higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

4 November 2022

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 1.1.1 A
1.1.2 A
1.1.3 A
1.1.4 B
1.1.5 A

(5 × 1) (5)

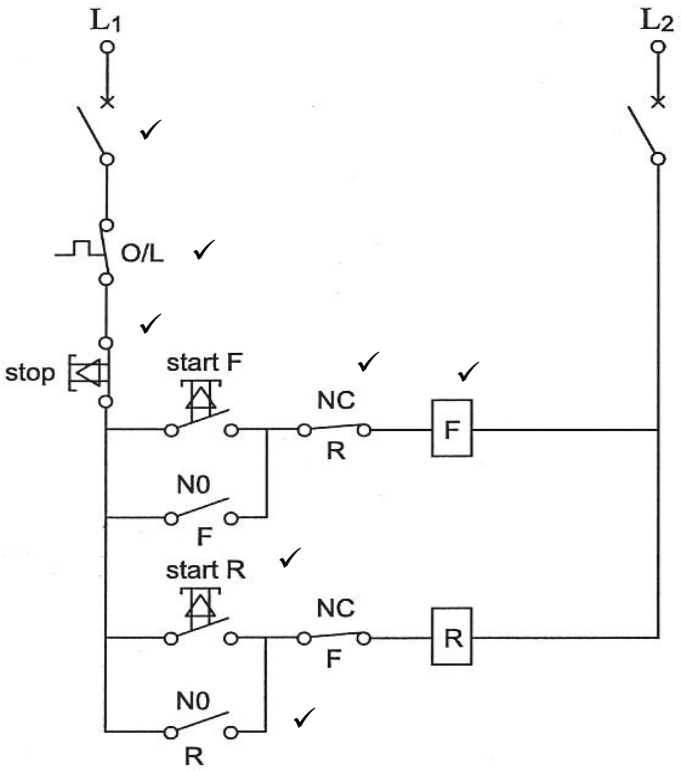
1.2 1.2.1 DC/AC series motor universal
1.2.2 AC split phase motor
1.2.3 AC induction motor
1.2.4 DC series motor
1.2.5 AC induction motor

(5 × 1) (5)

1.3 1.3.1 Belt drive
1.3.2 Gear reducer
1.3.3 Chain drive

(3 × 1) (3)

1.4



(7)
[20]

QUESTION 2

2.1 2.1.1 B
2.1.2 A
2.1.3 D
2.1.4 C

(4 × 1) (4)

2.2 It is to prevent the motor automatically restarting✓after a stoppage caused by a drop in voltage or failure of the supply,✓ where unexpected restarting of motor might cause injury to the operator.✓ (3)

2.3 A – Circuit breaker
B – Overload (Thermal)
C – Stop button (Spring loaded)
D – Normally opened contacts (of the main contactor/ coil)
E – Normally opened contacts (of the star contactor/ coil)
F – Normally closed contacts (of the delta contactor/ coil)
G – Normally closed contacts (of the star contactor/ coil)

(7 × 1) (7)

2.4 Basic insulation is applied to live parts of electric circuits to provide protection against electric shock✓✓ and double insulation is the insulation that comprises both basic and supplementary insulation.✓✓ (4)

2.5 It is electrically connecting various exposed and extraneous conductive parts within an installation to earth✓ to prevent a difference in potential occurring between them under fault conditions.✓ (2)

[20]

QUESTION 3

3.1 3.1.1 Considerations include whether the load needs to start at a low speed and increase gradually or whether a constant speed is required.

3.1.2 Where a motor drive is to be installed in extreme environmental conditions, special attention should be given to the motor casing.

3.1.3 The safety requirements need to be taken into consideration before selecting the drive control. E.g., does the installation require a flameproof control circuit and equipment which will prevent sparking?

(3 × 1) (3)

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3.2
- When the start button is depressed, the main coil, star contactor and timer will be energised.
- The normally opened contacts of the main coil will close to keep the start button in an ON position.
- The normally opened contacts of the timer will close, and the normally closed contacts will open.
- The motor will run in star at starting (at a reduced voltage).
- After a time-delay, the star contactor will de-energise and the delta contactor will be energised.
- As the motor changes from star to delta, the voltage will then change automatically to the full line voltage. (6)

3.3
- Remove all connections to the terminals.✓
- Use a multi-meter or insulation resistance tester (Megger)✓ and set on the ohm scale.✓
- Measure the resistance between:
  A1 and A2✓
  B1 and B2✓
  C1 and C2✓ (6)

3.4 3.4.1
- Screws, nuts and bolts, Rawl bolts, wall plugs, washers
- Steel tubing for conductor protection, lock nuts, and brass bushes
- Steel saddles
- PVC tubing, couplings, adapters
- PVC saddles
- Flexible tubing
- PVC trunking
- Mounting brackets (Any 6 × 1) (6)

3.4.2
- Wire stripper
- Long nose plier
- Diagonal cutter
- Combination plier
- Screw driver
- Hacksaw
- Shifting spanner (Any 6 × 1) (6)

[30]

QUESTION 4

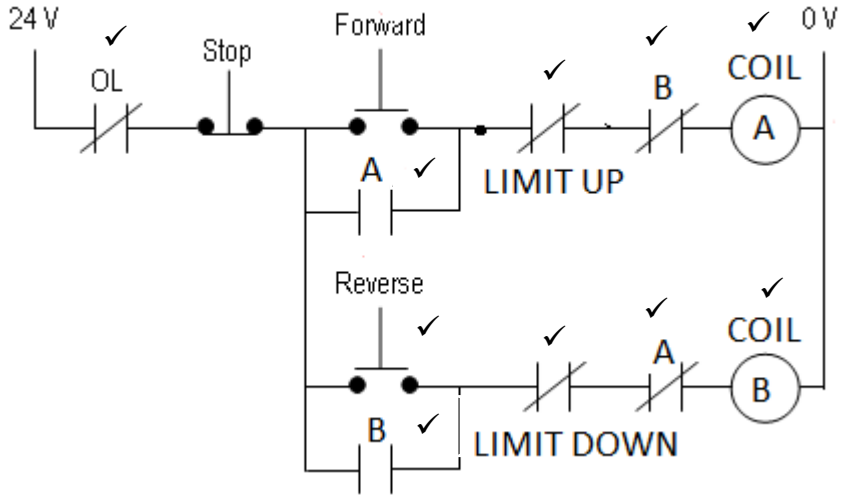
4.1 4.1.1
- Logical
- Relay ladder logic (RLL) (2)

4.1.2 Different input (1)

4.2
4.2.1 Normal closed (NC)
4.2.2 Internal relay (output)
4.2.3 One-shot contact
4.2.4 End statement
4.2.5 Timer coil

(5 × 1) (5)

4.3



(12)
[20]

QUESTION 5

5.1
- The overload is set to a current value that is less than the full load current rating of the motor.
- The motor has a short circuit.
- The main circuit conductors to the motor are short-circuited. (Any 2 × 1) (2)

5.2
- The main supply to the starter is off
- The control circuit breaker is off
- The overload has tripped
- The emergency stop contacts are stuck in the open position
- The stop contacts are stuck in the open position
- Conductor coils are open-circuited
- There are loose connections
- Conductors are open-circuited (Any 5 × 1) (5)

5.3
- Switch the supply off. Put the multi-meter's selector switch on the ohm scale.
- Put the test leads across the contactor coil. If a realistic reading is obtained the contactor coil is fine.
- If NO reading is obtained, there is an open circuit in the contactor coil. (3)

[10]

TOTAL: 100

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