higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

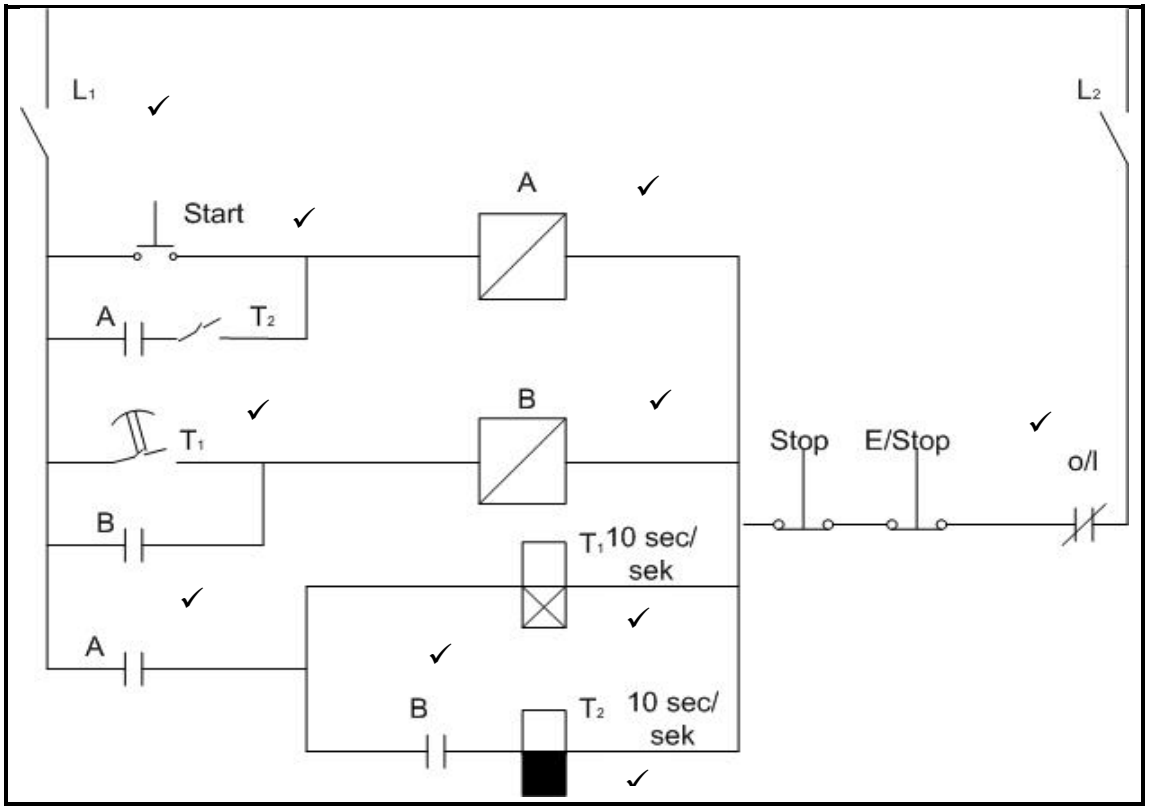
27 JULY 2018

This marking guideline consists of 7 pages.

Copyright reserved

QUESTION 1

1.1



[10]

QUESTION 2

- No supply at L,N → Connect supply
- Open circuit → Test for fault and rectify
- Open coil → Change coil
- Armature mechanically prevented → Open coil from pulling
- Air gap too big → Set air gap (5 × 2) **[10]**

QUESTION 3

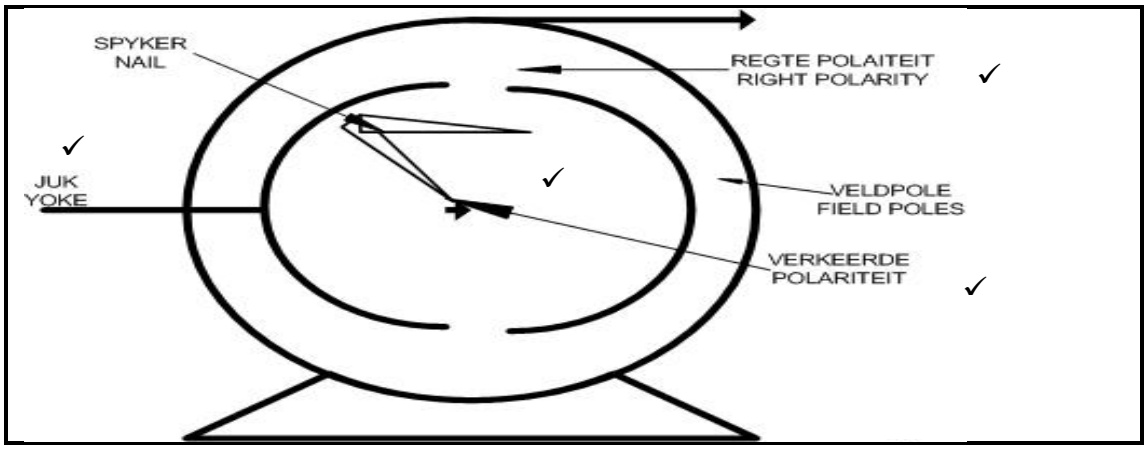
3.1 3.1.1 Armature – Is the rotating part of the machine and is mounted on a shaft and is used to provide a surface for the bearing to rotate in the end plates.

3.1.2 Brush holders – Are used to hold the brushes securely in position to make contact with the commutator.

3.1.3 Slip-ring – Is a conducting ring rotating with a winding and connected thereto and serving to make connection with an external circuit by means of a brush or brushes.

(3 × 2) (6)

3.2



(4)
[10]

QUESTION 4

4.1
- Brush contact losses
- Armature copper losses (2)

4.2
- Shunt field copper losses
- Friction losses
- Wind (mechanical) losses (3)

4.3
- Electrical or copper losses
- Iron losses
- Mechanical losses (3)

4.4
- Graphite brushes
- Copper graphite brushes
- Carbon brushes
- Elect-graphite brushes (Any 2 × 1) (2)

[10]

QUESTION 5

5.1 Disconnect the supply to the stator windings; between any two windings connect a DC supply. The magnetic field due to the DC supply will cause a slow rotation of the rotor. (3)

5.2 Supply current:

$$I_S = \frac{30000}{220}$$

$$= 136{,}363A$$

When the motor runs at full speed, the current is 150% of the supply current.

$$\begin{aligned} I_{fullspeed} &= I_s \times 1{,}5 \\ &= 136{,}363 \times 1{,}5 \\ &= 204{,}545A \end{aligned}$$

The value of DB resistor:

$$R_{DB} = \frac{V_T}{I_{fullspeed}}$$

$$= \frac{220}{204{,}545}$$

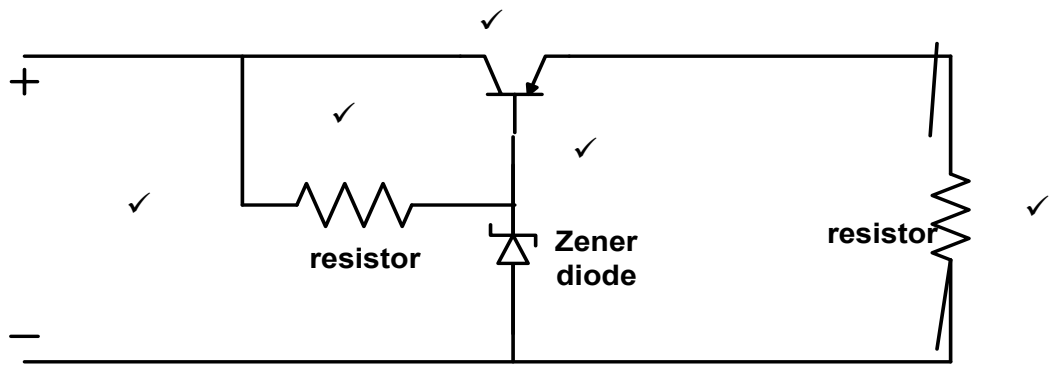
= 1,076 Ω (5)

5.3
- For lowering or hoisting (lifts)
- In overhead cranes
- For short movements (Any 2 × 1) (2)

[10]

QUESTION 6

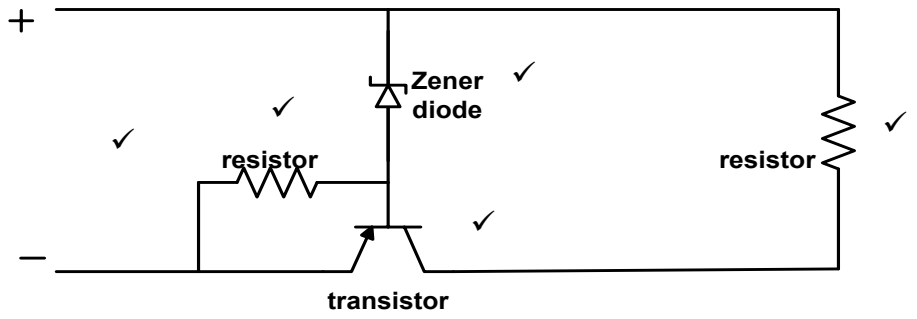
6.1



Positive Series Regulator

(5)

6.2



Negative Series Regulator

(5)
[10]

QUESTION 7

7.1 It is a two-channel recorder that plots one variable against another variable. (2)

7.2
- Selectable pen and carriage speeds
- Vacuum paper hold down
- Built-in electronic time-base
- Electric pen lift
- Zener reference supplies
- Selectable balancing speed (6)

7.3 Self-balancing potentiometer is use to control both the pen carriage position on one axis and the pen position on the carriage on the other axis. (2)
[10]

QUESTION 8

8.1 8.1.1 The output signal is not monitored and information is not fed back to control the amplifier.

8.1.2 The output signal is monitored and information is fed back to the input.

8.1.3 The output signal is feedback in phase with input signal.

8.1.4 The output signal is feedback in anti-phase with input signal.

(4 × 2) (8)

8.2
- It is cheap
- It is small
- It has stable operation
- It has no noise
- It has a low power consumption
- It is reliable

(Any 2 × 1) (2)
[10]

QUESTION 9

9.1
- J-K flip-flops
- R-S flip-flops
- D-type flip-flops
- T-type flip-flop

(Any 2 × 1) (2)

9.2 **NAND gate**

A	**B**	**$\overline{A.B}$**	
0	0	1	✓
0	1	1	✓
1	0	1	✓
1	1	0	✓

exclusive NOR gate

A	**B**	**$\overline{A+B}$**	
0	0	1	✓
0	1	0	✓
1	0	0	✓
1	1	1	✓

(2 × 4) (8)
[10]

QUESTION 10

10.1 $50,625_{10}$

10.2 1001111_2

10.3 86_{10}

10.4 $0011\ 1010\ 1011_2$

10.5 $10111,011_2$

(5 × 2) **[10]**

TOTAL: 100

Copyright reserved