higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

STORED PROGRAMME SYSTEMS
NQF LEVEL 3

8 NOVEMBER 2022

This marking guideline consists of 7 pages.

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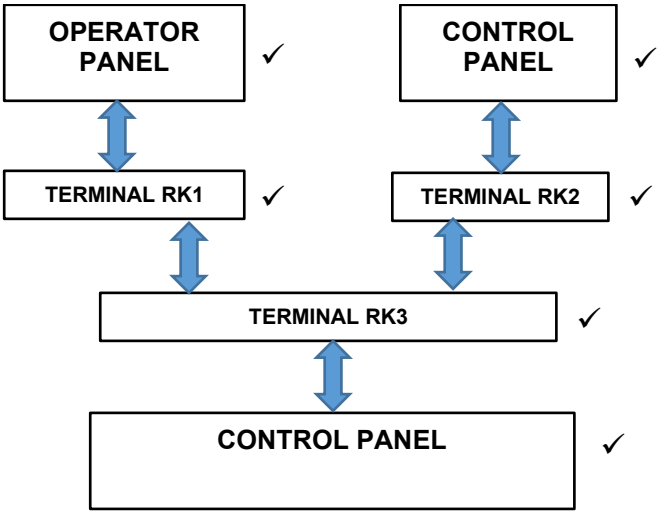
QUESTION 1

1.1
- Change-over switches
- Relay contacts
- Push buttons
- Sensors

(4 × 1) (4)

1.2 Embedded controllers are preprogrammed by the manufacturer,✓✓
Whereas:
Software-driven controllers are programmed by the user application software.✓✓ (2 × 2) (4)

1.3



(One extra mark for drawing arrows correctly)✓

(7 × 1) (7)

[15]

QUESTION 2

2.1
- Sight
- Hearing
- Touch
- Smell
- Taste

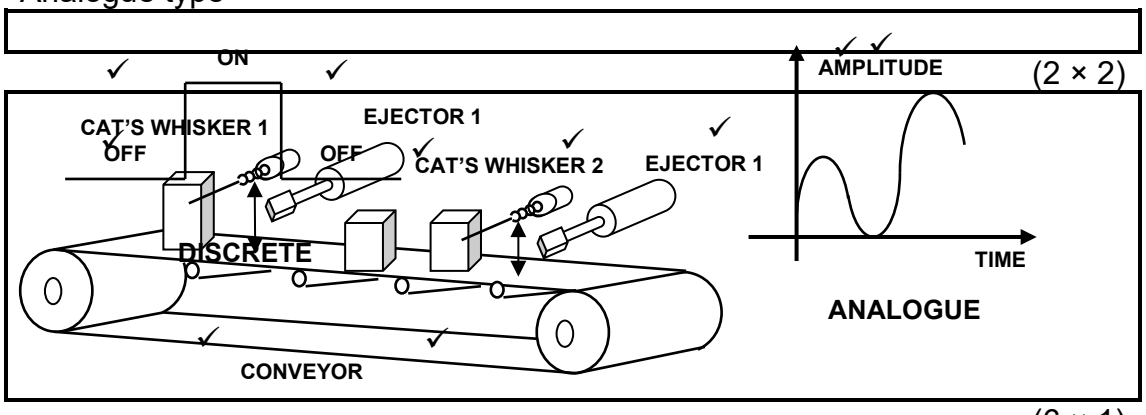
(5 × 1) (5)

2.2
2.2.1 Temperature
2.2.2 Flow rate
2.2.3 Pressure
2.2.4 Level

(4 × 1)

2.3 Analogue type (1)

2.4



(2 × 2) (4)

2.5

(6 × 1) (6)

[20]

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QUESTION 3

3.1

3.1.1	ON/OFF detent switch.
3.1.2	Turn the system ON/OFF
3.1.3	Normally open push button
3.1.4	Start the automated system
3.1.5	I1
3.1.6	Normally closed push button
3.1.7	Stop the automated system
3.1.8	1 & 2
3.1.9	Indication laps
3.1.10	24 V or 48 V

(10 × 1) (10)

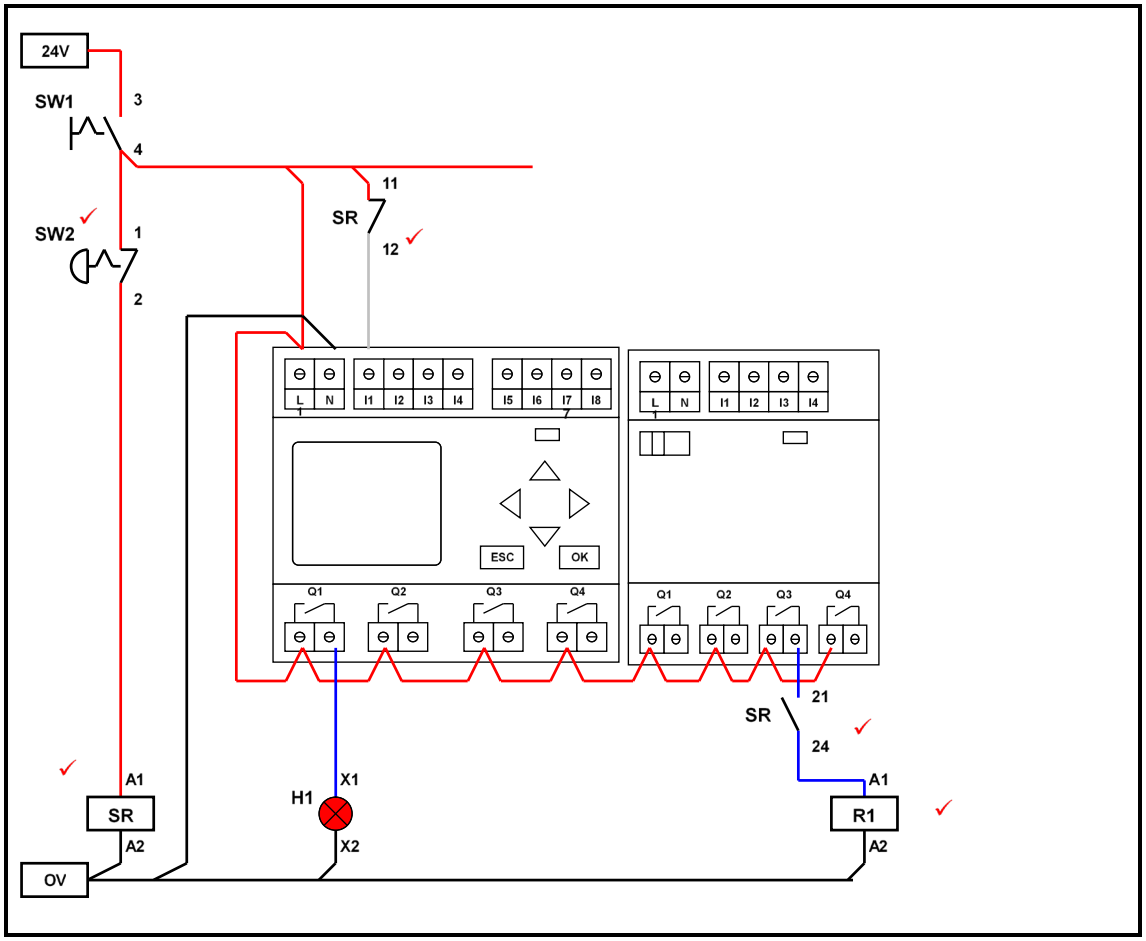
3.2

- Terminal list
- Address allocation list
- Working circuit
- Control circuit

(Any 3 × 1) (3)

3.3 The instruction enables a reader to determine the sequence of events that must be met by the PLC source code or program.✓✓ (1 × 2) (2)

3.4

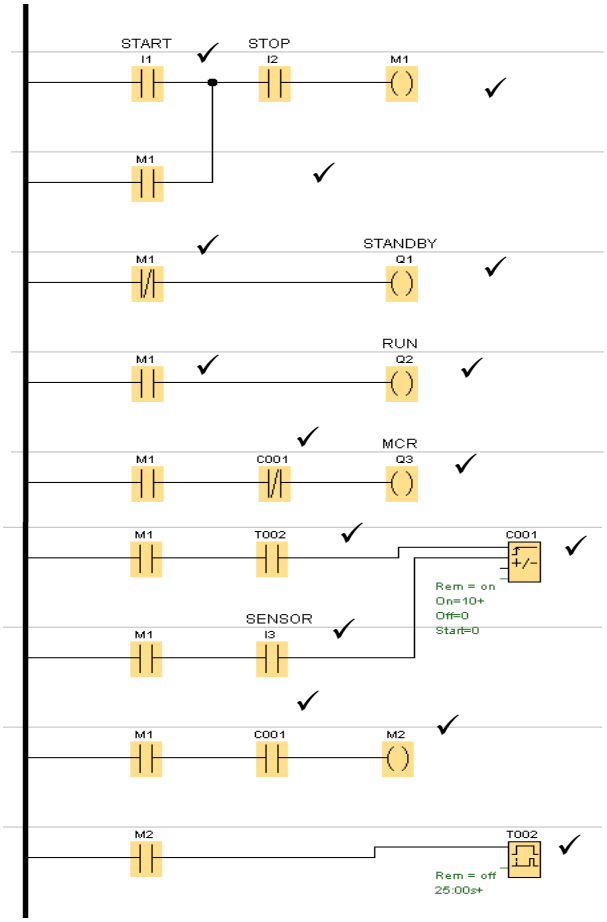


(5 × 1) (5)

[20]

QUESTION 4

4.1



(15 × 1) (15)

4.2
- AND gate switching logic
- OR gate switching logic
- Latching circuit logic (3 × 1) (3)

4.3 Rule 1:
Input devices are placed near the left corner of the rung.
Rule 2
One (and only one) output is placed near the right corner of the rung
Rule 3:
Input devices can be connected in series, parallel, or a combination of series and parallel.
Rule 4:
Output devices *cannot* be connected in series.
Rule 5:
Each output device can be represented only once in the diagram.
Rule 6:
All the input and output devices must be placed horizontally.
Rule 7:
Current in the relay logic diagram must flow from left to right.
Rule 8:
Diagrams must be numbered and labelled correctly
Rule 9:
The enabling control logic and safety interlocking must be inserted between the input and output devices. (Any correct SIX) (Any 6 × 1) (6)

4.4 A graphical PLC application software source code will be represented by pictures,✓✓
whereas
A written PLC application software source code will be represented by structured written words.✓✓ (2 × 2) (4)

4.5
- PLC LADDER logic
- Function block
- Sequence function chart (Any 2 × 1) (2)

[30]

QUESTION 5

5.1

- Knowledge of the IEC component-related symbols, designations and terminal numbering.
- Knowledge of the operation and testing of components.
- Ability to read circuit diagrams (control and power).
- Knowledge of sensors and their operation, alignment, adjustment and testing.
- Ability to use test equipment such as a continuity tester and a multimeter.
- Ability to read terminal allocation lists.
- Understanding of PLC source code operation. (Any 4 × 1) (4)

5.2

CHECKLIST				
#	**Description**	**YES**	**NO**	**Comment**
1	Are components according to design specifications?			✓
2	Are components correctly and securely placed?			✓
3	Are all connecting wires terminated at the correct terminals and secured?			✓
4	Do all the connecting wires have continuity?			✓
5	Check that the sensors are correctly adjusted.			✓
6	Ensure that the services are correct.			✓
7	Ensure that the system, machine or application operates in accordance with design specifications.			✓

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(7 × 1) (7)

5.3
- Checking is the use of a check list to determine if all components have been inserted according to design specifications, if services are set correctly and sensors are aligned, and if all connecting wires are inserted and terminations are done.✓✓
  Whereas
- Testing is the process of ensuring that the process operates in accordance with the instruction
  OR
- that the voltages are present, or pressure are present at certain points and correct when trouble shooting.✓✓ Markers must use discretion. (2 × 2) (4)

[15]

TOTAL: 100