higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

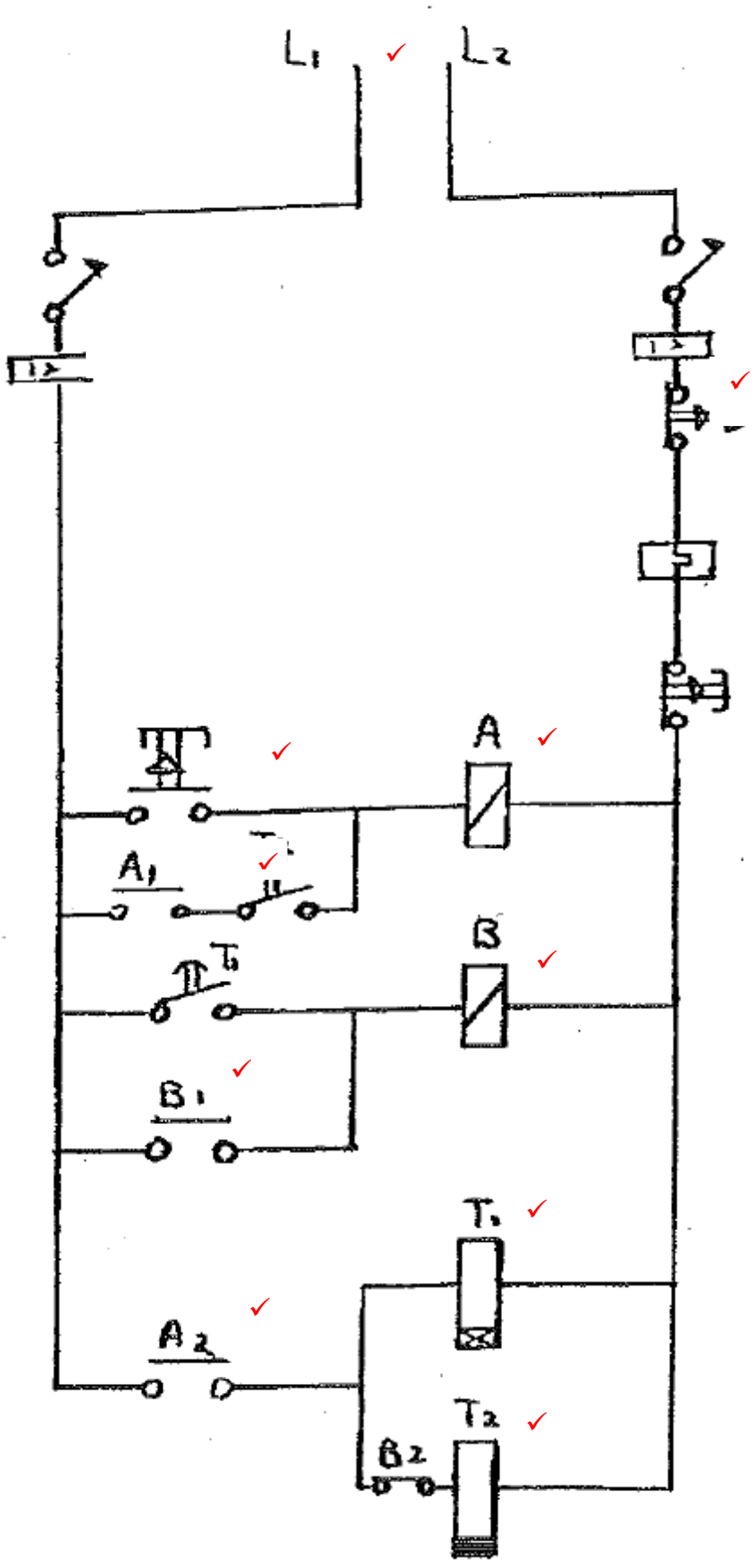
FAULT FINDING AND PROTECTIVE DEVICES N5

31 JULY 2019

This marking guideline consists of 6 pages.

Copyright reserved

QUESTION 1



[10]

QUESTION 2: ANSWER SHEET

PROBLEMS	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Gradual wear of brushes	Normal✓	Do not change type of grades of brushes.✓
Brushes wears rapidly	Humidity below 6 grain/m^2✓	Humidity in air from steam or water.✓
Wear, hot shunt and arcing	Wrong brush pressure✓	Adjust brush pressure.✓
Sparking	No film on commutator✓	Leave as is as film will form in due time.✓
Vibration of brushes	Brush box too far from commutator, brush angle wrong✓	Adjust brush box 3 mm from commutator. Adjust brush box angle.✓

[10]

QUESTION 3

3.1
- Variable loss
- Constant loss
- Main loss

(3)

3.2
- Swinburne break test
- Hopkinson break test

(2)

3.3
- Rope break test
- Prone break test

(2)

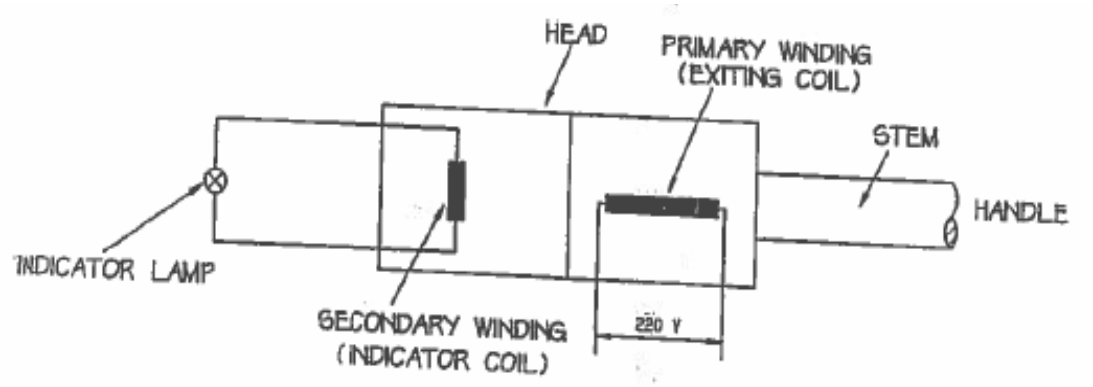
3.4
- They are relatively cheap.
- They have a very simple construction.
- They require little maintenance.
- They have a high starting current.
- They have a high operating torque.

(Any 3 × 1) (3)

[10]

QUESTION 4

4.1



(6)

4.2 4.2.1 Checks the correct polarity of the field winding or checks whether the supply is in the correct direction to set up the magnetic field with the required polarity

4.2.2 Obtains the neutral point of brushes on the commutator

(2 × 2) (4)

[10]

QUESTION 5

5.1 5.1.1 No-load current
5.1.2 Output line
5.1.3 Torque line
5.1.4 Rotor copper losses
5.1.5 Stator copper losses
5.1.6 Constant losses (6)

5.2
- The armature must rotate.
- The coils of the main field must remain exited.
- The polarity of the main field coils must not change.
- Connect the resistor across the armature and cut the supply to the armature. (4)

[10]

QUESTION 6

6.1 $$Deflection = \frac{E \times L \times I}{2 \times d \times V_a}$$ ✓

$$= \frac{15 \times 25 \times 10^{-3} \times 300^{-3}}{2 \times 42 \times 10^{-3} \times 1\,000}$$ ✓✓

$$= 1{,}34\ mm$$ ✓ (4)

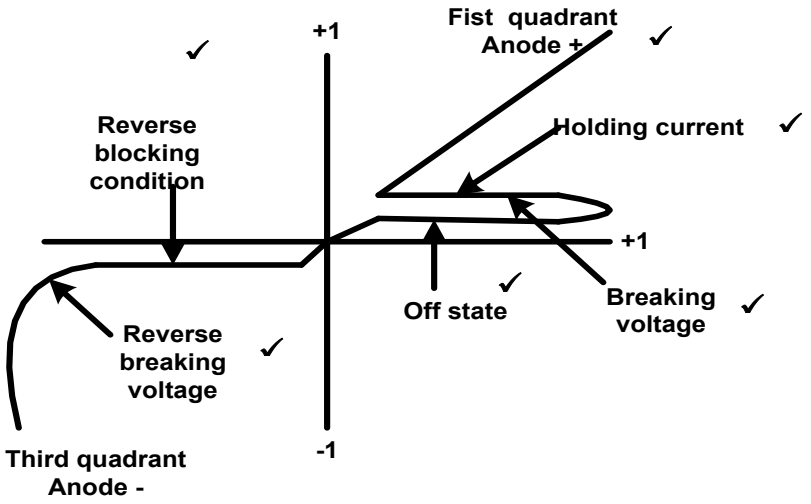
6.2
- The deflection voltage.
- The length of the deflection path in the deflecting field.
- The distance from the deflecting system to the target. (3)

6.3
- It measures AC and DC volts.
- It measures frequency.
- It analyses waveforms.
- It indicates phase difference between signals.
- It indicates wave distortion. (Any 3 × 1) (3)

[10]

QUESTION 7

7.1



(6)

7.2 A holding current is the minimum current required to hold an SCR in its conducting state. (2)

7.3
- Forced commutation
- Line commutation
- Reduce the anode to cathode current to below the minimum holding current (Any 2 × 1) (2)

[10]

QUESTION 8

8.1
- Serial to parallel converter
- Parallel to serial converter
- Delay line
- Ring counter
- Twisted ring counter
- Sequence generator (Any 4 × 1) (4)

8.2 FOUR flip-flops (2)

8.3

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

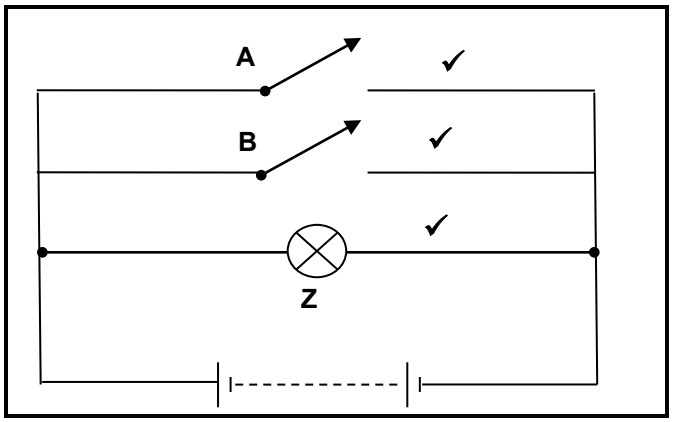
✓ ✓ ✓ ✓

(4)
[10]

QUESTION 9

9.1 4 possibilities (1)

9.2



✓ ✓ ✓

(3)

9.3 9.3.1 Exclusive OR gate (XOR)
9.3.2 AND gate
9.3.3 NOR gate

(3 × 2) (6)
[10]

QUESTION 10

10.1 60, 5_{10}
10.2 010 011 110_2
10.3 0011 1011 1111,1010_2
10.4 81,125_{10}
10.5 117_8

(5 × 2) **[10]**

TOTAL: 100

Copyright reserved