higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## STORED PROGRAMME SYSTEMS
### NQF LEVEL 3

### 13 November 2024

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

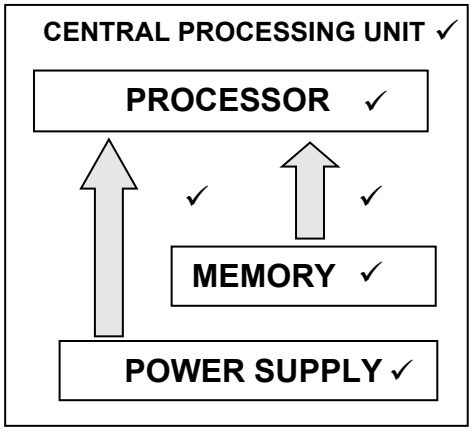
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## QUESTION 1

1.1
- Embedded control
- Electronic control
- Software control
- Relay logic control (hard wiring) (4)

1.2 Software control makes use of an application program for various applications such as PLC, CNC, and robotic control. (1)

1.3




**(Use discretion when marking)** (6 × 1) (6)

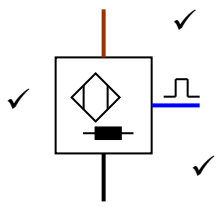
1.4
- The programmable logic controller makes us of software control (application software)✓✓
  whereas
- Hard-wire controllers make use of relay logic control (physical components and wiring).✓✓ (2 × 2) (4)

**[15]**

## QUESTION 2

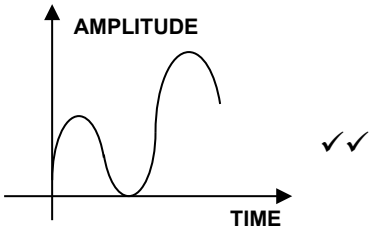
2.1 The sensor's function is to detect the presence of a work piece✓ or the status of the automated application.✓ (1 × 2) (2)

2.2




(3 × 1) (3)

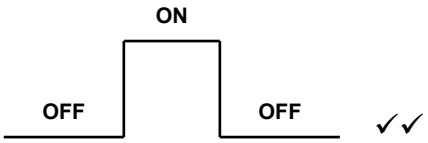
2.3 The analogue output is continuous by nature.✓




✓✓

**ANALOGUE**

The binary output is either on or off.✓




✓✓

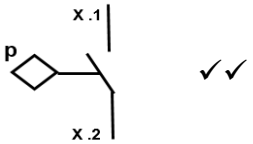
**BINARY**

(2 × 3) (6)

2.4 2.4.1 Capacitive bellows sensor
2.4.2 Photo-electric sensor
2.4.3 Mechanical sensor (limit switch)
2.4.4 Inductive sensor

(4 × 1) (4)

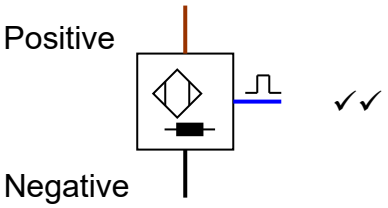
2.5 2.5.1




✓✓

(1 × 2)

2.5.2




✓✓

(1 × 2) (4)

2.6
- Wear
- Water ingress
- Dust ingress

(Any correct relevant one) (Any 1 × 1) (1)

**[20]**

## QUESTION 3

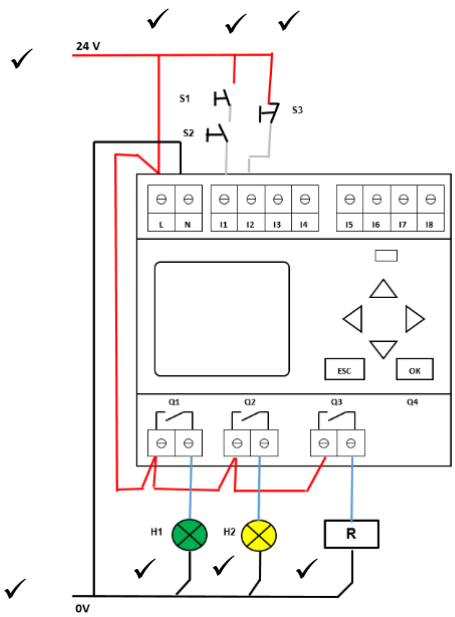
3.1 The information can inform a mechatronics person what components are required✓ and where they should be placed.✓ (2)

3.2 Information can be used to create the materials list with I/O addresses✓ and the PLC wiring/connection diagram.✓ (2)

3.3
- Sensors
- Switches
- Push buttons
- Relay contacts
- Contactor contacts
- E/stop contacts
- Safety relay contacts (Any 5 × 1) (5)

3.4
- Relay contacts
- Horn
- Siren
- Indication lamps (various colours)
- Contactor
- Actuator
- Solenoid valve (Any THREE correct relevant responses) (Any 3 × 1) (3)

3.5

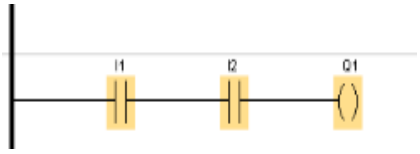



(8 × 1) (8)
**[20]**

**QUESTION 4**

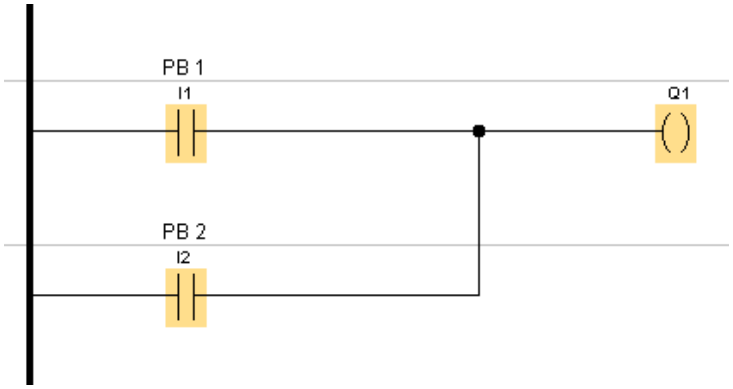
4.1
- AND function
- OR function
- Latch function (3)

4.2 AND FUNCTION



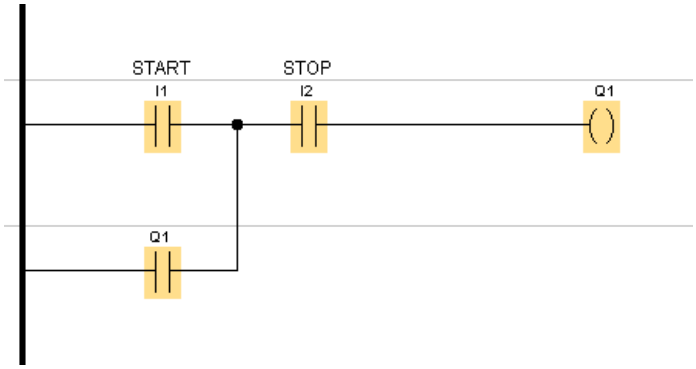

✓✓

OR FUNCTION




✓✓

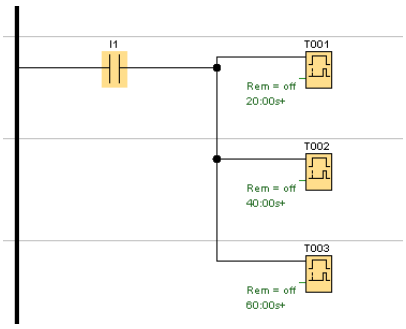
LATCHING FUNCTION




✓✓

(3 × 2) (6)

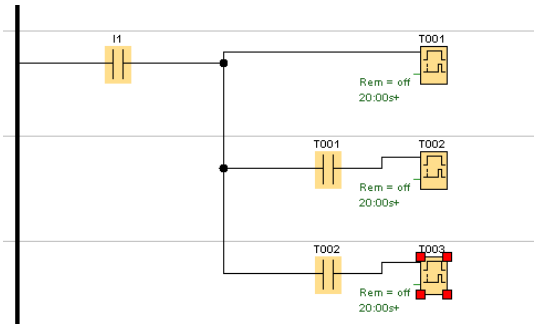
4.3 At switch on (I1), all timers will start timing out and switch on when set time is reached. This is known as cascaded timers.✓




✓✓

Whereas

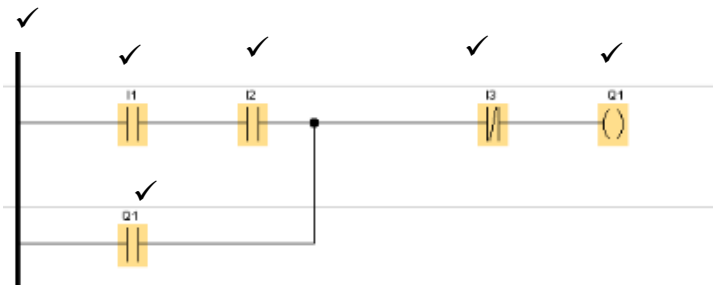
Sequenced timers operate in such a manner that once the first timer is activated by I1, the timers will turn each other on at the pre-set time intervals.✓




✓✓

(2 × 3) (6)

4.4




(6 × 1) (6)

4.5
- Up-counter
- Down-counter
- Up/down-counter
- Delay on-timer
- Delay off-timer
- Auxiliary relay

(Any 4 × 1) (4)

4.6
- Function block diagram
- Ladder diagram
- Grafcet (SFC)
- Statement list
- Instruction list (5)

**[30]**

**QUESTION 5**

5.1
- Power supply check
- CPU check
- Communications check
- I/O Module check (4)

5.2 Program maintenance is when
- corrections to the program are made;
- modifications are made;
- additions are made; and
- software updates are made. (Any 2 × 1) (2)

5.3 5.3.1
- Faulty sensor
- Broken wire
- Loose connection

5.3.2
- Loose connection
- Broken wire
- Faulty field device or actuator

5.3.3
- Faulty output LED
- Faulty logic in the program
- Faulty address allocation

(3 × 3) (9)

**[15]**

**TOTAL: 100**

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