higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

29 July 2021

This marking guideline consists of 6 pages.

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QUESTION 1

1.1
- Design according to the question
- Find suitable contact to retain the circuit
- Use golden rules for the coils
- Switch out the timer when its work is done
- Look for feedback
- Simplify the circuit
- Find a suitable place for a stop button (7)

1.2
- Circuit breakers
- Fuses
- Overload relay (thermal or electromagnetic relays) (3)

[10]

QUESTION 2

2.1
- Armature must rotate
- Main field coils must remain excited
- Main field coils' polarity may not change
- Connect resistor across armature and cut the supply to the armature (4)

2.2
- DC injection
- Eddy current braking (2)

[6]

QUESTION 3

3.1 3.1.1
- Laminated plates are insulated separately.
- They keep eddy current paths apart.

3.1.2
- Carbon brushes are made of material with relatively high contact resistance.
- They have a negative temperature coefficient.

3.1.3
- Thin mica is used to insulate segments from each other
- and from the shaft on the commutator.

(3 × 2) (6)

3.2
- Change armature connection
- Change connections of the field coils (2)

3.3
- It is used to prevent
- or to limit a high starting current. (2)

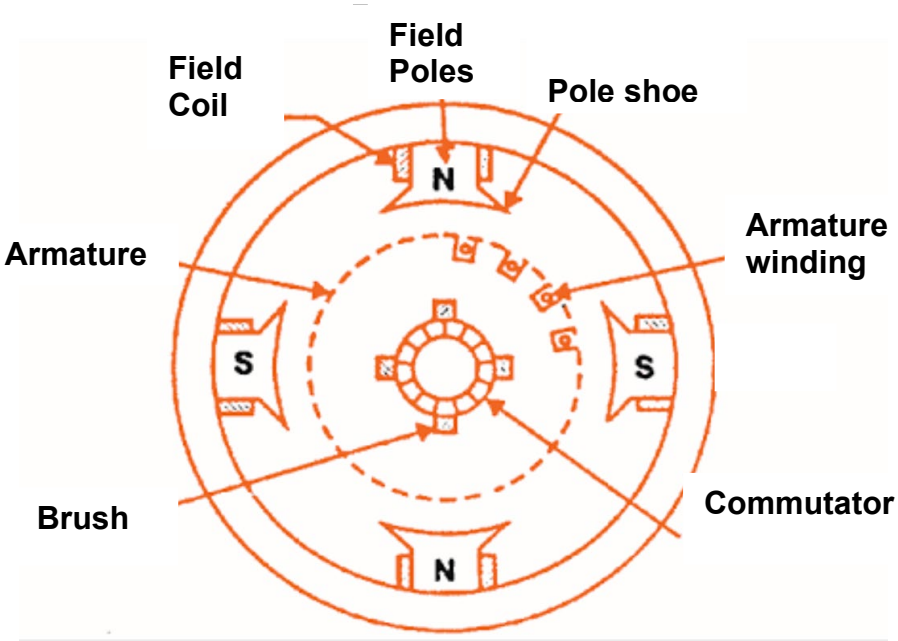
[10]

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QUESTION 4

4.1
- Carbon brushes
- Copper graphite brushes
- Electro-graphite brushes
- Graphite brushes (Any 3 × 1) (3)

4.2



(7)
[10]

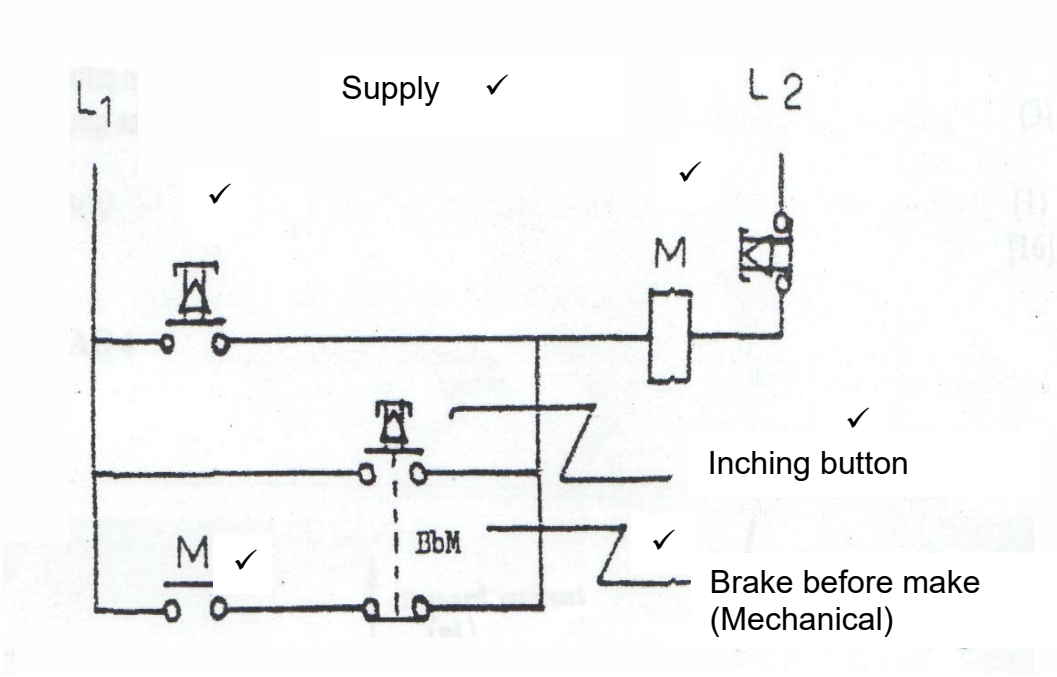
QUESTION 5

5.1
- Reverse phase
- Reverse coil
- Shorted turns
- High resistance connections (4)

5.2
- It is performed with maximum operate current, full speed voltage, and full load speed if possible.
- For multi-speed motors, full speed must be reached for the first half of the test and low speed for the second half of the test.
- Test at least for half an hour. (3 × 2) (6)

[10]

QUESTION 6



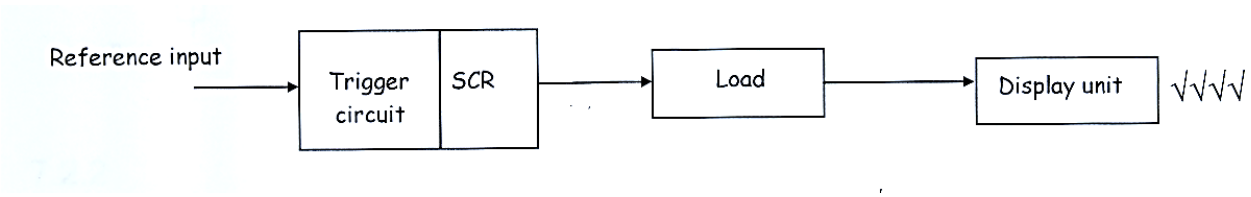
[6]

QUESTION 7

7.1
- It has stable operation.
- It has no noise.
- It is cheap.
- It is small.

(Any 3 × 1) (3)

7.2



- The desired value is set at the reference input.
- The SCR will be triggered by the triggering circuit.
- The output from the load will be measured and displayed in the display unit. (7)

[10]

QUESTION 8

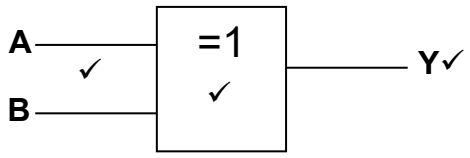
A–Input signal
B–Attenuator
C–Vertical amplifier
D–Delay line
E–Cathode-ray tube
F–Horizontal amplifier
G–Sweep generator (time base)
H–Synchronize pulse generator
I–Trigger circuit
J–Power supply (10 × 1) **[10]**

QUESTION 9

9.1 9.1.1

- (a) NOT gate
- (b) XOR gate
- (c) AND gate (3)

9.1.2



(3)

9.1.3

Inputs		Outputs	
A	**B**	**Y✓✓**	**Z✓✓**
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

(4)

9.2 9.2.1

- (a) clocked SR flip-flop
- (b) clocked SR master/slave flip-flop (2)

9.2.2

S	R	Q	$\overline{Q}$	
0	0	Q_n	$\overline{Q_n}$	✓ ✓
0	1	0	1	✓
1	0	1	0	
1	1	Invalid		✓

(4)

9.2.3 SD stands for preset. (1)

9.2.4 RD stands for prereset. (1)
[18]

QUESTION 10

10.1 $11{,}011_2$

10.2 743_8

10.3 $7{,}625_{10}$

10.4 $A1C{,}E_{16}$

10.5 $000101101{,}111_2$

(5 × 2) **[10]**

TOTAL: 100

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