higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

LOGIC SYSTEMS N2

25 November 2024

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 1.1.1 MSD stands for the most significant digit

LSD stands for the least significant digit (2)

1.1.2 The most significant digit means it is the digit that has the greatest effect on that binary number.

Least significant digits mean that it is the digit that has the least effect on that binary number (2)

1.2 1.2.1 $1001_2 \times 111_2$

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

(3)

1.2.2 $110001_2 \div 111_2$

					1	1	1	✓
1	1	1	1	1	0	0	0	1
			-	1	1	1		✓
				1	0	1	0	✓
				-	1	1	1	
						1	1	1 ✓
					-	1	1	1
						0	0	0

(4)

1.3 1.3.1 $111111_2 = 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$
$= 32 + 16 + 8 + 4 + 2 + 1$✓
$= 63$✓ (2)

1.3.2 $111_2 = 2^2 + 2^1 + 2^0$
$= 4 + 2 + 1$✓
$= 7$✓ (2)

1.4 1.4.1 D ✓

1.4.2 A ✓

1.4.3 C ✓

1.4.4 E ✓

1.4.5 B ✓

(5 × 1) (5)

1.5 1.5.1 False ✓

1.5.2 True ✓

1.5.3 False ✓

1.5.4 True ✓

1.5.5 True ✓

(5 × 1) (5)
[25]

QUESTION 2

2.1 2.1.1 Encoder converts decimal characters to binary code for central processor to perform arithmetic operations in binary

OR

The encoder changes the decimal number or character to binary form which is acceptable to the processor

2.1.2 Decoder converts binary code to decimal characters to be displayed as an output

OR

The decoder changes the binary number or character to a form which can be shown on the screen

(2 × 1) (2)

2.2 Excess-3 code
Gey code. (2)

2.3 2.3.1 Byte ✓ (1)

2.3.2 Bits ✓ (1)

2.3.3 1000 0001 ✓ (1)

2.3.4 Three ✓

2.3.5 Four ✓

2.4 2.4.1 It is very simple process

2.4.2 It is a complex process

2.4.3 Encoders are used in video encoders, emails, etc.

2.3.4 Decoders are used in microprocessor or memory chips etc

(4 × 1) (4)

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2.5 2.5.1

2	6	7
8421	8421	8421
0010 ✓	0110 ✓	0111 ✓

$267 = 001001100111_{8421BCD}$ ✓

2.5.2

2	6	7
2421	2421	2421
0010 ✓	1100 ✓	1101 ✓

$267 = 001011001101_{2421BCD}$ ✓

2.5.3

2	6	7
$84\overline{21}$	$84\overline{21}$	$84\overline{21}$
0110 ✓	1010 ✓	1001 ✓

$267 = 011010100184\overline{21}BCD$ ✓

(3 × 4) (12)

QUESTION 3

3.1

ROM	RAM
1. It is a permanent storage device	It is a temporary storage device
2. It can store large amount of data	Only small amount of data can be stored✓
3. It is non-volatile in nature	It is a volatile in nature
4. We can write data fast	It is slower compared to ROM

(Any 3 × 2) (6)

3.2
- Punch card
- Magnetic tape
- CD ROM
- DVD
- Stiffy disc
- Flash drive OR USB
- Hard drive

(Any 4 × 1) (4)

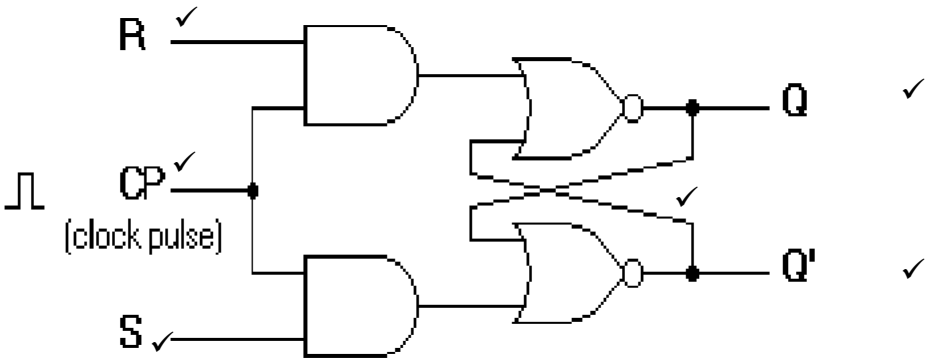
3.3

INPUTS		OUTPUTS		
A✓	B✓	C✓	D✓	E✓
0	0	0	1	0
0	1	0	0	0
1	0	0	1	0
1	1	1	0	0

(5)

3.4 3.4.1 Clocked RS flip-flop (1)

3.4.2



(6)

3.5 3.5.1 D ✓ (1)

3.5.2 B ✓ (1)

3.5.3 C ✓ (1)

[25]

QUESTION 4

4.1
- Temporary data storage
- Data transfer
- As a counter
- Data manipulation

(4)

4.2 4.2.1 True. ✓

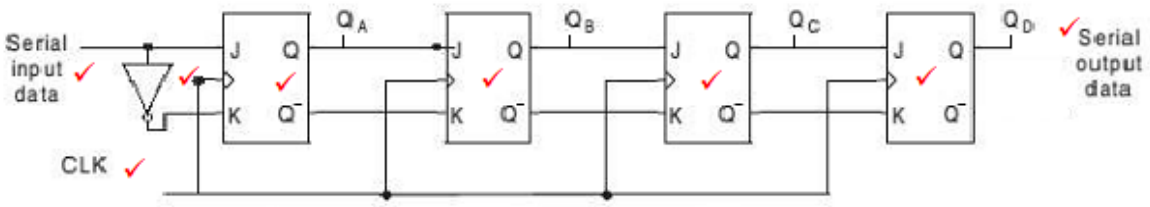
4.2.2 True. ✓

4.2.3 False. ✓

4.2.4 False. ✓

(4 × 1) (4)

4.3



(8)

4.4 The purpose of a counter is to store (and sometimes display) the number of times a particular event or process has occurred, often in relationship to a clock. (1)

4.5

SYNCHRONOUS COUNTER	ASYNCHRONOUS COUNTER
No connection between output of the first flip-flop and clock input of the next flop-flop. ✓	The output of the first flip-flop drives the clock for the next flip-flop. ✓
All flip-flops are clocked at the same time ✓	The flip-flops are not clocked at the same time ✓
The circuits are complex ✓	The circuits are simple ✓
High speed ✓	Very slow ✓

(8)
[25]

TOTAL: 100

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