higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MECHATRONIC SYSTEMS
NQF LEVEL 2

XX February 2020

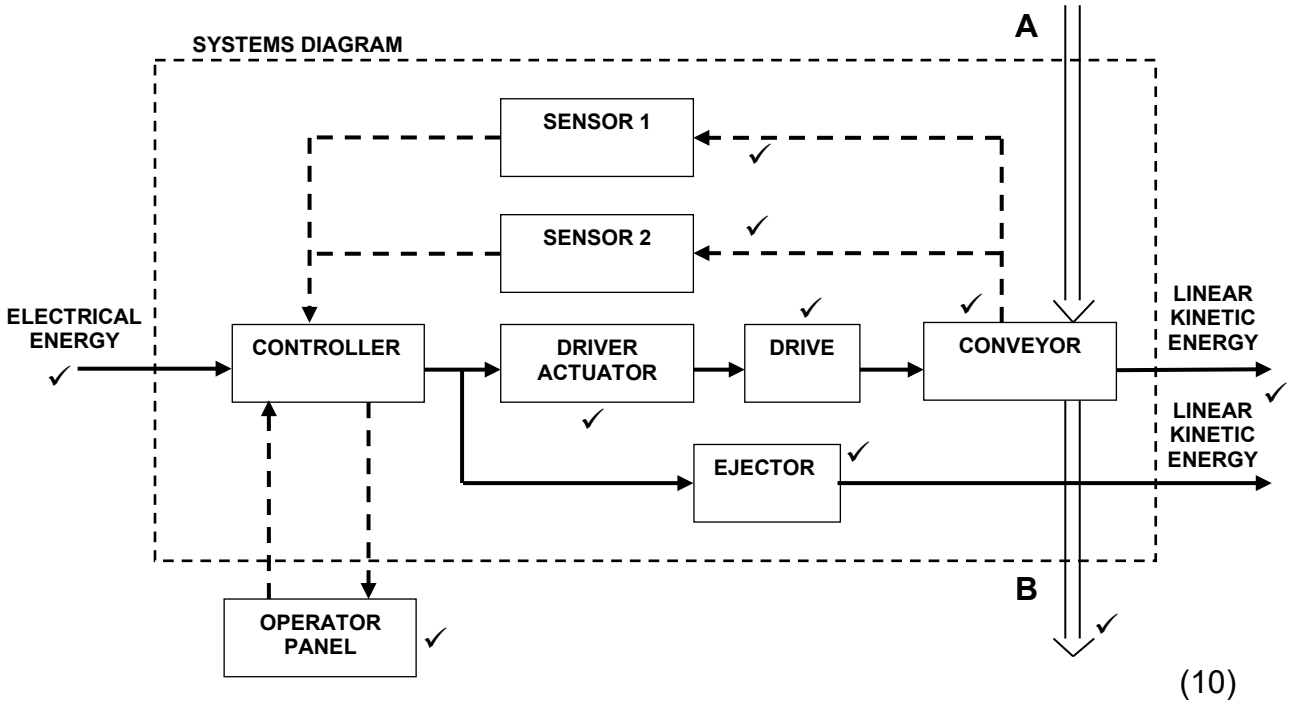
This marking guideline consists of 6 pages.

Copyright reserved

QUESTION 1

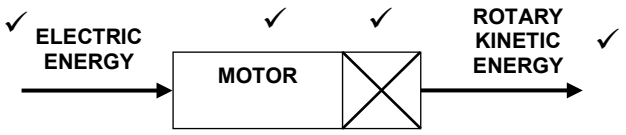
1.1 1.1.1 Control panel (1)
1.1.2 Operator panel (1)
1.1.3 Machine application (1)

1.2



(10)

1.3



(4)

1.4
- Understanding system operation
- Understanding subsystem operation
- Understanding energy flow through the circuit
- Understanding information flow in the circuit
- Understanding matter (material) flow through the circuit
- Troubleshooting systems and related components
- Designing new similar systems (Any 3 × 1) (3)

[20]

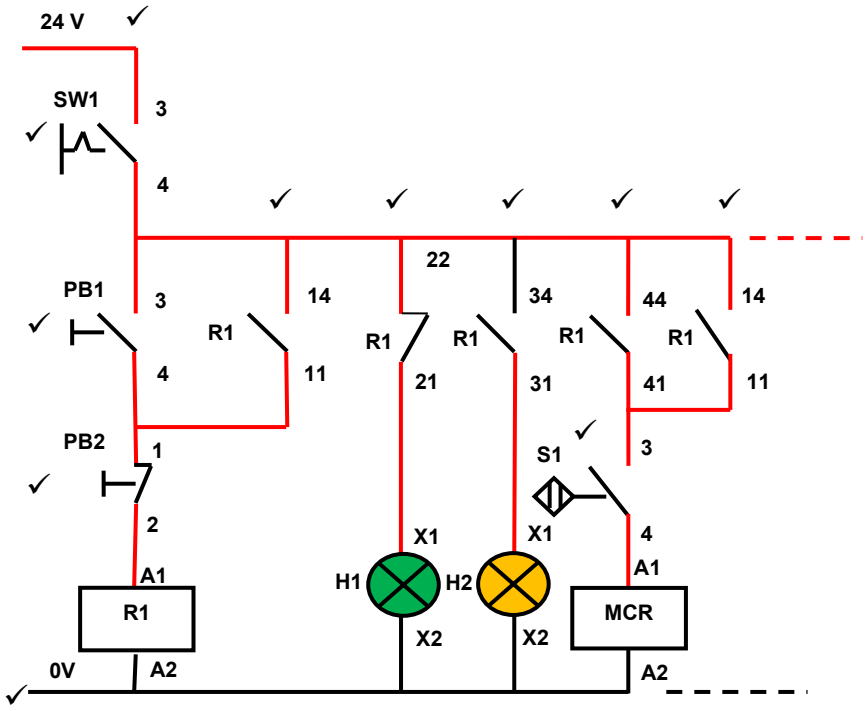
QUESTION 2

2.1 Detecting the type of workpiece to start the conveyor belt (2)

2.2 Detect a metal workpiece that need to be ejected from the conveyor (2)

2.3 The solenoid ejector (hub) operates on the magnetic principle of attraction-/ repulsion to move the actuator. (2)

2.4



(10)

2.5 The timer is time based in that the preset time must elapse before any action can take place. (2)

2.6 Remote control occurs over a distance between sites. (2)

[20]

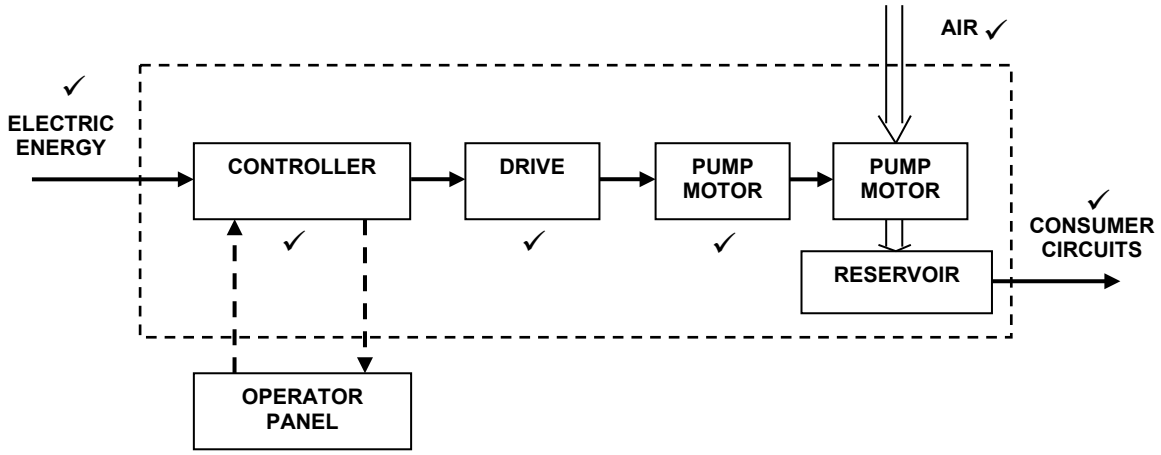
QUESTION 3

3.1 Compressed air has been forced into a cylinder under pressure. (2)

3.2 A compressor is made up of subsystems that enable air to be compressed. (2)

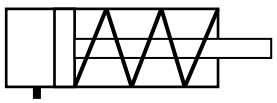
3.3
- Air manufacturing
- Air distribution
- Consumer work circuits (3)

3.4



(6)

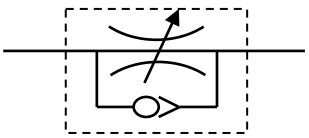
3.5 3.5.1



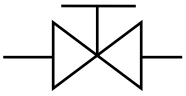
3.5.2



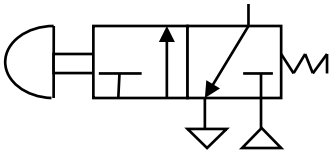
3.5.3



3.5.4



3.5.5



(5 × 1) (5)

3.6 When a force is applied, the valve is activated and the spool moves. The pressurised air flows via ports 1 and 2 which in turn activates the cylinder movement. When the force is removed, the spool moves backwards via the spring and the air exhausts via ports 2 and 3. (2)

[20]

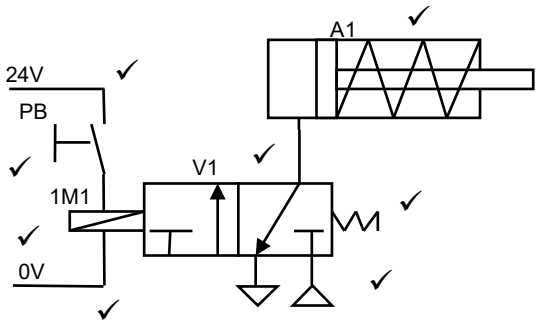
QUESTION 4

4.1 Cheaper to implement and manipulate (2)

4.2
- Clamping
- Lifting
- Packaging
- Holding
- Clamping
- Forming (Any 4 × 1) (4)

4.3 The control signal to the solenoid valve armature will move a spool inside the valve✓✓ which in turn controls the air flow.✓✓ (2 × 2) (4)

4.4



(8)

4.5
- 24–48 VDC
- 110 VAC (2)

[20]

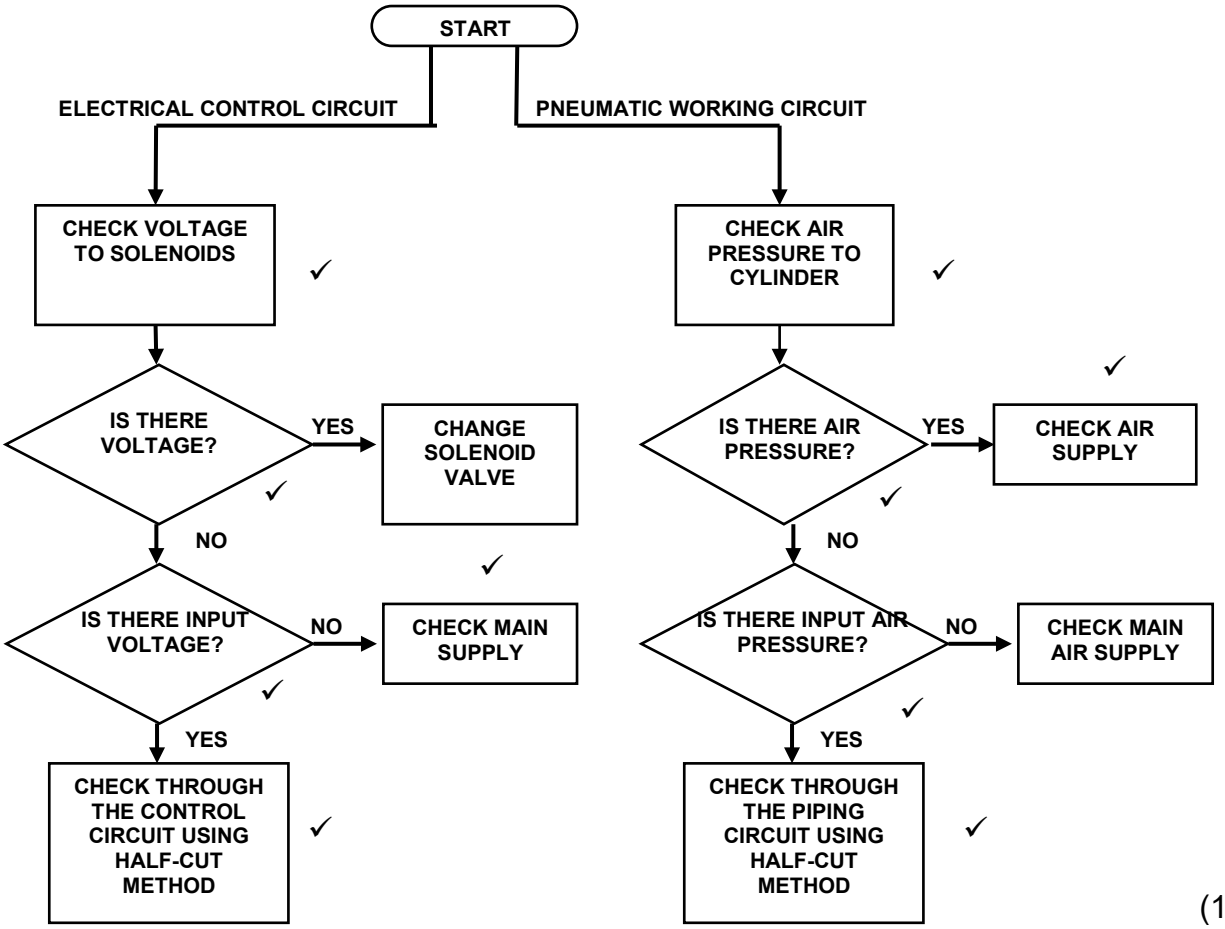
QUESTION 5

5.1 Air contamination occurs when air has foreign matter ingressing in a pneumatic system. (2)

5.2
- Dust
- Water
- Iron fillings
- Metal chips (Any 2 × 1) (2)

5.3
- Blockages
- Pipe damage
- Stuck valves and cylinders
- Rust damage (Any 2 × 1) (2)

5.4



(10)

5.5
- The half-cut method can be used on the electrical control circuit or the pneumatic working circuit.
- Where the electrical presence on the output actuator coil or the pressure is present the valve is checked.
- Check that there is electrical energy available or air pressure present.
- Check at test points half way in the circuit and determine whether the problem is backwards or forwards and repeatedly apply the half-cut method until the problem has been isolated. (4)

[20]

TOTAL: 100

Copyright reserved