higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

26 MARCH 2018

This marking guideline consists of 6 pages.

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QUESTION 1

1.1
- No smoking during maintenance
- Acid will destroy an alkaline cell
- Check electrolyte level
- Avoid spilling, keep installation dry
- If body is enclosed in steel, normal position, insulate them from each other
- Battery lugs checked for dry or poor connections
- Do not treat battery terminals or interconnections with grease
- Clean off deposits on top surface of cell
- Investigate cells for creaks
- If electrolyte is in excess of normal use, check charging rate
- Charger on float, tests each cell voltage
- Record S.G readings
- A yearly boost charge is recommended
- Never leave boost charge on, if unattended
- Check if voltage is retained after switched off for period
- Check output voltage (16 × ½) (8)

1.2 Final voltage is the voltage at which maximum AH can be obtained before the cell is exhausted. (2)

1.3
- Rated capacity
- Performance at low temperature
- Life ability
- Conservation of charge
- SG of electrolyte (5)

[15]

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 protective system distinguishes between those conditions for which it is intended to operate and those for which it shall operate

2.1.3 The quality whereby a protectuve system remains inoperative under all conditions other that for which it is specifically designed to operate

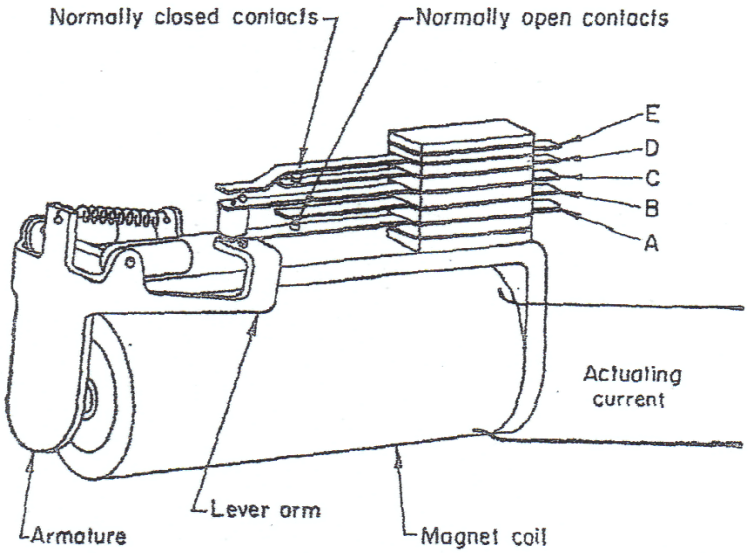
2.1.4 Intended to improve the reliability of the whole system, as protective relays are sensitive and must act within fairly fine limits

(4 × 2) (8)

2.2
- Current transformer
- Voltage transformer
- Relay
- Circuit breaker
- Batteries (5)

2.3
- Time delay is biggest at sending end where it should be least – fault should be cleared quickly the closer they are to the grid sub
- Sensitivity only good at minimum operating, and becomes erratic at small overloads – only suitable for short circuits
- If the most distant relays operating time setting is less than 0,4 sec, or if the different in time setting between consecutive relays is less than 0,4 sec, the system becomes unstable (3)

2.4 Attracted armature relay



(6)
[22]

QUESTION 3

3.1
- Safeguard the supply
- Safeguard switching and other equipment
- Safeguard against over-voltage, lightning and switching surge
- Provide path to earth
- Prevent line current to follow through the equipment (5)

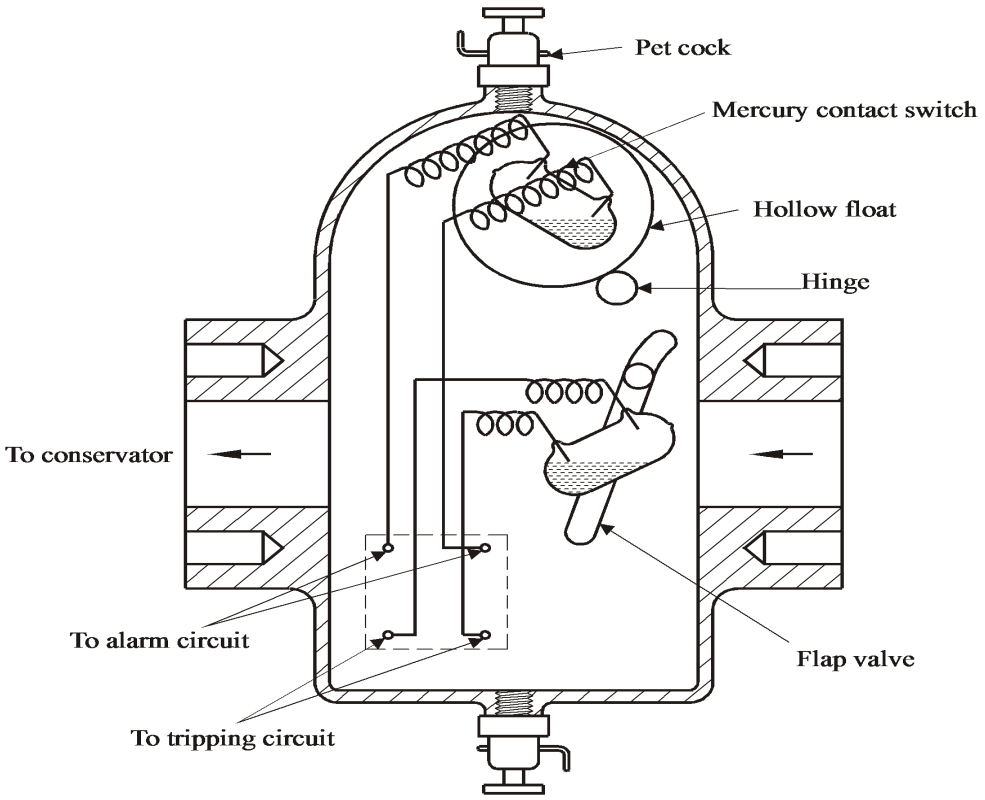
3.2
- Over-current
- Earth fault
- Buscholtz relay
- Temperature
- Zone protection
- Closing spring not wound up properly
- Fuse blown
- No supply
- Closing coil faulty
- OCB aux switch open or faulty
- Mechanical latch faulty, spring motor limits not making (12 × ½) (6)

3.3
- No supply
- Trip coil faulty
- Fuse blown
- Close push button closed
- Wire burnt off
- Open link
- Push button faulty
- Low supply
- Contacts of protective device faulty
- Open aux switch
- Back in system aux OCB contacts faulty (12 × ½) (6)

[17]

QUESTION 4

4.1



(7)

4.2 By using a circuit breaker and overcurrent relay combination. The relay must be an inverse definite-minimum time delay. (2)

4.3
- Tank earth
- Gas detection
- Current detection
- Over fluxing
- Overheating
- Over current
- Unrestricted earth fault
- Restricted earth fault (8)

[17]

QUESTION 5

5.1
- It is useful only for shunt faults and only if at least one healthy conductor is available.
- The fault resistance should be below 200 Ω.
- The test is not suitable for open circuit faults.
- Only the approximate location of the fault can be identified.
- The other end of the cable should also be accessible for fixing a jumper. (5)

5.2
- Earth faults
- Open circuit
- Shorts circuit (3)

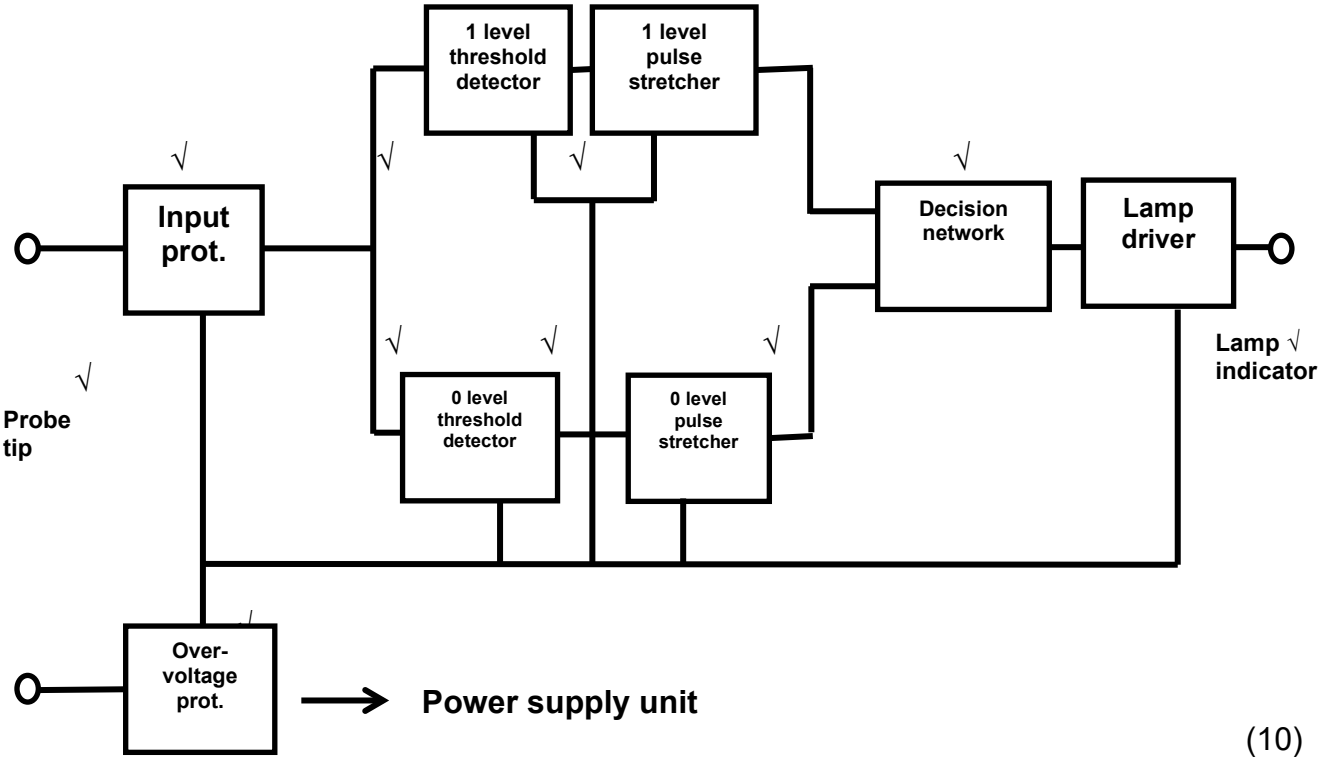
5.3

	Rated voltage	Between conductors	Conductors to earth	Condition	Time
5.3.1	300/500	1 500	1 500	New and used	10 min✓✓
5.3.2	600/1 000	2 000	2 000	New and used	10 min✓✓

(2 × 2) (4)
[12]

QUESTION 6

6.1



(10)

6.2
- DC tacho feedback
- Digital tacho feedback
- AC tacho feedback
- Terminal voltage feedback (4)

6.3 A logic pulser is a digital test instrument used for injecting logic signals into a digital circuit. (2)

6.4 Metal-oxide varistor is a bi-directional breakdown device. (1)
[17]

TOTAL: 100

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