

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

**NATIONAL CERTIFICATE
NOVEMBER EXAMINATION
LOGIC SYSTEMS N3
19 NOVEMBER 2014**

This marking guideline consists of 7 pages.

SECTION A**QUESTION 1**

1.1	1.1.1	B
	1.1.2	A
	1.1.3	C
	1.1.4	C
	1.1.5	D
	1.1.6	C
	1.1.7	A
	1.1.8	D
	1.1.9	A
	1.1.10	B

(10 × 1) (10)

1.2	1.2.1	False ✓
	1.2.2	False ✓
	1.2.3	True ✓
	1.2.4	True ✓
	1.2.5	True ✓
	1.2.6	True ✓✓
	1.2.7	True ✓
	1.2.8	False ✓
	1.2.9	False ✓

(10)

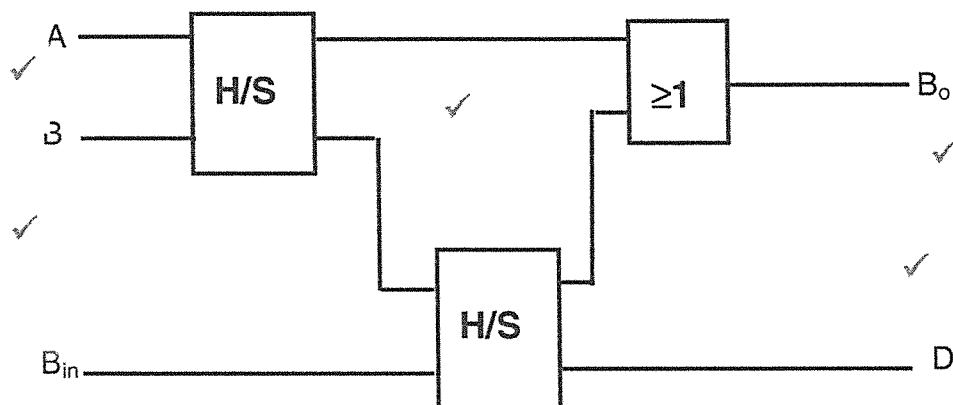
1.3	1.3.1	E
	1.3.2	C
	1.3.3	A
	1.3.4	B
	1.3.5	D

(5 × 1) (5)
[25]**TOTAL SECTION A: 25**

SECTION B

QUESTION 2

2.1



(5)

2.2

2.2.1

$$18_{16} \times 111_2$$

$$18_{16} = 11000_{10} \checkmark$$

				1	1	0	0	0	
				x		1	1	1	
				1	1	0	0	0	
		1	1	0	0	0			✓
	1	1	0	0	0				
1	0	1	0	1	0	0	0	0	✓

$$\therefore 10101000_2 = 250_{10} \checkmark$$

(4)

2.2.2

$$124_8 \div 1100_2$$

$$124_8 = 1010100_{10} \checkmark$$

						1	1	1	✓
1	1	0	0	1	0	1	0	0	
				1	1	0	0	↓	↓
				1	0	0	1	0	↓
				0	1	1	0	0	↓
				0	0	1	1	0	0
						1	1	0	0
						0	0	0	0
						0	0	0	

$$\therefore 111_2 = 7_{10} \checkmark$$

(4)

2.2.3 $100_{10} - 40_{16}$

4	0
0100	0000

$\therefore 100_8 = 1000000_2 \checkmark$

2^6	2^5	2^4	2^3	2^2	2^1	2^0
64	32	16	8	4	2	1
1	1	0	0	1	0	0

$\therefore 100_{10} = 1100100_2 \checkmark$

Two's complement of 1000000 = 0111111 + 1 = 1000000 $\checkmark$

$$\begin{array}{r}
 0 \ * \ 1 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \\
 1 \ * \ 1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \\
 \hline
 1 \ 0 \ * \ 0 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \ \checkmark \\
 \hookrightarrow \text{Ignore carry}
 \end{array}$$

(4)

2.3

P1	P2	D1	P3	D2	D3	D4
1	2	3	4	5	6	7
?	?	1	?	0	0	0

1, 3, 5, 7 $P1 + D1 + D2 + D4$
 $P1 + 1 + 0 + 0$
 $P1 = 1 \checkmark$

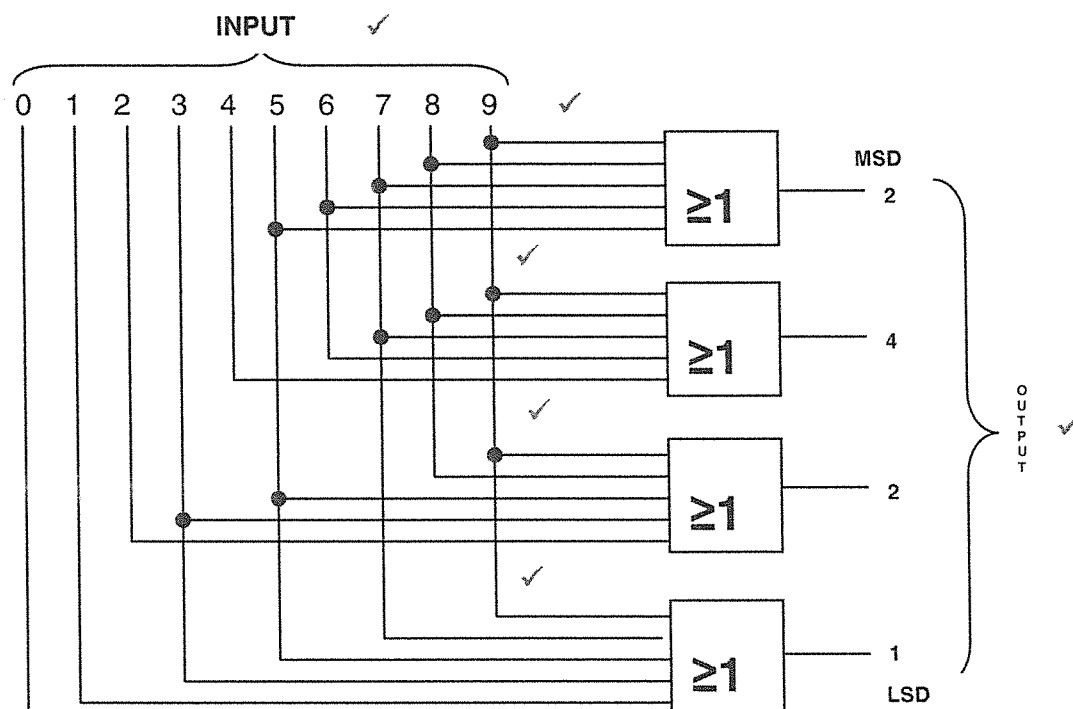
2, 3, 6, 7 $P2 + D1 + D3 + D4$
 $P2 + 1 + 0 + 0$
 $P2 = 1 \checkmark$

4, 5, 6, 7 $P3 + D2 + D3 + D4$
 $P3 + 0 + 0 + 0$
 $P = 0 \checkmark$

A complete word is 1110000 $\checkmark \checkmark$

(5)

2.4



(6)

2.5 11011000 to 4221 BCD code

1101 1000
 ↓ ↓
 7✓ 4✓

4221 BCD code of 11000011 is 63₁₀(2)
[30]

QUESTION 3

3.1 3.1.1

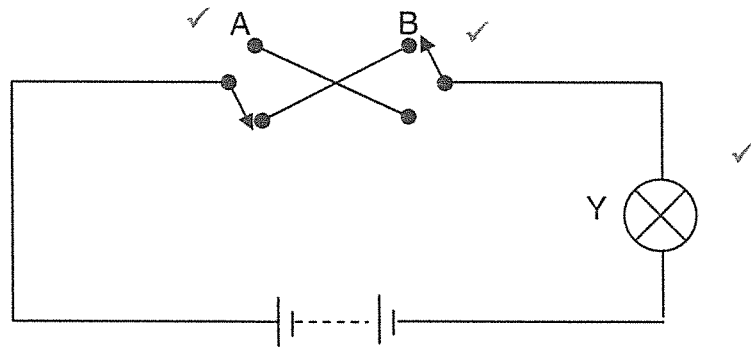
A	B	Q ₁ ✓✓	Q ₂ ✓✓	Q ₃ ✓✓	Q ₄ ✓✓	D✓	Y✓
OFF	OFF	ON	OFF	OFF	ON	ON	ON
OFF	ON	ON	OFF	OFF	ON	ON	ON
ON	OFF	ON	OFF	OFF	ON	ON	ON
ON	ON	ON	ON	ON	OFF	OFF	OFF

(10)

3.1.2 NAND gate✓✓

(2)

3.2

(3)
[15]**QUESTION 4**

4.1 4.1.1

Flip-flop is a single-bit memory cell. It stores single-bit information in its true and complement form. This is the fundamental block of any sequential circuit.✓✓

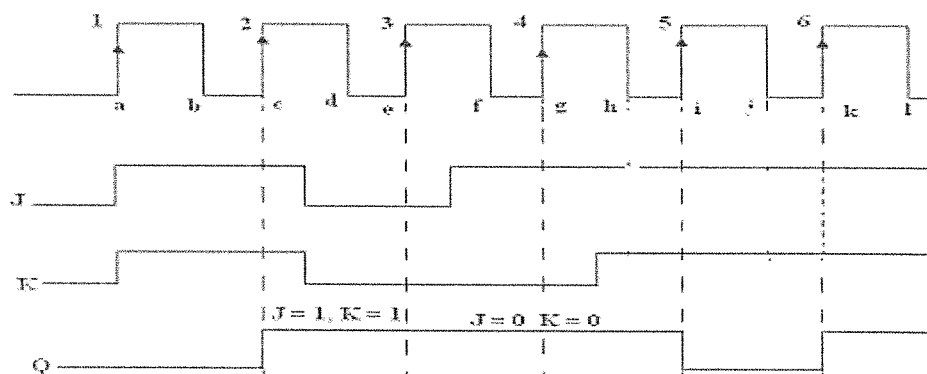
(2)

4.1.2

J	K	Q	Q'
0	0	Q _n	Q _n '
0	1	0	1
1	0	1	0
1	1	Q _n '	Q _n

(4)

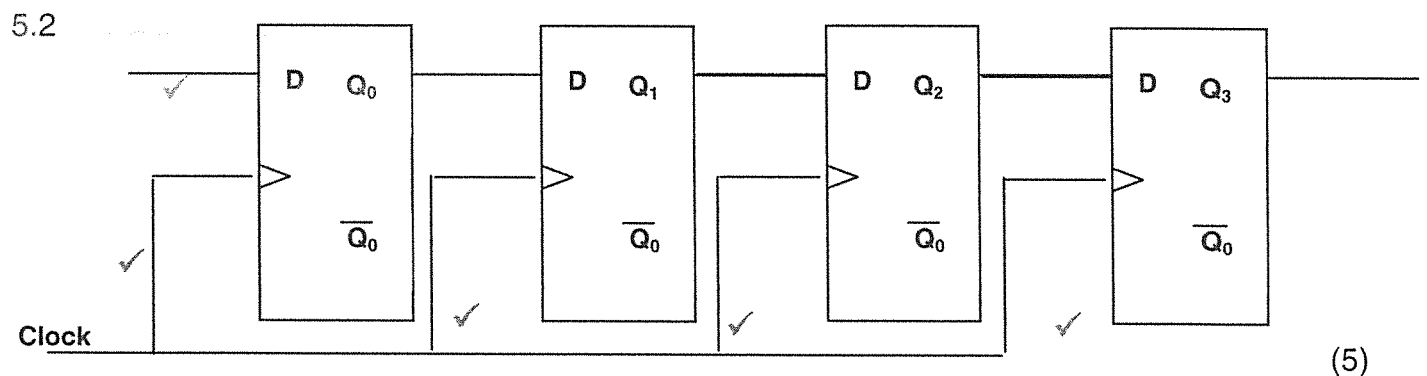
4.1.3

✓
✓
✓
✓ (4)

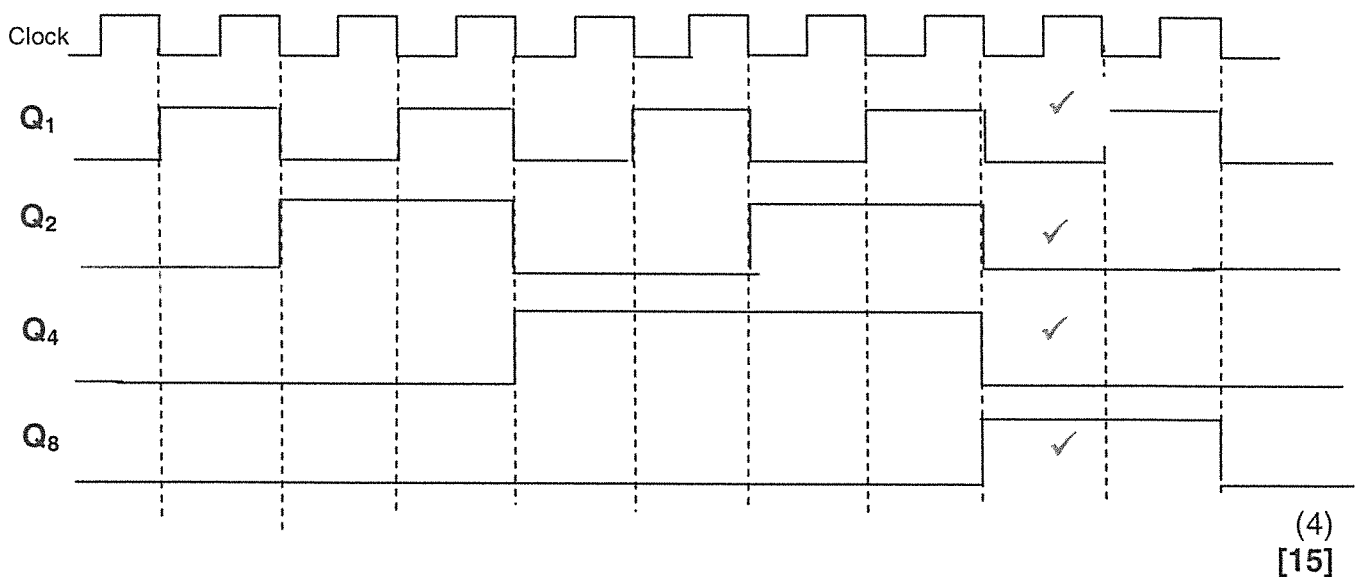
- 4.2 4.2.1 **ROM:** Read Only Memory is a permanent or semi-permanent memory. ✓ In Permanent ROM, the data is permanently stored and cannot be changed. It can only be read from the memory. ✓ (2)
- 4.2.2 No. ROM is a non-volatile memory ✓. Programming of ROM involves making the required interconnections at the time of fabrication ✓ and therefore, its contents are unaffected, even when the power is OFF. Thus it is a non-volatile memory. ✓ (3)
- [15]

QUESTION 5

- 5.1 It is used to store data temporarily. ✓✓
It is used to convert data from serial to parallel or parallel to serial. ✓✓
It is also used to buffer between different systems with different clocks. ✓✓ (6)



5.3



TOTAL SECTION B: 75
GRAND TOTAL: 100