higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

2 December 2024

This marking guideline consists of 6 pages.

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QUESTION 1

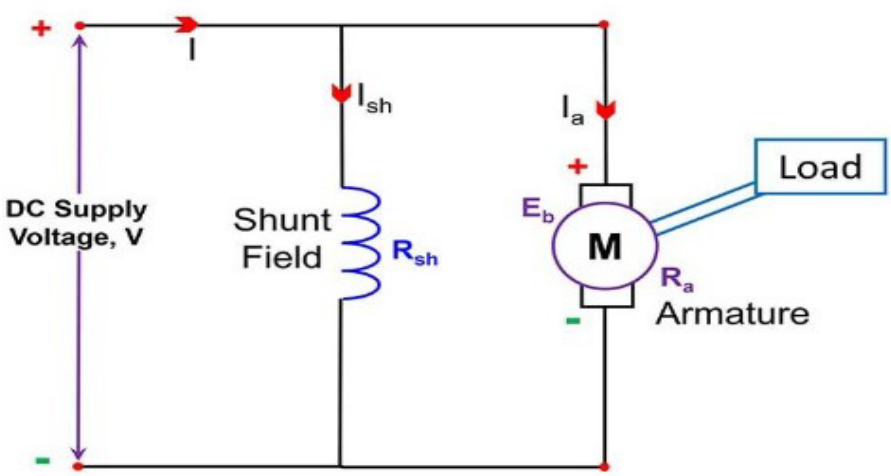
1.1 1.1.1 D✓
1.1.2 A✓
1.1.3 D✓
1.1.4 A✓
1.1.5 A✓

(5 × 1) (5)

1.2
- Series motor✓
- Shunt motor✓
- Compound motor (long shunt and short shunt)

(Any 2 × 1) (2)

1.3



I, I_{sh}, I_a, Armature, and DC supply is 0,5 mark each
Correct diagram 1 mark (4)

1.4 1.4.1

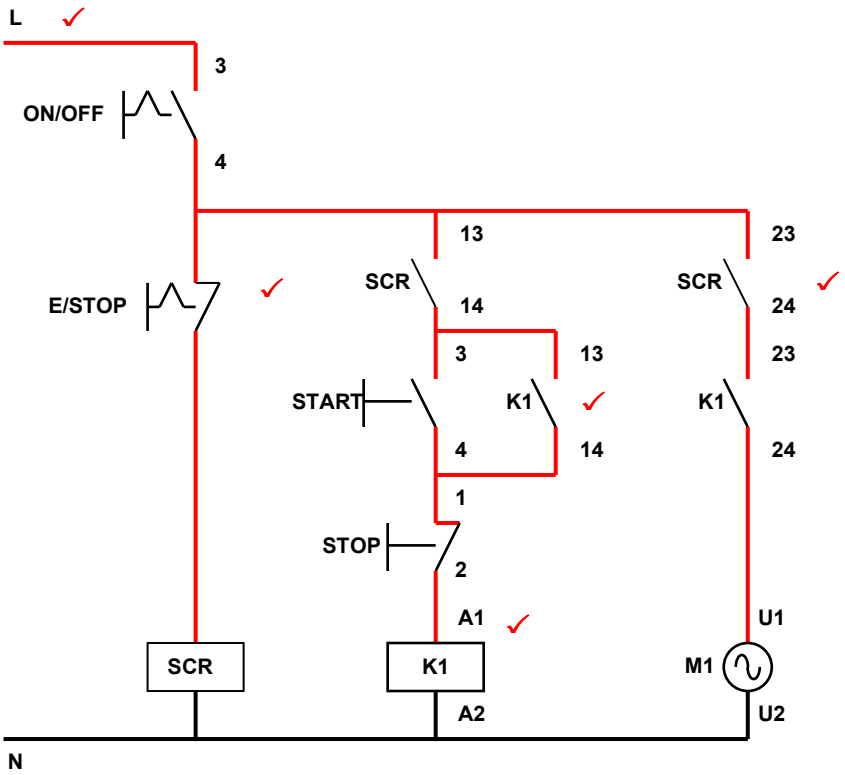


FIGURE 2 (5)

1.4.2 Direct online starter✓ (1)

1.5 $P_{in} = V \times I$
$= 250 \times 10$
$= 2500W$
$= 2{,}5kW$ (3)
[20]

QUESTION 2

2.1 2.1.1 True✓
2.1.2 True✓
2.1.3 True✓
2.1.4 False✓
2.1.5 True✓
(5 × 1) (5)

2.2 Any solid material prevents/blocks the flow of electric current.✓✓ (2)

2.3 Earthed means connected to the general mass of the earth in such a manner as to ensure,✓ at all times, an immediate discharge of electrical energy without danger.✓✓ (3)

2.4
- Vulcanised rubber✓
- Porcelain✓
- Silicon rubber✓
- Bakelite✓
- Polyvinyl chloride (PVC)✓
- Asbestos
- Micanite
- Glass
- Moulded resins and plastics
- Oil-impregnated paper (Any 5 × 1) (5)

2.5 To trip when there is a fault (short circuit or overload)✓✓ (2)

2.6
- Shock current✓
- Over-current✓
- Fault current✓
- Over voltage
- Under voltage
- Excessive temperatures
- Electric arc (Any 3 × 1) (3)

[20]

QUESTION 3

3.1
3.1.1 E✓
3.1.2 C✓
3.1.3 K✓
3.1.4 G✓
3.1.5 F✓
3.1.6 A✓
3.1.7 B✓
3.1.8 D✓
3.1.9 H✓
3.1.10 I✓

(10 × 1) (10)

3.2 3.2.1
- Isolator✓
- Circuit-breaker✓
- Fuse✓
- An overload relay✓
- Emergency stop pushbutton✓ (5)

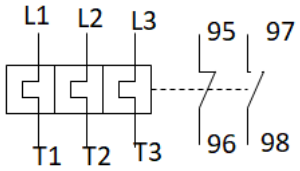
3.2.2
- Isolator – used to connect or isolate the electrical energy to/from the machine.✓
- Circuit-breaker – used to protect the power control circuit wiring from damage.✓
- Fuse – used to protect the power control circuit wiring from damage.✓

- An overload relay – used to protect the load from overload currents.✓
- Emergency stop pushbutton – used to remove the supply from the power and control circuits when an emergency hazard is present – requires manual resetting.✓ (5)

3.2.3 Mechanical interlock✓ and electrical interlock.✓ (2)

3..3
- Digital or analogue multimeter✓
- Insulation-resistance tester (Megger)✓
- Voltage or current tester✓ (3)

3.4



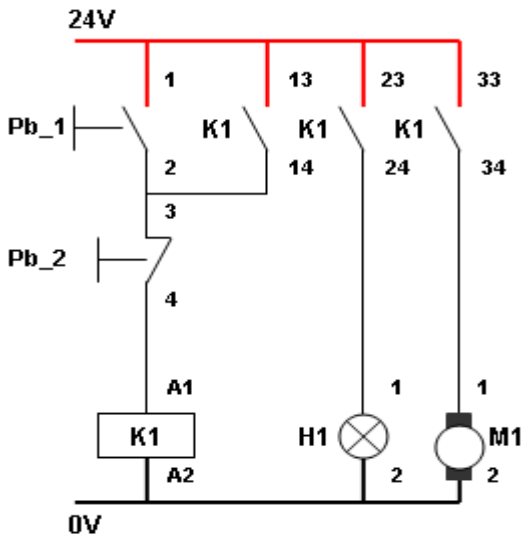
Markers must use their discretion (5)
[30]

QUESTION 4

4.1
4.1.1 Once✓
4.1.2 Devices✓
4.1.3 Relay Logic✓
4.1.4 Numbered✓
4.1.5 Sequence✓
(5 × 1) (5)

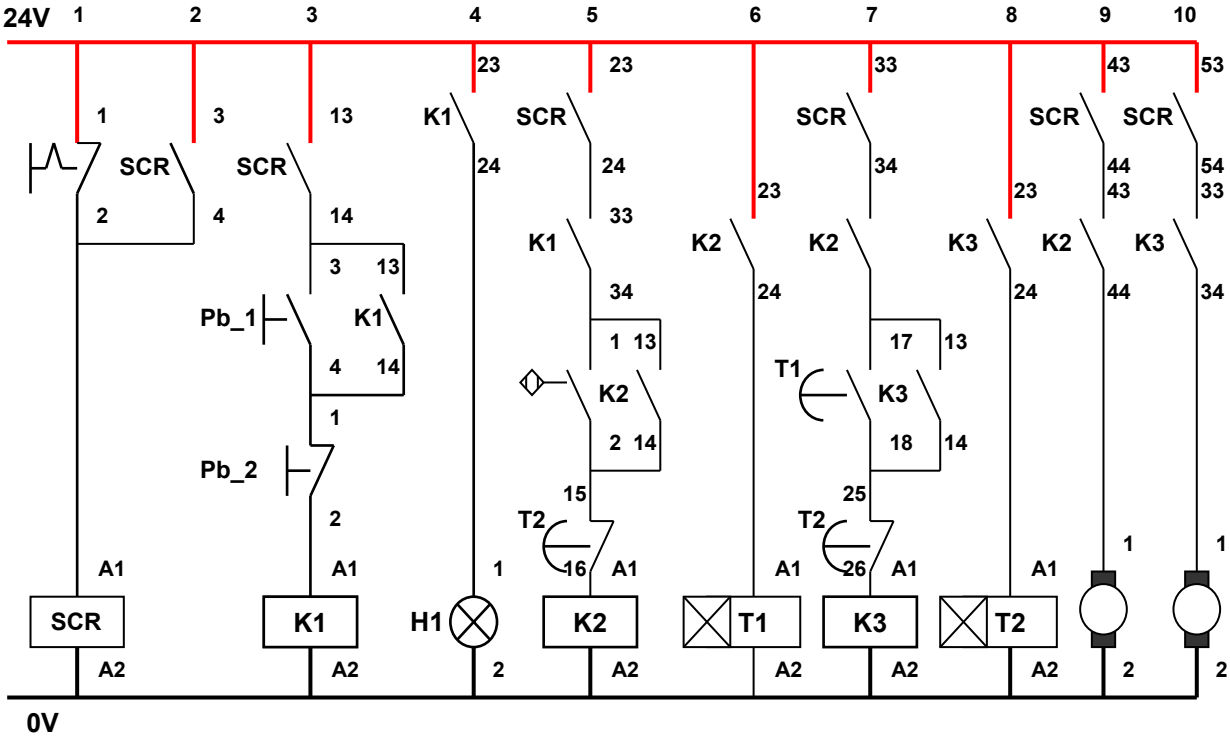
4.2 4.2.1 The output devices (motor and lamp) cannot be connected in series and they need to be connected in parallel.✓✓✓ (3)

4.2.2



(4)

4.3



(8)
[20]

QUESTION 5

5.1 A fault – a condition where at least one component has failed and the operation of the system has stopped.✓✓ (2)

5.2 Symptoms – evidence that something is wrong.✓✓ (2)

5.3 Troubleshooting – to systematically isolate and eliminate faults.✓✓ (2)

5.4 Failure – a condition where the performance of a fixed task of an item under consideration totally fails because of an unknown cause.✓✓ (2)

5.5 Malfunction – the function of a component has failed and is not performed as intended, or is not performed at all.✓✓ (2)
[10]

TOTAL: 100

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