



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**DIGITAL ELECTRONICS N6**

**17 NOVEMBER 2022**

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

**SECTION A****QUESTION 1**

- 1.1 Internal interrupt
- 1.2 Frequency-shift keying (**not** fsk)
- 1.3 Off-line
- 1.4 Thermocouple
- 1.5 Computer numeric control OR Numeric control (**not** CNC or NC) (5 × 1) **[5]**

**QUESTION 2**

- 2.1 C
- 2.2 A
- 2.3 D
- 2.4 D
- 2.5 A (5 × 1) **[5]**

**QUESTION 3**

- 3.1 G
- 3.2 B
- 3.3 C
- 3.4 E
- 3.5 A (5 × 1) **[5]**

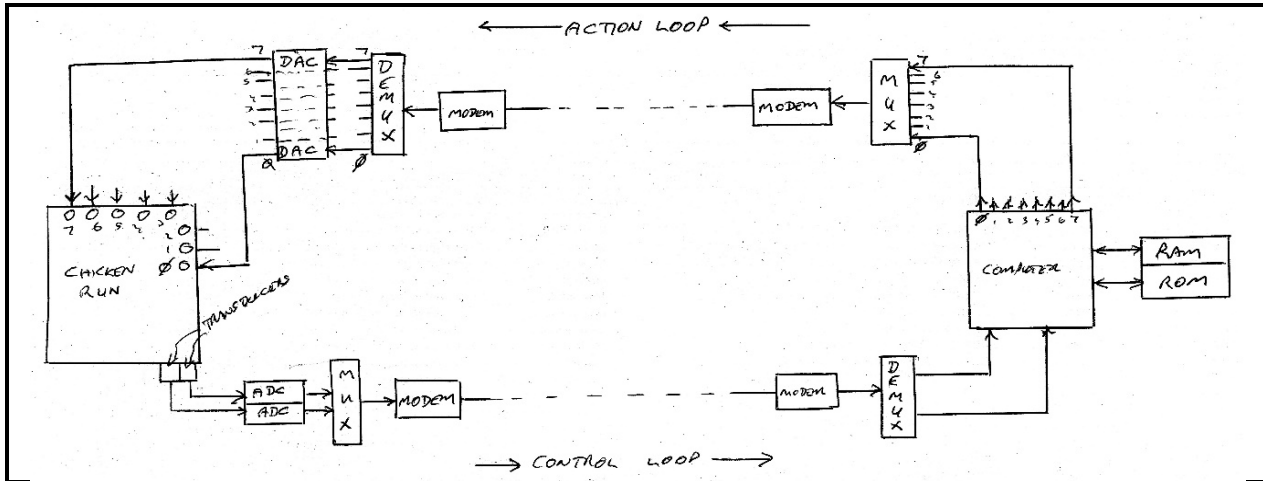
**QUESTION 4**

- 4.1 False
  - 4.2 True
  - 4.3 False
  - 4.4 False
  - 4.5 True (5 × 1) **[5]**
- [20]**

**TOTAL SECTION A: 20**

## SECTION B

### QUESTION 5



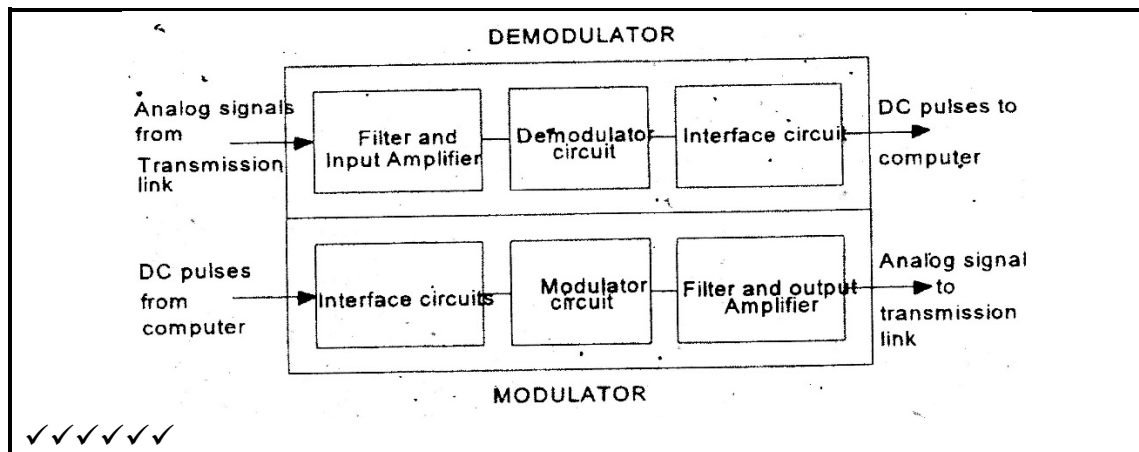
NOTE: The chicken run must be named as such. Candidates must be penalised if they misname it.

✓✓✓✓✓✓✓✓✓✓

**[10]**

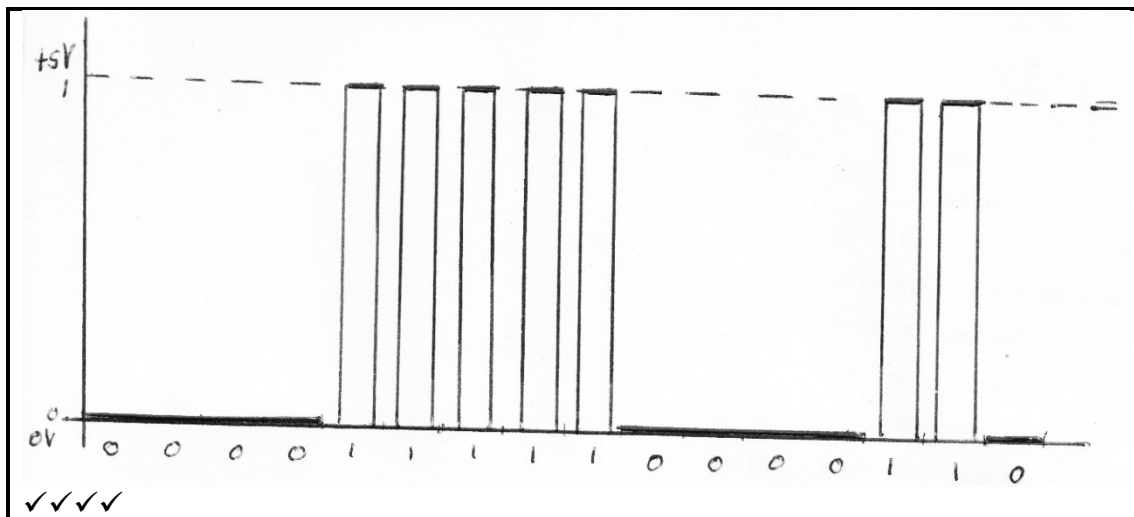
### QUESTION 6

## 6.1



(6)

6.2



(4)

6.3 Salaries and wages; utility bills; clothing bills (or simply bills) or any other suitable answer. ✓✓ (2)

6.4 Sun spots; Lightning; Other electric equipment (or electric power lines) or any other suitable answer. ✓✓✓ (3)

6.5 Google; Yahoo; Bing; Baidu; AOL or any other suitable answer. ✓✓ (2)

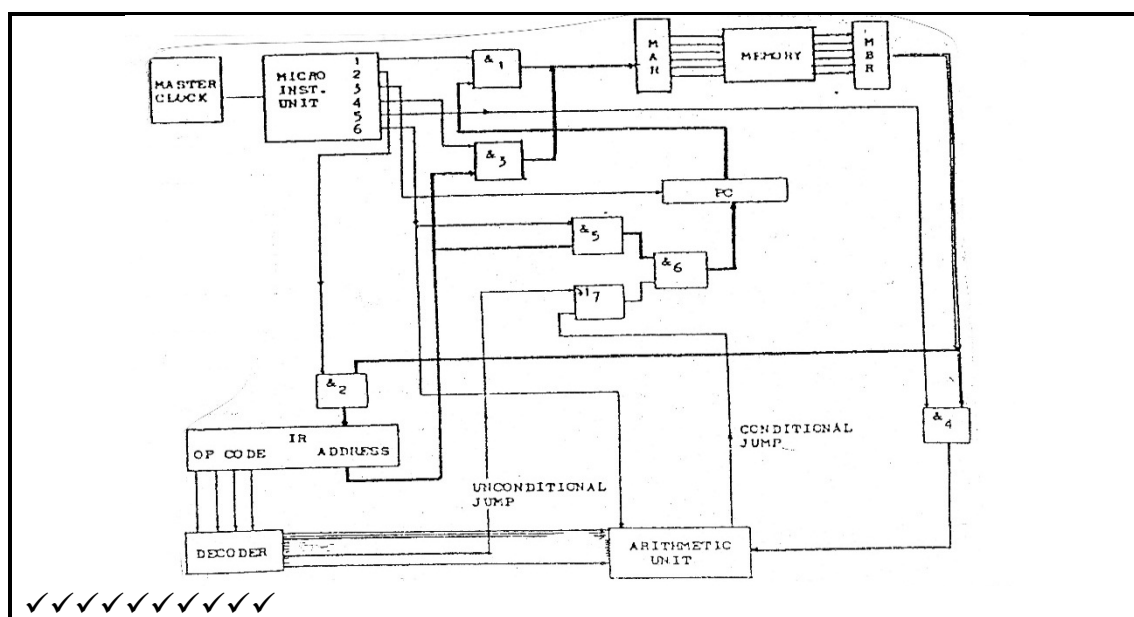
6.6 6.6.1  $fsv \text{ at } 11111111_2 = 255_{10}$   
 $255 \times 100\mu V = 25,5 \text{ mV}$  ✓✓ (2)

6.6.2  $11110_2 = 30_{10}$   
 $30 \times 100\mu V = 3 \text{ mV}$  ✓

(1)  
[20]

## QUESTION 7

7.1

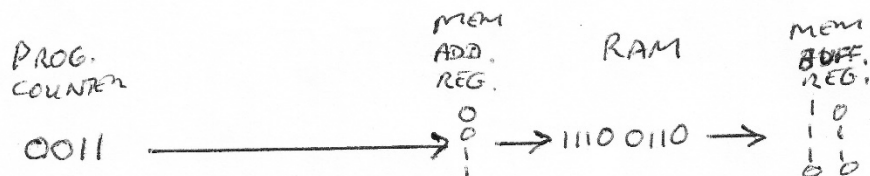


(10)

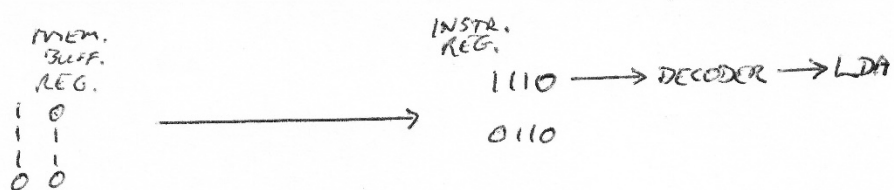
7.2

## FETCH ROUTINE

PULSE 1



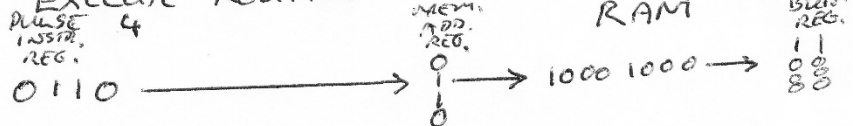
PULSE 2



PULSE 3

PC = PC + 1  
= 0100

EXECUTE ROUTINE



PULSE 5

MEM. BUFF. REG.

1000  
1000

ALU

ACC.

1000 1000

PULSE 6

DO NOTHING

(10)  
[20]

**QUESTION 8**

8.1 THE WORDS OF WISDOM FOR TODAY ARE:

✓✓

EVERYTHING UNDER THE SUN IS IN TUNE

BUT THE SUN IS ECLIPSED BY THE MOON ✓✓✓✓✓✓✓✓

NOTE: 1. If the top line is written as is (all in one line, in capitals and followed by a semi-colon) **and** then 2 lines are skipped – 2 marks are awarded (either both marks or nothing).

2. To obtain all 8 marks or nothing, the candidate must have the correct print-out in capitals on two lines.

(10)

| 8.2 | <u>Instruction #</u> | <u>Address contents</u> |
|-----|----------------------|-------------------------|
|     | 0000                 | 55 <sub>16</sub>        |
|     | 0001                 | 99 <sub>16</sub>        |
|     | 0002                 | 77 <sub>16</sub>        |
|     | 0003                 | 66 <sub>16</sub>        |
|     | 0004                 | CC <sub>16</sub>        |

(5)

**[15]****QUESTION 9**9.1 1<sub>1</sub> 0<sub>2</sub> 1<sub>3</sub> 1<sub>4</sub> 1<sub>5</sub> 1<sub>6</sub> 1<sub>7</sub> 1<sub>8</sub> 1<sub>9</sub> 0<sub>10</sub>

Pos. 1 checks 3; 5; 7; 9

1 1 1 1 – P1 should thus be 0: NOT thus: 1✓

Pos. 2 checks 3; 6; 7; 10

1 1 1 0 – P2 should thus be 1: IT IS thus: 1✓

Pos. 4 checks 5; 6; 7

1 1 1 – P4 should thus be 1: IT IS thus: 0✓

Pos. 8 checks 9; 10

1 0 – P8 should thus be 1: IT IS thus: 0✓

Thus the fault lies on bit 0011<sub>2</sub> = 3<sub>10</sub>✓

Thus pos.1 which is a 1 should be a 0

In other words, the word should be: **1001111110**<sub>hamming</sub> ✓✓ (The number must be corrected **and** the code must be identified with the correct subscript for both marks to be awarded.)

(Note the change in mark allocation from previous exams)

(7)

|     |                                                       |                                                                  |      |
|-----|-------------------------------------------------------|------------------------------------------------------------------|------|
| 9.2 | 9.2.1                                                 | $+0,1111000 \times 10^{+010} \checkmark$                         |      |
|     |                                                       | $= 11,11_2 \checkmark$                                           |      |
|     |                                                       | $= 2 + 1 + 0,5 + 0,25$                                           |      |
|     |                                                       | $= 3,75_{10} \checkmark$                                         | (3)  |
|     | 9.2.2                                                 | $-0,00001111 (+1 \text{ to l.s.b.}) \times 10^{+010} \checkmark$ |      |
|     |                                                       | $= - (0,0001) \times 10^{+010}$                                  |      |
|     |                                                       | $= - (0,01)_2 \checkmark$                                        |      |
|     |                                                       | $= - (0,25)_{10} \checkmark$                                     | (3)  |
| 9.3 | $\bar{A}\bar{G}(\bar{E} + E) + A\bar{G}(\bar{E} + E)$ |                                                                  |      |
|     | $= \bar{A}\bar{G} + A\bar{G}$                         |                                                                  |      |
|     | $= \bar{G}(\bar{A} + A)$                              |                                                                  |      |
|     | $= \bar{G} \checkmark \checkmark$                     |                                                                  | (2)  |
|     |                                                       |                                                                  | [15] |

|                         |            |
|-------------------------|------------|
| <b>TOTAL SECTION B:</b> | <b>80</b>  |
| <b>GRAND TOTAL:</b>     | <b>100</b> |