_C = 0$ ✓

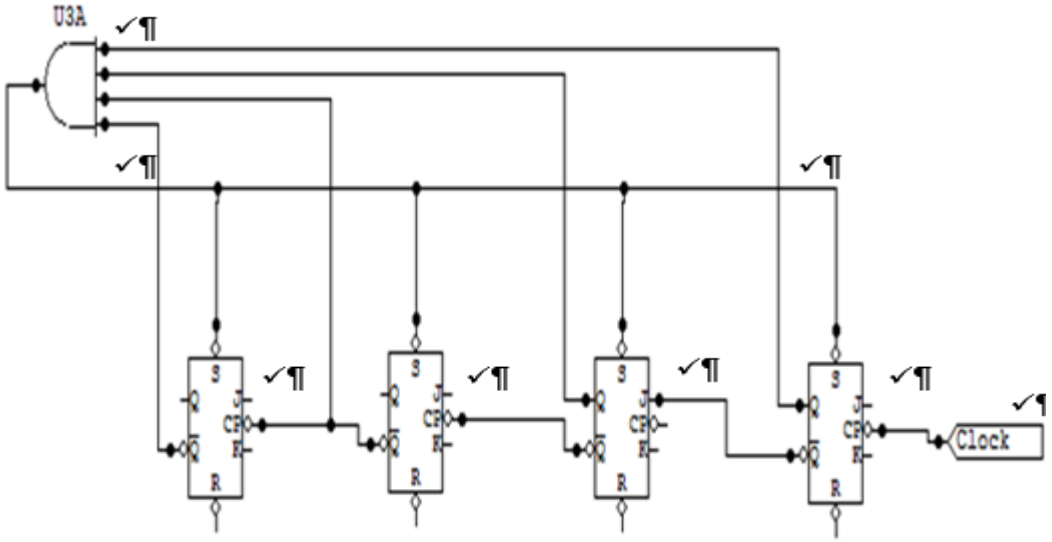


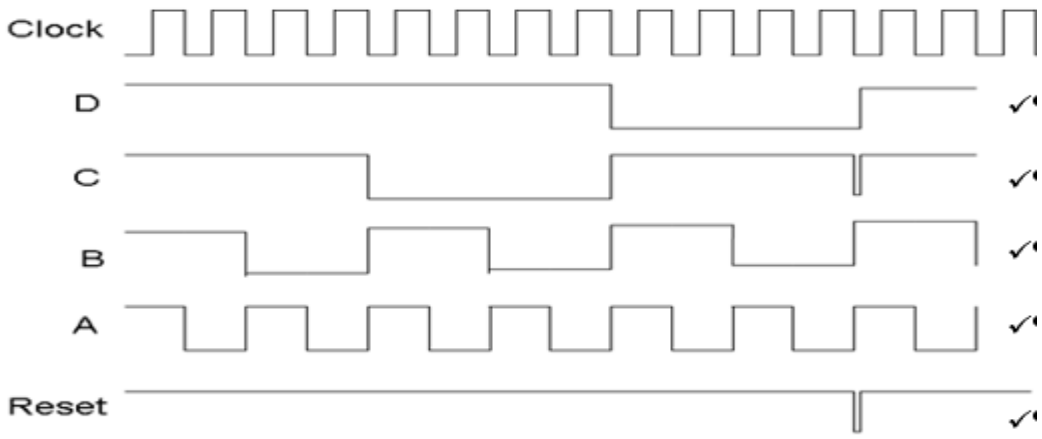

**[15]**

## QUESTION 2

| | A | B | C | D |
|---|---|---|---|---|
| 15 | 1 | 1 | 1 | 1 |
| 14 | 1 | 1 | 1 | 0 |
| 13 | 1 | 1 | 0 | 1 |
| 12 | 1 | 1 | 0 | 0 |
| 11 | 1 | 0 | 1 | 1 |
| 10 | 1 | 0 | 1 | 0 |
| 9 | 1 | 0 | 0 | 1 |
| 8 | 1 | 0 | 0 | 0 |
| 7 | 0 | 1 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 |
| 5 | 0 | 1 | 0 | 1 |
| 4 | 0 | 1 | 0 | 0 |
| 3 | 0 | 0 | 1 | 1 |
| 2 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 |

$\overline{A}\,\overline{B}CD$ ✓✓

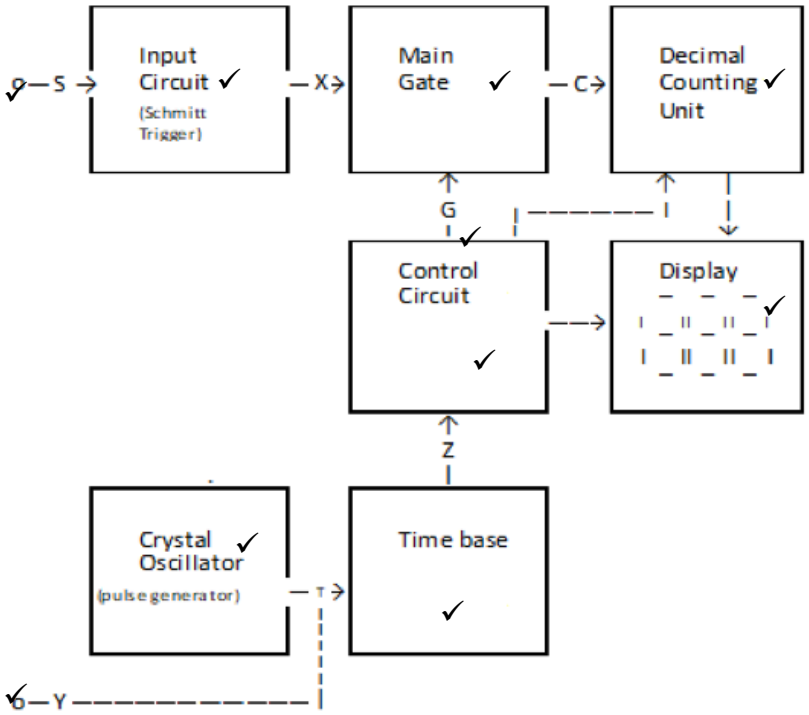



Reset on 3, 15 – 4 down counter, Mod 12 down counter **[15]**

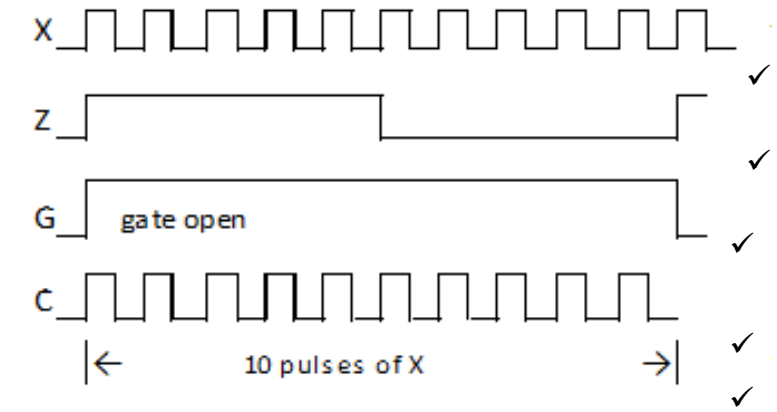
## QUESTION 3

3.1




(10)

3.2




Frequency of X = 10 pulses per time interval G

(5)
**[15]**

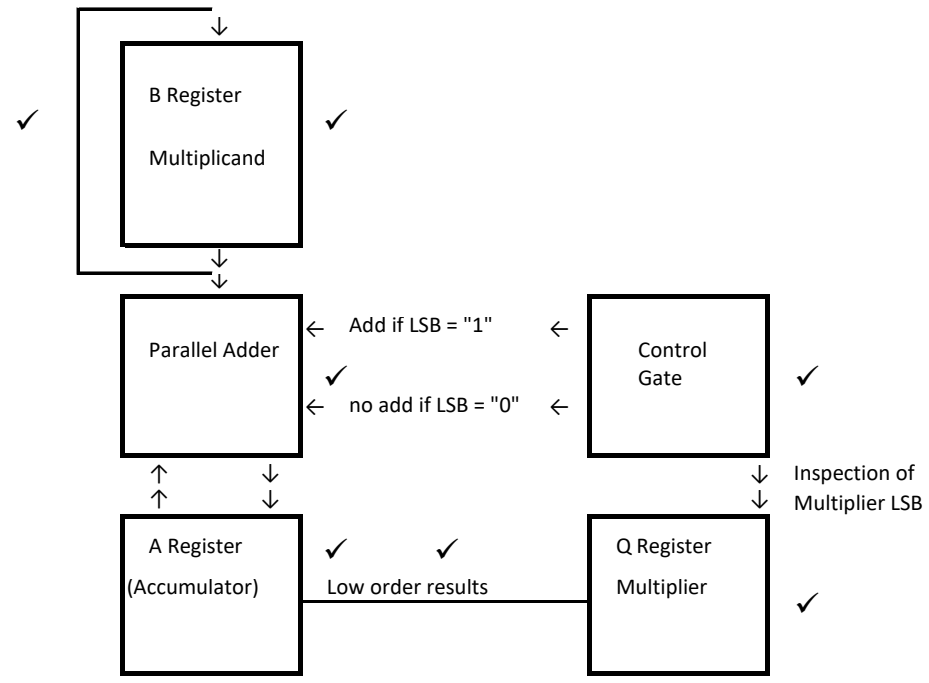
## QUESTION 4

4.1 False
4.2 False
4.3 True
4.4 True
4.5 True
4.6 False
4.7 True
4.8 False
4.9 False
4.10 True
4.11 False
4.12 True
4.13 True

**[13]**

## QUESTION 5

5.1




(7)

5.2
- If the LSB of the multiplier is 1, the multiplicand is added to the accumulator register contents.
- If the LSB of the multiplier is 0, the multiplicand is not added to the accumulator register contents.
- After the add or no-add, the accumulator and Q register contents are shifted right.
- The above cycle is repeated for the rest of the bits in the multiplier.
- The final answer is in the accumulator register. (5)

**[12]**

## QUESTION 6

6.1
- A computer stores program instructions✓ and data✓ in the SRAM or DRAM when the computer is running.✓
- When the computer is not running, the program instructions and data✓ are stored on the hard drive.✓ (5)

6.2

| | | |
|---|---|---|
| 6.2.1 | F | |
| 6.2.2 | D | |
| 6.2.3 | H | |
| 6.2.4 | I | |
| 6.2.5 | A | |
| 6.2.6 | C | |
| 6.2.7 | J | |
| 6.2.8 | B | |
| 6.2.9 | E | |
| 6.2.10 | G | |

(10 × 1) (10)
**[15]**

## QUESTION 7

7.1

| | | |
|---|---|---|
| 7.1.1 | False | |
| 7.1.2 | False | |
| 7.1.3 | True | |
| 7.1.4 | False | |
| 7.1.5 | True | |
| 7.1.6 | True | |

(6 × 1) (6)

7.2

| | | |
|---|---|---|
| 7.2.1 | Non-impact | |
| 7.2.2 | Impact | |
| 7.2.3 | Non-impact | |
| 7.2.4 | Impact | |
| 7.2.5 | Impact | |

(5 × 1) (5)

7.3 Both printers print characters as a matrix of dots. (2)

7.4 Both printers use pre-formed characters. (2)
**[15]**

**TOTAL: 100**

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