



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

21 November 2022

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1
- OR-gate
 - XOR-gate
 - NAND-gate
- (3)

- 1.2 1.2.1. The output of an exclusive OR-gate will be logic 1✓ only if when one of the inputs is at logic 1, otherwise it'll be at logic 0. ✓ (2)

OR

The output will be 1 when the in inputs are unequal(either HIGH or LOW) and the output will be 0 when both inputs are the same

- 1.2.2. The output of a NOT gate✓ is a complement of the input. ✓ OR (2)
The output of the NOT gate is opposite to that of the input

- 1.3 1.3.1 OR gate Truth table

A	B	Q	
0	0	0	✓
0	1	1	
1	0	1	✓
1	1	0	

NOT gate Truth table

A	Q	
0	1	✓
1	0	✓

(4)

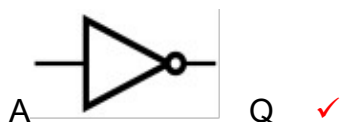
- 1.3.2

XOR gate IEC symbol



(2)

NOT gate IEC symbol



- 1.4 1.4.1
- | | | | | | | |
|------|----|----|---|---|---|---|
| Code | 32 | 16 | 8 | 4 | 2 | 1 |
| 36 = | 1 | 0 | 0 | 1 | 0 | 0 |
- (2)

✓

Therefore $36 = 100100_2$ ✓

- 1.4.2

Code	8	4	2	1
------	---	---	---	---

15 =	1	1	1	1
------	---	---	---	---

✓

(2)

Therefore $15 = 1111_2$ ✓

1.5 1.5.1

$$\begin{array}{r} 100100 \\ + 1111 \\ \hline 110011_2 \end{array} \checkmark$$

(3)

110011_2	1	1	0	0	1	1
Code	32	16	8	4	2	1

✓

Therefore $32+16+2+1=51$ ✓

1.5.2

$$\begin{array}{r} 100100 \\ - 1111 \\ \hline 100101_2 \end{array} \checkmark$$

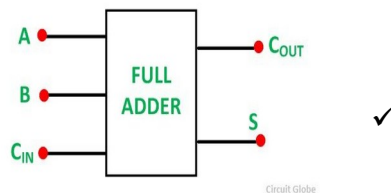
(3)

10101_2	1	0	1	0	1
Code	16	8	4	2	1

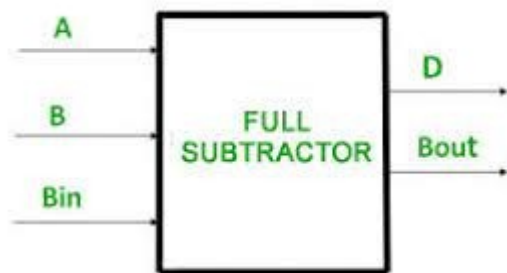
✓

Therefore $16+4+1=21$ ✓

1.6 1.6.1



1.6.2



✓

(2 × 1)

(2)
[25]**QUESTION 2**

2.1	2.1.1	0001
	2.1.2	0010
	2.1.3	0011
	2.1.4	0100
	2.1.5	0111

2.1.6	1100
2.1.7	1101
2.1.8	1110
2.1.9	1111

(9 × 1) (9)

2.2 Codes are usually used for security purposes. (1)

2.3

- 7421 Code
- 4221 Code
- 2421 BCD Code

(3 × 1) (3)

2.4 A code is self-complement if 1's complement of the code number of S gives the code number of 9 – S✓, where S is any digit between 0 and 9. ✓ (2)

2.5

Decimal Digit	Input BCD				Output Excess-3				
	A	B	C	D	W	X	Y	Z	
0	0	0	0	0	0	0	1	1	✓
1	0	0	0	1	0	1	0	0	✓
2	0	0	1	0	0	1	0	1	✓
3	0	0	1	1	0	1	1	0	✓
4	0	1	0	0	0	1	1	1	✓
5	0	1	0	1	1	0	0	0	✓
6	0	1	1	0	1	0	0	1	✓
7	0	1	1	1	1	0	1	0	✓
8	1	0	0	0	1	0	1	1	✓
9	1	0	0	1	1	1	0	0	✓

(10)
[25]**QUESTION 3**

3.1

- Primary memory: This memory is normally part of the computer and is a volatile memory.✓ Volatile memories will only retain information for as long as there is power supplied to the device.✓
- Secondary memory: This memory is used for long-term storage of data.✓ This memory is separated from the primary memory and, when removed, will keep all the data written into it.✓

(2 × 2) (4)

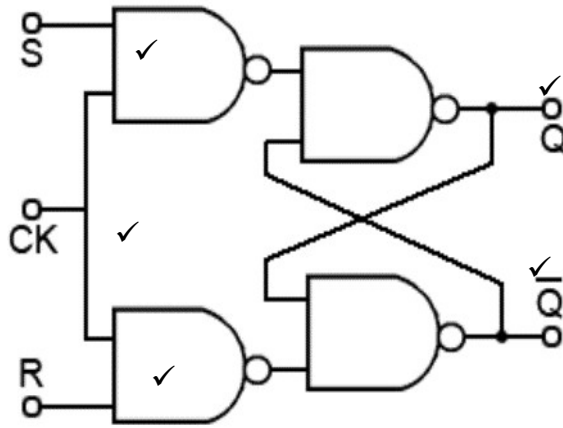
3.2

- Magnetic tape
- Punch cards
- Memory stick
- Compact disc

(Any 3 × 1) (3)

3.3 Compact disc (1)

3.4



(5)

3.5

3.5.1



3.5.2

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

✓

✓

3.5.3

NOR-gate✓✓

3.5.4

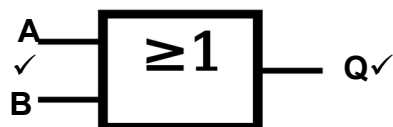
A	B	Q
0	0	1
0	1	0
1	0	0
1	1	0

✓

✓

3.5.5 OR-gate✓✓

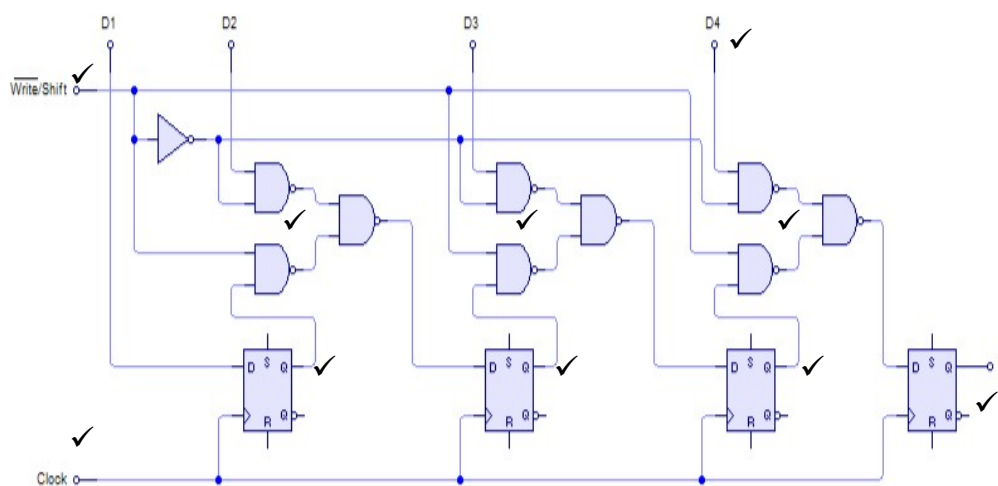
3.5.6

(12)
[25]**QUESTION 4**

4.1 Four flip-flops (1)

4.2 30 clock pulses (2)

4.3



(10)

4.4 4.4.1 FALSE

4.4.2 TRUE

4.4.3 TRUE

4.4.4 TRUE

4.4.5 FALSE

(5 X 1)

(5)

4.5 Clock wave(pulse)
Pre-set pulse
Pre-reset pulse

(3)

4.6 A Johnson counter is a modified or twisted ring counter, ✓ where the output from the last stage is inverted and fed back as input to the first stage. ✓ (4)

Ring counter is a circulating register with a content (least significant bit) ✓ of only one 1 and the rest 0s at a start of a cycle. ✓

TOTAL: **[25]**
100