



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

**ELECTROTECHNOLOGY
NQF LEVEL 4**

XX February 2024

This marking guideline consists of 7 pages.

QUESTION 1

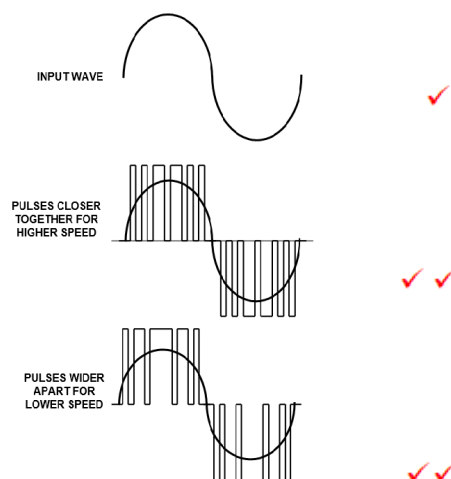
- 1.1 1.1.1 Moisture and water
 1.1.2 Power diode
 1.1.3 Magnetic field
 1.1.4 Synchronous speed
 1.1.5 Power factor

(5 × 1) (5)

- 1.2 • Check the alignment of a directly coupled motor
 • Check the belt and belt tension
 • Keep the motor free from dirt and oil
 • Check motor for overheating
 • Clear all air vents
 • Check for dampness inside the motor
 • Lubricate bearings regularly
 • Check for abnormal noises
 • Check for excessive vibrations

(Any 4 × 1) (4)

1.3



(5)

- 1.4 1.4.1 It is achieved by momentarily connecting the motor in the opposite direction.
 1.4.2 Occurs when the braking energy is returned to the main supply.
 1.4.3 It is achieved by dissipating energy as heat in a resistor, by converting the forward motion into a back EMF by means of generator action.

(3 × 1) (3)

1.5

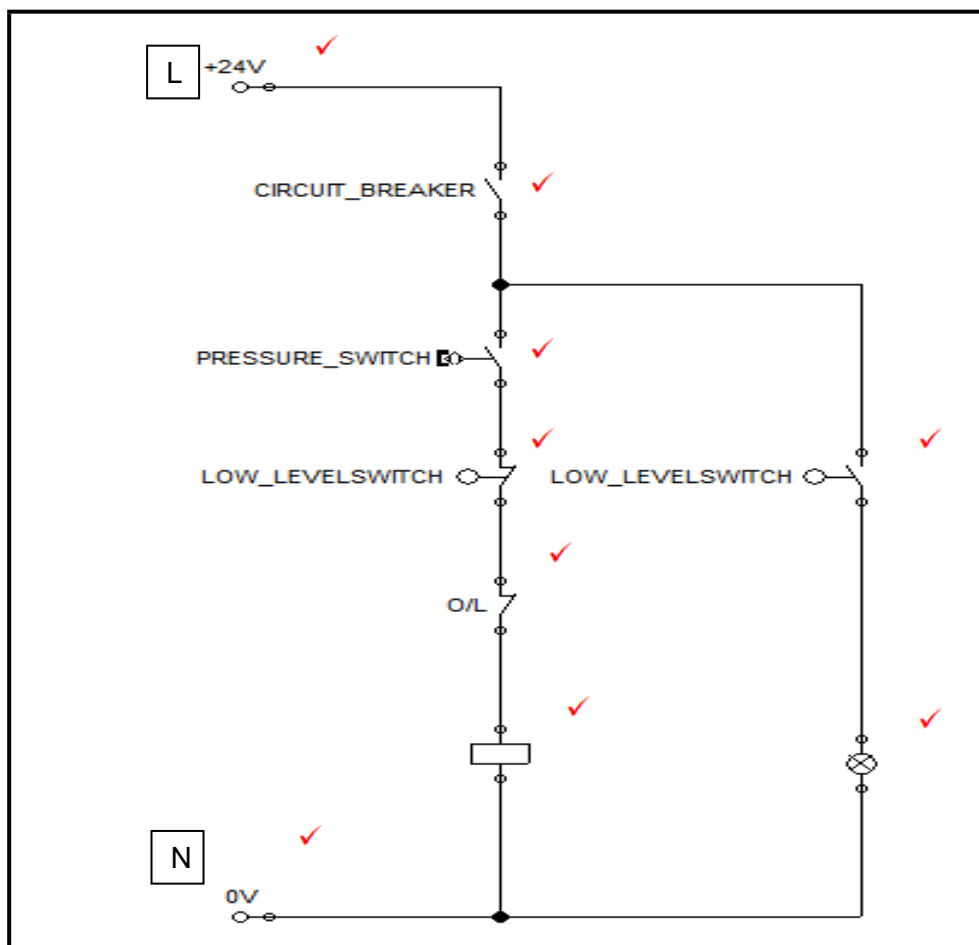
i

i

(3)
[20]

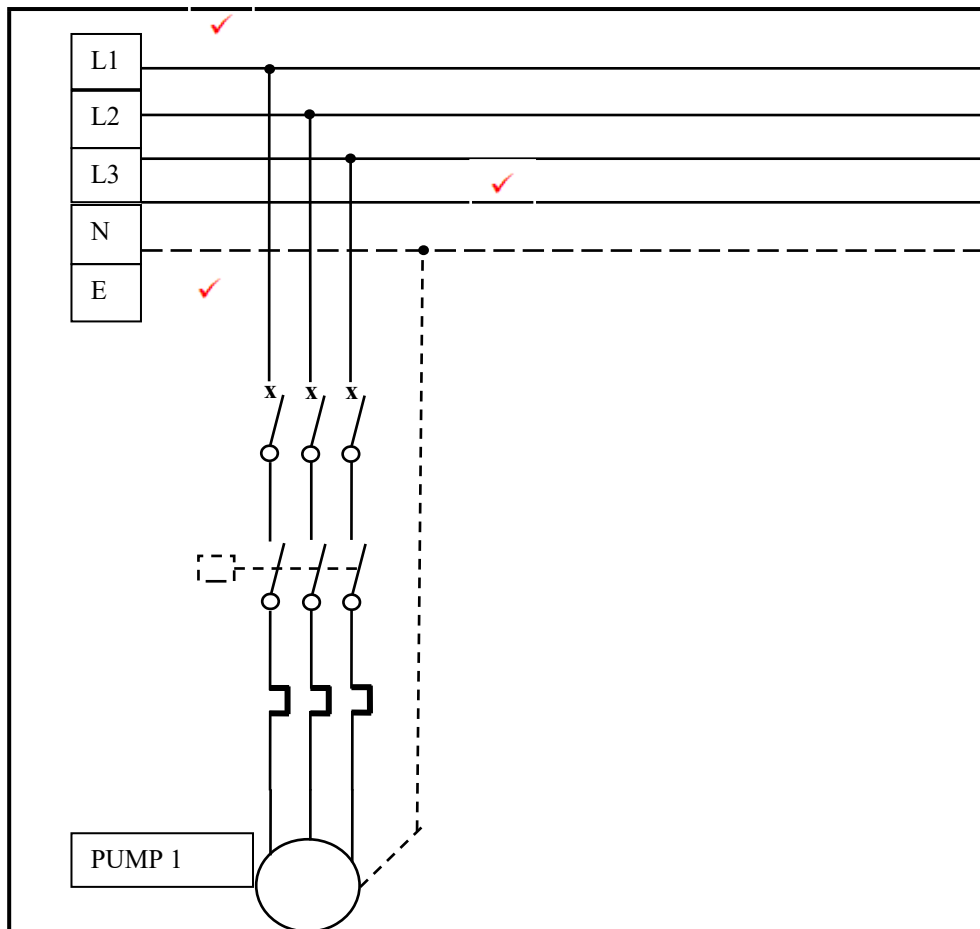
QUESTION 2

2.1 2.1.1



(9)

2.1.2



(6)

2.2	2.2.1	B
	2.2.2	A
	2.2.3	D
	2.2.4	E
	2.2.5	C

(5 × 1) (5)
[20]**QUESTION 3**

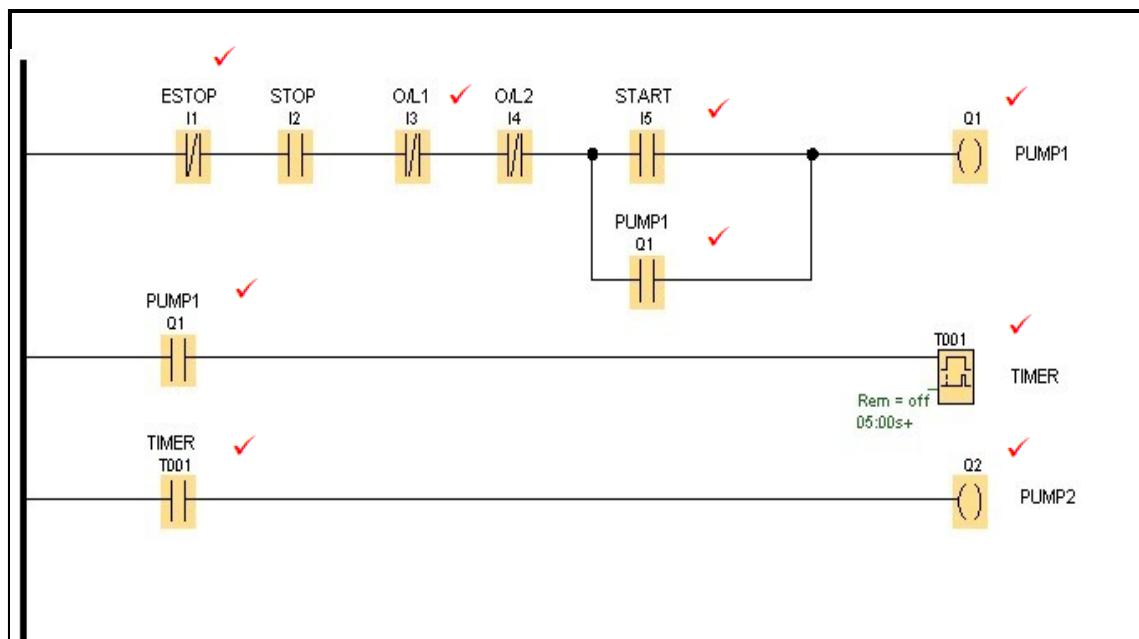
- 3.1
- Single-pole circuit breaker
 - Level sensor
 - Pressure sensor
 - 3-phase circuit breaker
 - Contactor coil
 - Overload
 - Indication lamp
 - 3-phase motor

(Any 6 × 1) (6)

- 3.2 STEP1: Confirm that the replacement motor is of the same size. Remove all electrical power.
 STEP 2: Open the motor cover and loosen the wire-retaining nuts and remove the supply wires.
 STEP 3: Use correct size spanners to loosen the motor from the stand.
 STEP 4: Install the new motor.
 STEP 5: Connect the main wires to the terminals of the new motor.
 STEP 6: Test the motor's rotation by 'bumping' the motor with power. (6)
- 3.3 3.3.1 • A better understanding of all components and system functions.
 • Documentation of data for warranty purposes.
 • Accumulation of baseline information and values to speed up future troubleshooting and proper maintenance. (3)
- 3.3.2 • True RMS multi-meter.
 • True RMS clamp-on ammeter.
 • Photo tachometer.
 • Current/Voltage signal generator
 • Oscilloscope (5)

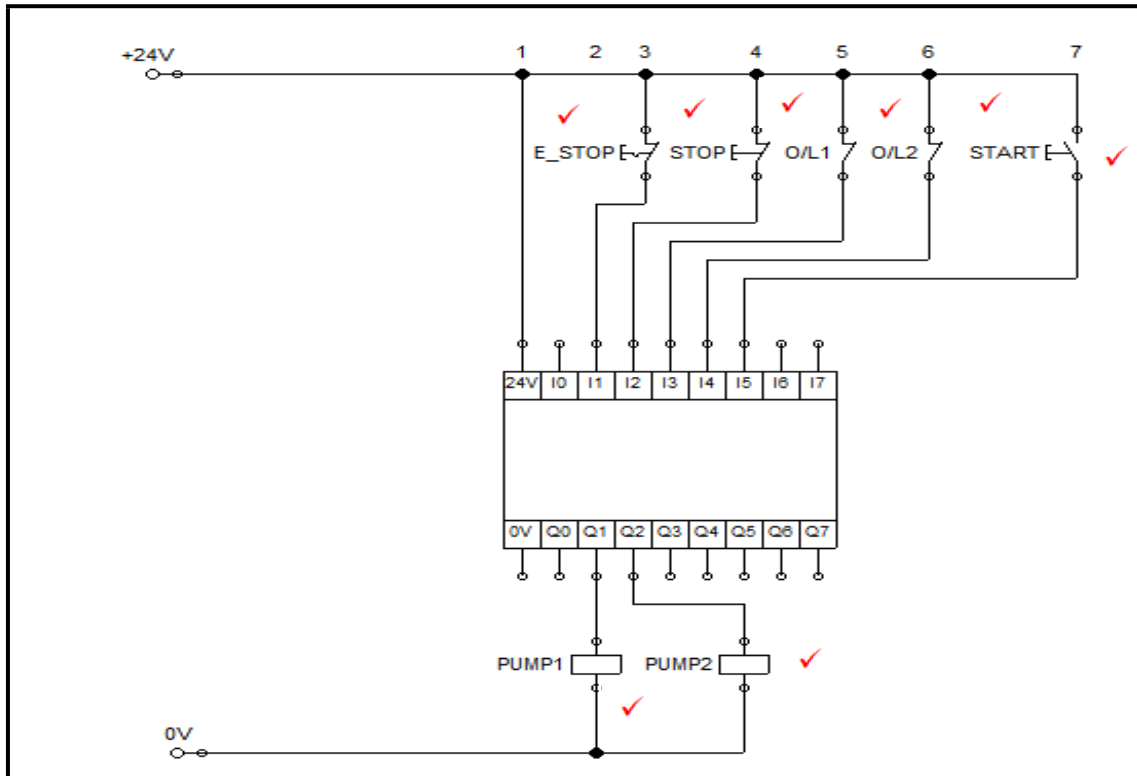
[20]**QUESTION 4**

4.1



(9)

4.2



(8)

4.3

- Use a grounding bracelet if possible to minimize charge build-up on personnel.
- Handle a module by the edges without touching components or printed circuit paths.
- Store modules with ESD sensitive components in the conductive packaging used for shipping the modules or when returning static sensitive modules for repair.

(3)
[20]**QUESTION 5**

5.1

- Maintenance must be performed by qualified personnel familiar with the construction, operation, and hazards involved with the system.
- Maintenance should be performed with the system dead and disconnected from all sources of power. If maintenance must be performed while the system is energised, safety-related practices should be followed.
- Care should be taken when servicing electrostatic sensitive components. The manufacturer's recommendations for these components should be followed.
- Ventilation passages should be kept open. If the equipment depends on auxiliary cooling, e.g., air, water, or oil, periodic inspection (with filter replacement when necessary) should be made of these systems.
- The means employed for grounding or insulating the equipment from ground should be checked to assure its integrity.

- Accumulations of dust and dirt on all parts, including on semiconductor heat sinks, should be removed according to the manufacturer's instructions, if provided; otherwise, the manufacturer should be consulted. Care must be taken to avoid damaging any delicate components and to avoid displacing dust, dirt, or debris in a way that permits it to enter or settle into parts of the control equipment.
- Enclosures should be inspected for evidence of deterioration. Accumulated dust and dirt should be removed from the top of the enclosures before opening doors or removing covers.
- Certain hazardous materials removed as part of maintenance or repair procedure (e.g., polychlorinated biphenyls (PCBs) found in some liquid filled capacitors) must be disposed of in an appropriate manner.

(Any 4 × 1) (4)

- 5.2 5.2.1
- Conducted emission
 - Radiated emission

5.2.2 Switching OFF the isolator, ✓ lock it out and put on lock out tag. ✓

5.2.3 No. ✓ There is no circuit breaker or fuse protection before the power supply. ✓

(3 × 2) (6)

5.3 South African Bureau of Standards (SABS) (1)

- 5.4
- Quality of the electrical components used
 - The specification of the motor used
 - The quality of the installation workmanship
 - The system design
 - The maintenance plans and procedures applied
 - The skills and experience of the maintenance personnel

(Any 5 × 1) (5)

- 5.5
- Efficient movement of materials between workstations
 - Avoiding bottlenecks
 - Effective use of available equipment
 - Training of operator and maintenance personnel
 - Efficient use of natural resources
 - Effective use of gravity
 - Elimination of safety hazards

(Any 4 × 1) (4)

[20]**TOTAL: 100**