higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## FAULT FINDING AND PROTECTIVE DEVICES N6

## 9 April 2021

**This marking guideline consists of 6 pages.**

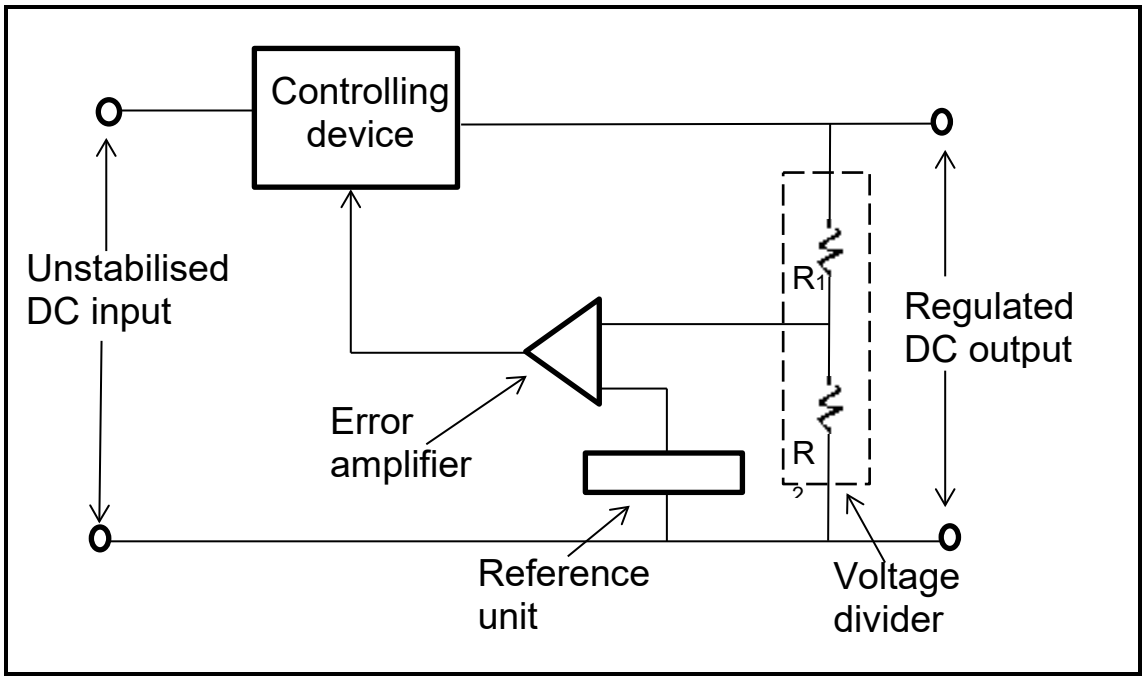
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**QUESTION 1**

1.1 1.1.1 Overcharging or leaks, adjust or repair
1.1.2 Repair or adjust the charger
1.1.3 Check voltage and electrolyte
1.1.4 Provide cooling or reposition
1.1.5 Repair or adjust

(5 × 1) (5)

1.2




(7)

1.3
- It is when a battery is continually connected to a load and is designed to maintain a constant voltage throughout its load range.
- The voltage to the battery should supply sufficient current to the battery to overcome internal losses and keep the battery fully charged so that the voltage from the battery remains at the correct value under all conditions. (4)

**[16]**

**QUESTION 2**

2.1 2.1.1 A dependent time delay having an operating time which is an inverse function of the electrical characteristic quantity.

2.1.2 The quality whereby a protection system remains inoperative under all conditions other than for which it is specifically designed to operate.

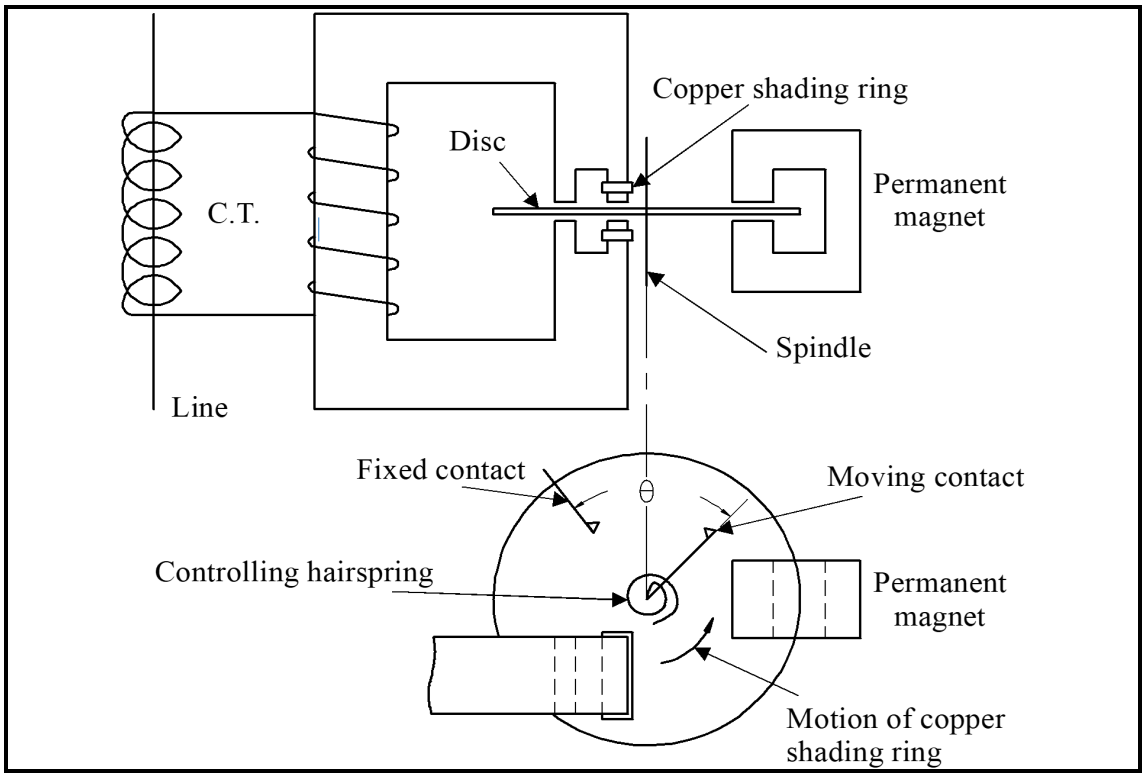
2.1.3 Intended to improve the reliability of the whole system, as protective relays are sensitive and must act within fairly fine limits.

(3 × 2) (6)

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2.2
- Lightning
- Switching surges
- Static
- Contact with a high-voltage system
- Line to ground faults
- Resonant conditions
- Restriking ground faults (7)

2.3




(7)
**[20]**

**QUESTION 3**

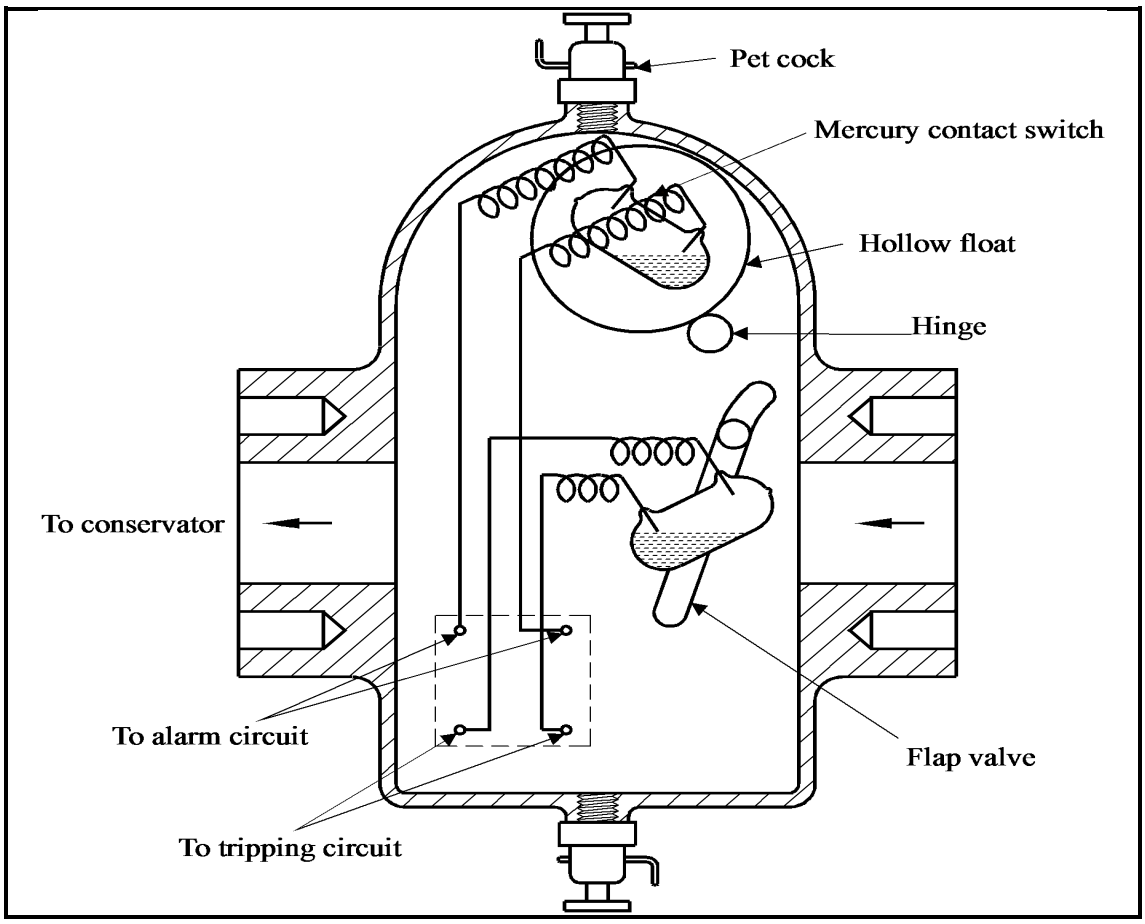
3.1
- They safeguard the supply.
- They safeguard switching and other equipment.
- They safeguard against overvoltage, lightning and switching surges.
- They provide a path to earth.
- They prevent a line current to follow through the equipment. (5)

3.2
- Spark-over test
- Operating duty cycle
- Surface contamination
- Unipolar oscillating impulse test
- Duty test with repeated spark-over
- Partial discharge
- Corrosion test
- Exposure to charging temperature
- Vibration seismic test (Any 8 × 1) (8)

3.3 A positive charge cloud will induce a negative charge into both conductors and the earth wire so that the potential in the neighbourhood of the line is reduced. The magnitude of the line is protected. (4)
**[17]**

**QUESTION 4**

4.1




(7)

4.2
- High oil temperature alarm.
- High winding temperature alarm.
- Discolouration of insulation oil.
- Gas accumulation in Buchholz relay.
- Buchholz relay alarm.
- Abnormal noise produced by the transformer.
- Furan analysis indicating deterioration of winding paper insulation.
- PD analysis results indicating the presence of PD activity inside the transformer.
- Spurious tripping. (Any 6 × 1) (6)

4.3
- Operating temperature
- Atmospheric conditions
- Presence of moisture or fibres (3)

**[16]**

## QUESTION 5

5.1
- Continuity test
- Phase identification test
- Short-circuit test
- Insulation resistance test (4)

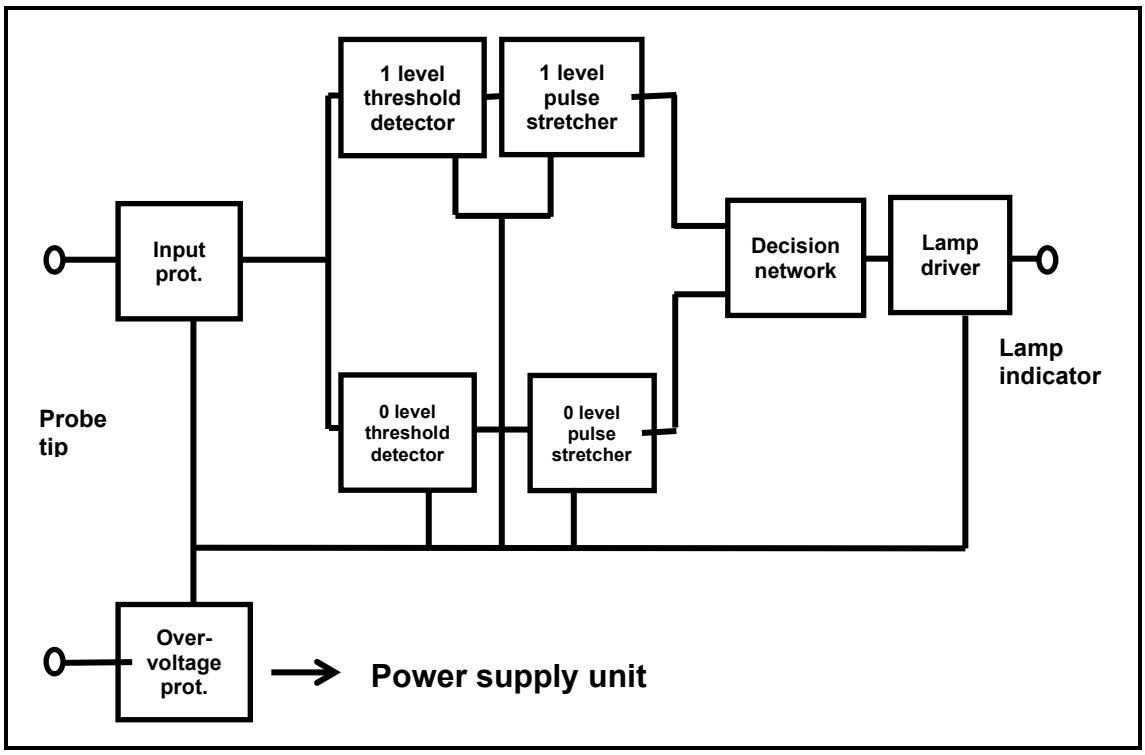
5.2
- Earth fault
- Open circuit
- Short circuit (3)

5.3
- Pick holes
- Too sharply bents
- Excavation damage
- Spikes
- Corrosion
- Electrolyte (6)

**[13]**

## QUESTION 6

6.1

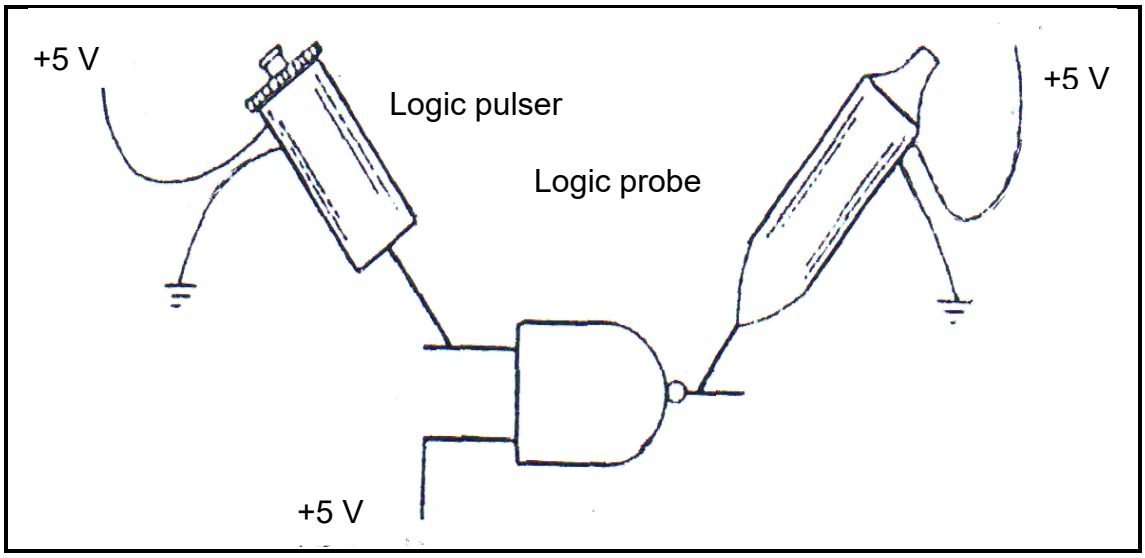



(10)

6.2 A logic pulser is a digital test instrument used to inject a logic signal into a digital circuit. (2)

6.3 Erratic triggering is caused by an insufficient gate current, especially when the SCR is cold. (2)

6.4




(4)
**[18]**

**TOTAL: 100**

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