higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

9 April 2021

This marking guideline consists of 7 pages.

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QUESTION 1

1.1 10 (1)

1.2 16 (1)

1.3 1.3.1 45 + 66

Code	32	16	8	4	2	1
45 =	**1**	**0**	**1**	**1**	**0**	**1**

✓

Code	64	32	16	8	4	2	1
66 =	**1**	**0**	**0**	**0**	**0**	**1**	**0**

✓

$$\begin{array}{r} 1\ 0\ 1\ 1\ 0\ 1 \\ +\ 1\ 0\ 0\ 0\ 0\ 1\ 0 \\ \hline 1\ 1\ 0\ 1\ 1\ 1\ 1_2 \checkmark \end{array}$$

$1\ 1\ 0\ 1\ 1\ 1\ 1_2 = 2^6 + 2^5 + 2^3 + 2^2 + 2^1 + 20$ ✓
$= 64 + 32 + 8 + 4 + 2 + 1$
$= 111_{10}$ ✓

1.3.2 56 – 23

Code	32	16	8	4	2	1
56 =	**1**	**1**	**1**	**0**	**0**	**0**

✓

Code	16	8	4	2	1
23 =	**1**	**0**	**1**	**1**	**1**

✓

$$\begin{array}{r} 1\ 1\ 1\ 0\ 0\ 0 \\ -\ 1\ 0\ 1\ 1\ 1 \\ \hline 1\ 0\ 0\ 0\ 0\ 1_2 \checkmark \end{array}$$

$1\ 0\ 0\ 0\ 0\ 1_2 = 2^5 + 2^{\circ}$✓
$= 32 + 1$
$= 33_{10}$ ✓

1.3.3 $36 \div 4$

Code	32	16	8	4	2	1
36 =	**1**	**0**	**0**	**1**	**0**	**0**

✓

Code	4	2	1
4 =	**1**	**0**	**0**

✓

$$\begin{array}{r} 1\,0\,0\,1_2 \\ 1\,0\,0\overline{)\,1\,0\,0\,1\,0\,0} \\ -1\,0\,0 \\ \hline 0\,1\,0\,0 \\ -1\,0\,0 \\ \hline 0 \end{array}$$ ✓ ✓

$1\,0\,0\,1_2 = 2^3 + 2^0$
$= 8 + 1$
$= 9_{10}$ ✓

1.3.4 7×15

Code	4	2	1
7 =	**1**	**1**	**1**

✓

Code	8	4	2	1
15 =	**1**	**1**	**1**	**1**

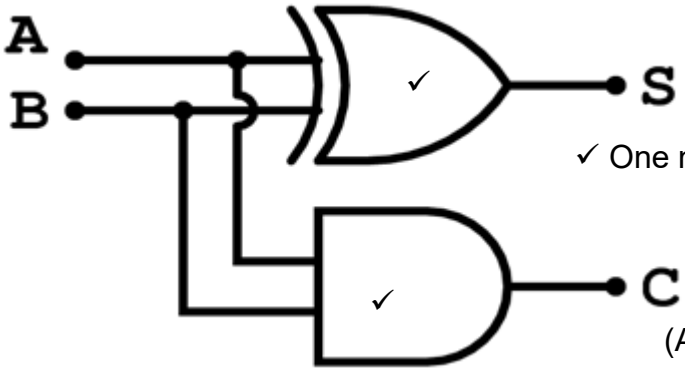
✓

$$\begin{array}{r} 1\,1\,1\,1 \\ \times\quad 1\,1\,1 \\ \hline 1\,1\,1\,1 \\ 1\,1\,1\,1\,0 \\ +\ 1\,1\,1\,1\,0\,0 \\ \hline 1\,1\,0\,1\,0\,0\,1_2 \end{array}$$ ✓ ✓

$1\,1\,0\,1\,0\,0\,1_2 = 2^6 + 2^5 + 2^3 + 2^0$
$= 64 + 32 + 8 + 1$
$= 105_{10}$ ✓

(4 × 5) (20)

1.4



✓ One mark for correctness

(Any other relevant sketch) (3)

[25]

QUESTION 2

2.1 2.1.1

1001 0110 1011

9 6 11
-3 -3 -3
6 3 8

100101101011 XS3 = 638_{10} ✓✓✓

2.1.2

3 7 6
8421 8421 8421
0101 1001 1010

376 = 010110011010 8421BCD ✓✓✓

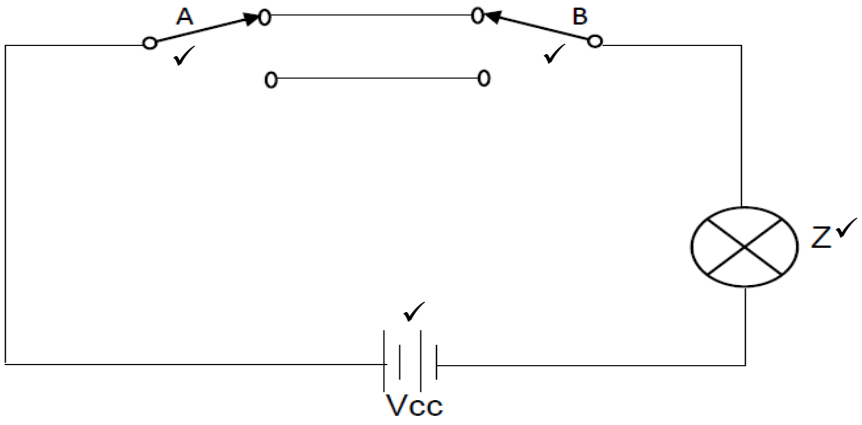
2.1.3

1101 1100 0011
2421 2421 2421
7 6 3

110111000011 2421BCD = 763_{10} ✓✓✓

(3 × 3) (9)

2.2



(4)

2.3 Weighted code is a code whereby the value of the position of every binary digit can be specified. (2)

2.4

Decimal	BCD (8421)	XS3
0	0000	0011 ✓
1	0001	0100 ✓
2	0010	0101 ✓
3	0011	0110 ✓
4	0100	0111 ✓
5	0101	1000 ✓
6	0110	1001 ✓
7	0111	1010 ✓
8	1000	1011 ✓
9	1001	1100 ✓

(10)
[25]

QUESTION 3

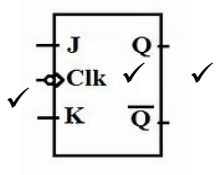
3.1
3.1.1 A
3.1.2 D
3.1.3 A
3.1.4 A
3.1.5 B
3.1.6 C
3.1.7 C

(7 × 1) (7)

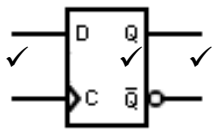
3.2
- DVD
- Floppy disc
- CD ROM
- Stiffy disc
- Flash drive
- Hard drive
- Punch cards
- Magnetic tape

(Any 5 × 1) (5)

3.3 3.3.1

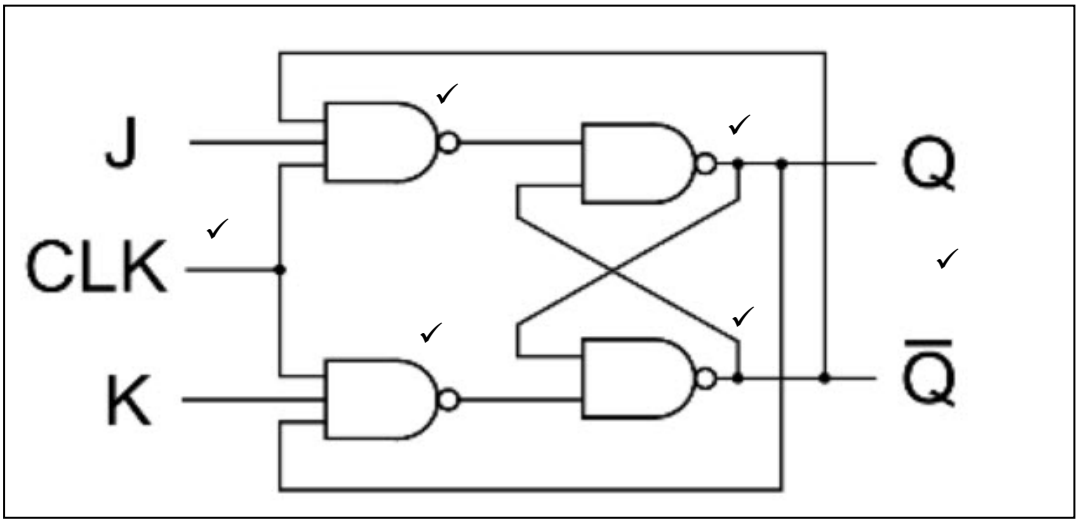


3.3.2



(2 × 3) (6)

3.4



(6)

3.5 No none-permissible combination can be placed on the input.
It can be changed to any other flip-flop easily. (Any 1) (1)
[25]

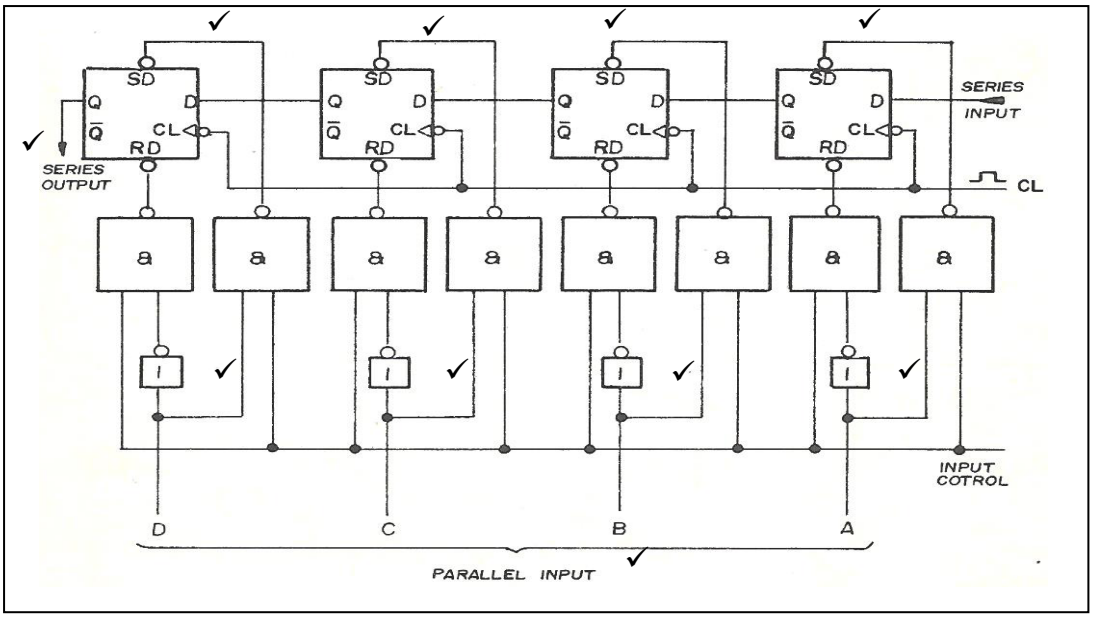
QUESTION 4

4.1 14 gates (2)

4.2 It is called a series counter because the output of the first flip-flop is the clock of the next flip-flop. (2)

4.3
- Serial to parallel converter
- Parallel to series converter
- Delay line
- Ring counter
- Twisted-ring counter
- Sequence generator (Any 6 × 1) (6)

4.4



(10)

4.5

Clock pulse	Q_8	Q_4	Q_2	Q_1 ✓
0	0	0	0	0
1	0	0	0	1 ✓
2	0	0	1	0
3	0	0	1	1 ✓
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0 ✓
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1 ✓

(5)
[25]

TOTAL: 100

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