higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## NOVEMBER EXAMINATION

## LOGIC SYSTEMS N2

## 27 NOVEMBER 2014

**This marking guideline consists of 7 pages.**

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## SECTION A

### QUESTION 1

1.1 1.1.1 B✓
1.1.2 C✓
1.1.3 B✓
1.1.4 A✓
1.1.5 A✓

(5 x 1) (5)

1.2 1.2.1 True✓
1.2.2 True✓
1.2.3 False✓
1.2.4 False✓
1.2.5 false✓

(5 x 1) (5)
**[10]**

**SECTION A: 10**

## SECTION B

### QUESTION 2

2.1 0 + 0 = 0✓
0 + 1 = 1✓
1 + 0 = 1✓
1 + 1 = 0 with a carry of 1✓ (4)

2.2 2.2.1

| | **32** | **16** | **8** | **4** | **2** | **1** | |
|---|---|---|---|---|---|---|---|
| 50 = | 1 | 1 | 0 | 0 | 1 | 0 | ✓ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 1 | 0 | 0 | 1 | 0 | |
| - | | 1 | 0 | 1 | 1 | 1 | |
| | | **1** | **1** | **0** | **1** | **1** | ✓ |

| 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|
| 1 | 1 | 0 | 1 | 1 |

$\therefore 11011_2 = 16 + 8 + 2 + 1 = 27_{10}$ ✓✓ (4)

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2.2.2

| | 8 | 4 | 2 | 1 | |
|---|---|---|---|---|---|
| 15 = | 1 | 1 | 1 | 1 | ✓ |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 1 | 1 | 1 | | |
| | | | x | 1 | 1 | 0 | 0 | | |
| | | | | 0 | 0 | 0 | 0 | | |
| | | | 0 | 0 | 0 | 0 | | | ✓✓ |
| | | 1 | 1 | 1 | 1 | | | | |
| | 1 | 1 | 1 | 1 | | | | | |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | | ✓ |

(4)

2.2.3

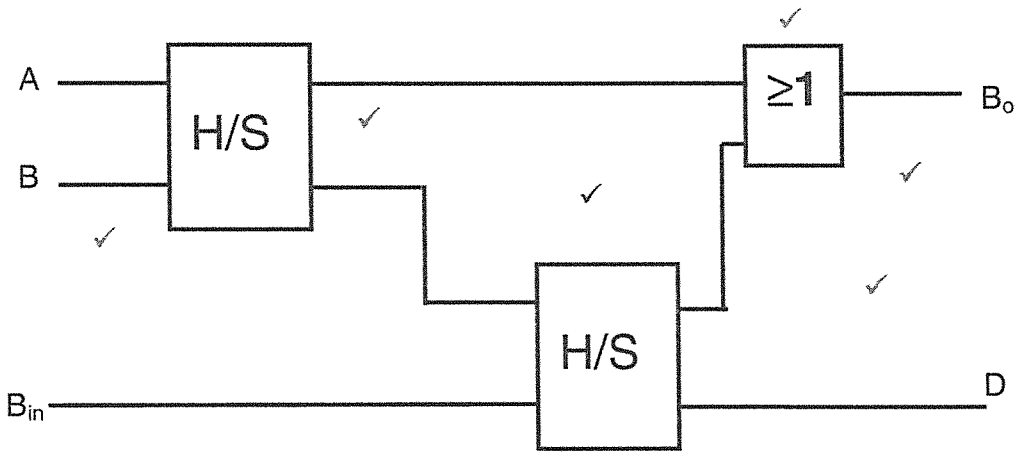
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 0 | 1 | 0✓ |
| 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | |
| | | | | 1 | 0 | 1 | 0 | | | | |
| | | | | 0 | 0 | 1 | 0 | 1 | | | ✓ |
| | | | | | 0 | 1 | 0 | 1 | 0 | | |
| | | | | | 0 | 1 | 0 | 1 | 0 | | |
| | | | | | |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

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 0 | 1 | 1 | 0 |

$\therefore 1010_2 = 8 + 2 = 10_{10}$ ✓✓

(5)

2.3




(7)

2.4 2.4.1

| 2421 | 2421 | 2421 |
|---|---|---|
| 2 | 6 | 9 |
| ↓✓ | ↓✓ | ↓✓ |
| **0010** | **1100** | **1111** |

(3)

2.4.2

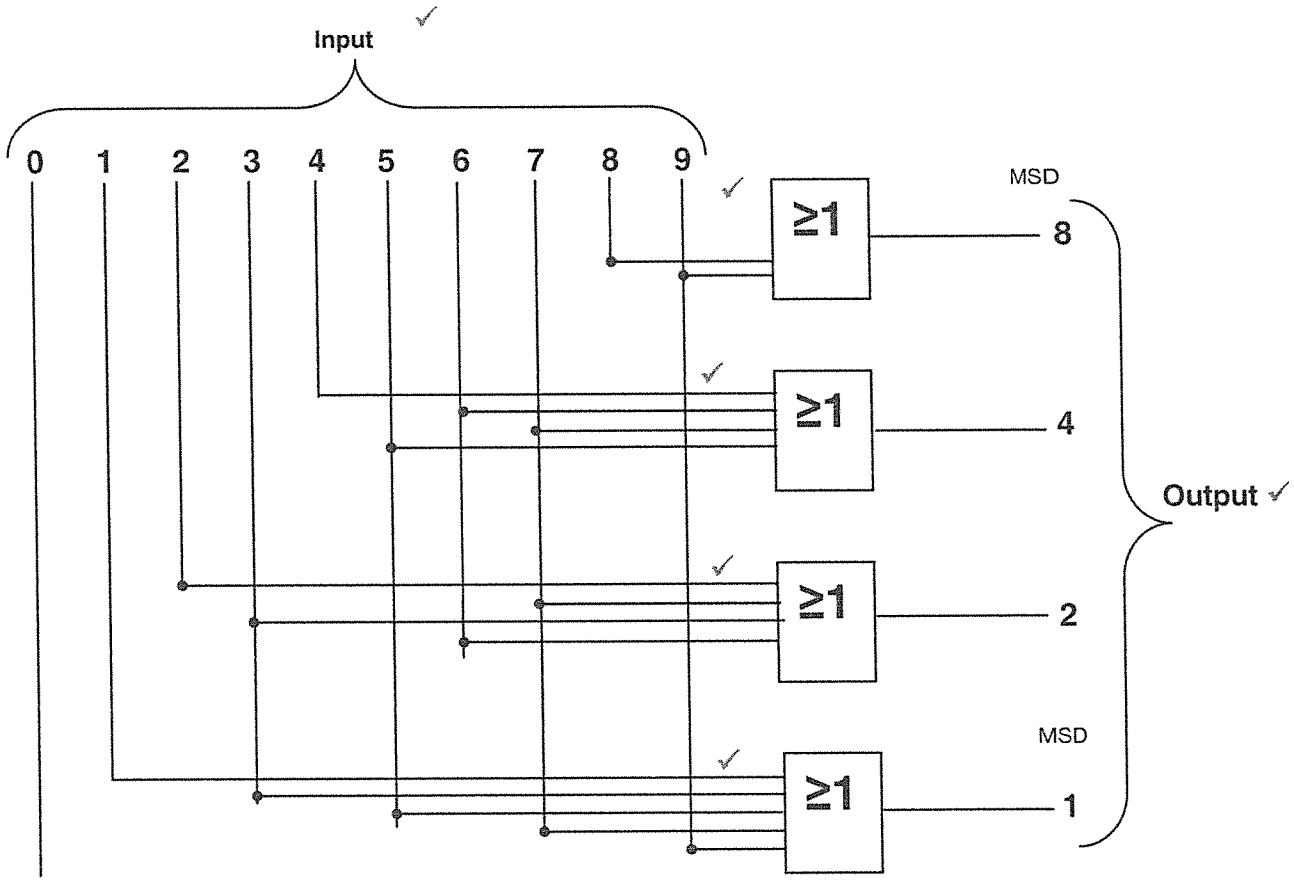
| 2 | 6 | 9 |
|---|---|---|
| +3 | +3 | +3 |
| 5 | 9 | 12 |
| ↓ | ↓ | ↓ |
| **0101**✓ | **1001**✓ | **1100**✓ |

OR

| 2 | 6 | 9 |
|---|---|---|
| ↓ | ↓ | ↓ |
| 9 | 3 | 6 |
| - 3 | -3 | -3 |
| **0101**✓ | **1001**✓ | **1100**✓ |

(3)

2.5




(6)

2.6 A decoder changes binary or BCD code to decimal code, ✓✓while an encoder changes decimal code to binary or BCD code. ✓✓ (4)

**[40]**

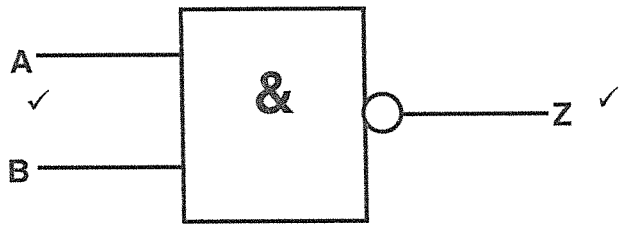
## QUESTION 3

3.1

| Inputs | | Outputs | | |
|---|---|---|---|---|
| A | B | AND | NOR | XOR |
| 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 |

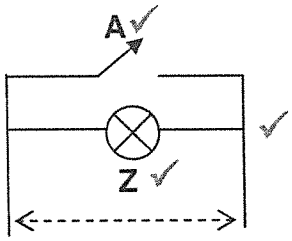
(6)

3.2




(2)

3.3




(3)

3.4 OR gate ✓✓ (2)

3.5 3.5.1 D-type Master Slave flip-flop✓✓ (2)

3.5.2 S-R Master Slave flip-flop✓✓ (2)

3.5.3

| Inputs | | Output | |
|---|---|---|---|
| S | R | Q | $\overline{Q}$ |
| 0 | 0 | $Q_n$ | $\overline{Q}_n$ |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | X | X |

(3)

3.5.4 Output $\overline{Q}$ will be zero (1). ✓ (1)

3.6 DVD, ✓ CD✓, (memory stick/flash drive/USB drive), ✓ magnetic tape, ✓ floppy disk, paper tape, punch card, hard drive

(Any 4 x 1) (4)

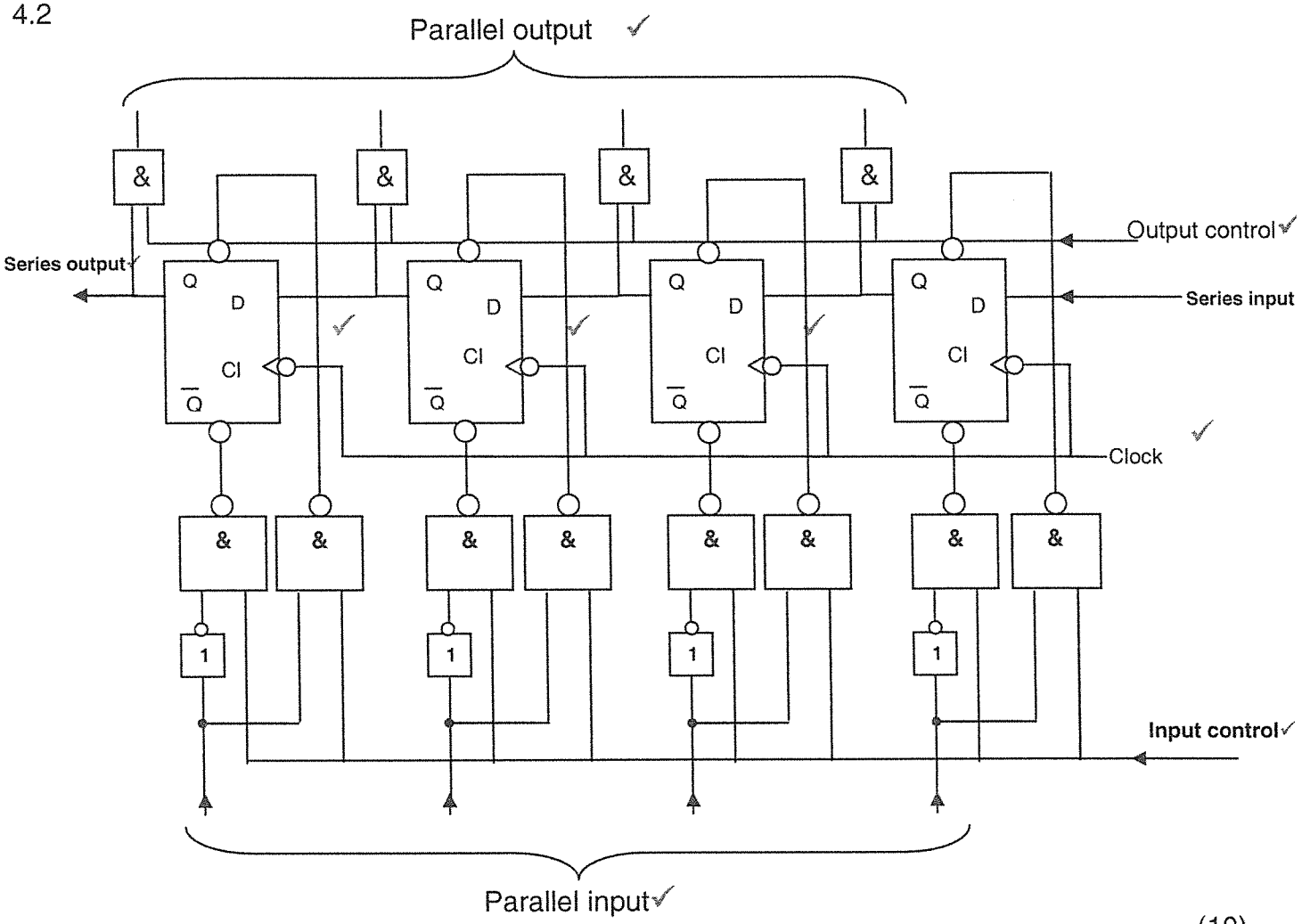
**[25]**

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## QUESTION 4

4.1 The inputs of the two shift registers are in parallel.✓✓ (2)

4.2




(10)

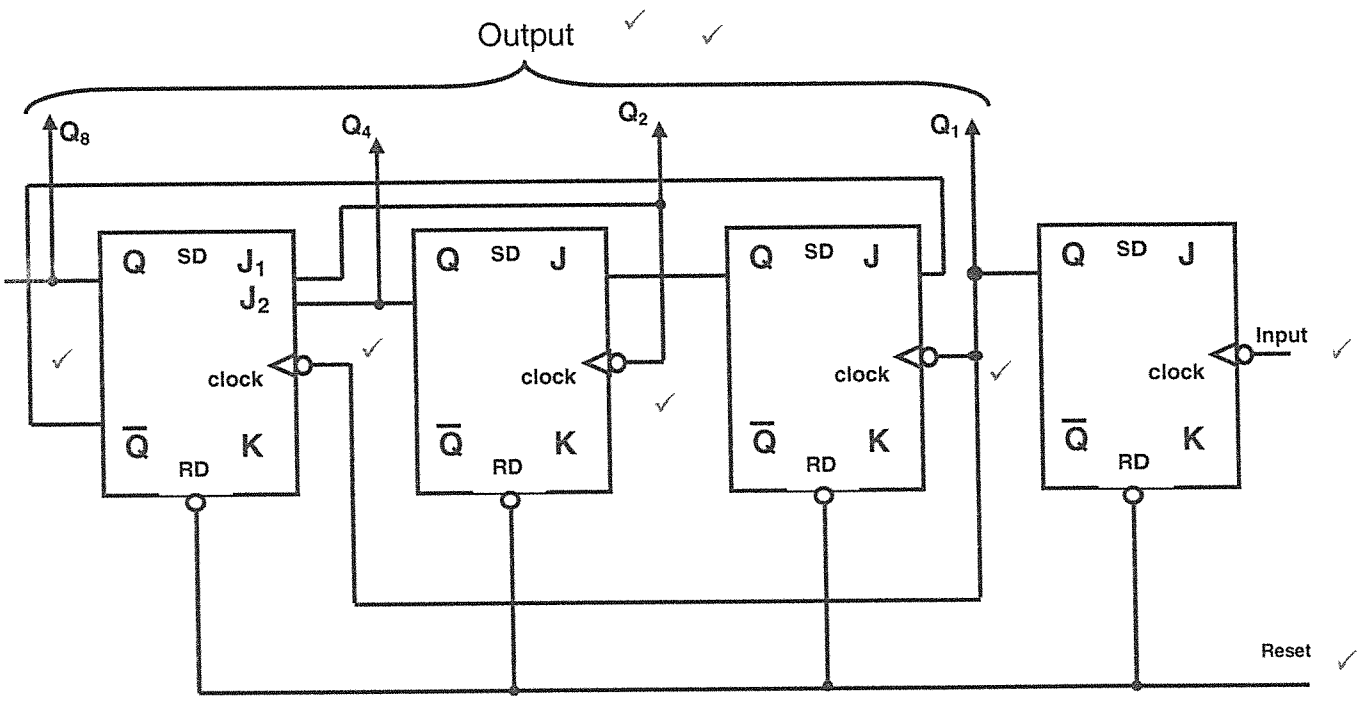
4.3

| Clock pulses | ✓ | ✓ | ✓ | ✓ |
|---|---|---|---|---|
| | 8 | 4 | 2 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 0 |
| 2 | 1 | 1 | 0 | 1 |
| 3 | 1 | 1 | 0 | 0 |
| 4 | 1 | 0 | 1 | 1 |
| 5 | 1 | 0 | 1 | 0 |
| 6 | 1 | 0 | 0 | 1 |
| 7 | 1 | 0 | 0 | 0 |
| 8 | 0 | 1 | 1 | 1 |
| 9 | 0 | 1 | 1 | 0 |
| 10 | 0 | 1 | 0 | 1 |
| 11 | 0 | 1 | 0 | 0 |
| 12 | 0 | 0 | 1 | 1 |
| 13 | 0 | 0 | 1 | 0 |
| 14 | 0 | 0 | 0 | 1 |
| 15 | 0 | 0 | 0 | 0 |

✓ (For correctness)

(5)

4.4




(8)
**[25]**

**TOTAL: 100**

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