higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

23 JULY 2018

This marking guideline consists of 7 pages.

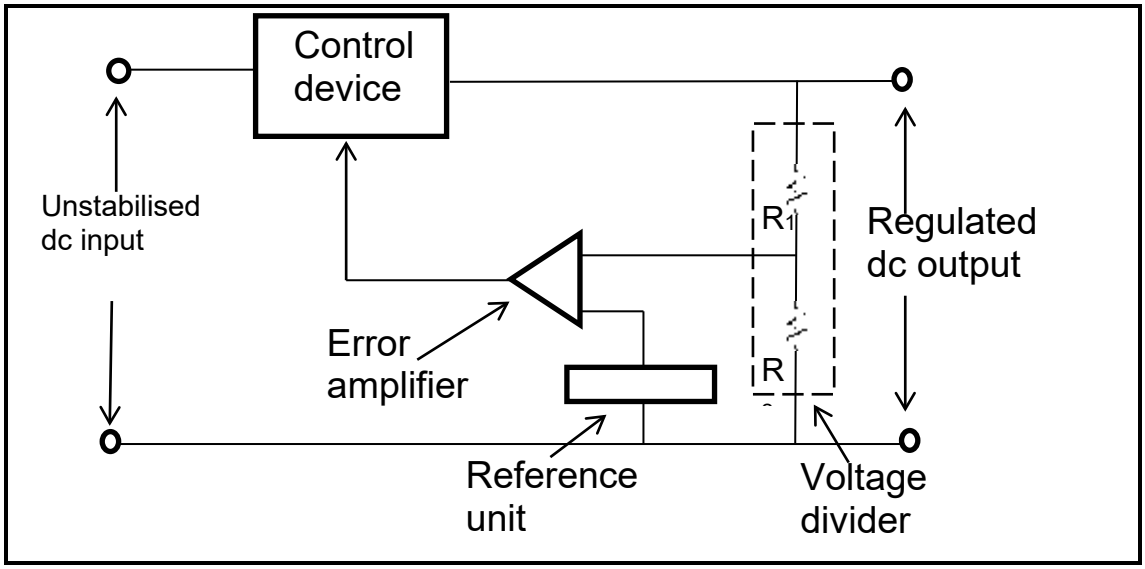
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QUESTION 1

1.1 1.1.1 Distilled water
1.1.2 Distilled water
1.1.3 Potassium hydroxide solution

(3 × 1) (3)

1.2



(7)

1.3
- Voltmeter
- Ammeter
- Hydrometer
- Cadmium testing electrode
- Zinc testing electrode
- Multimeter

(Any 5 × 1) (5)
[15]

QUESTION 2

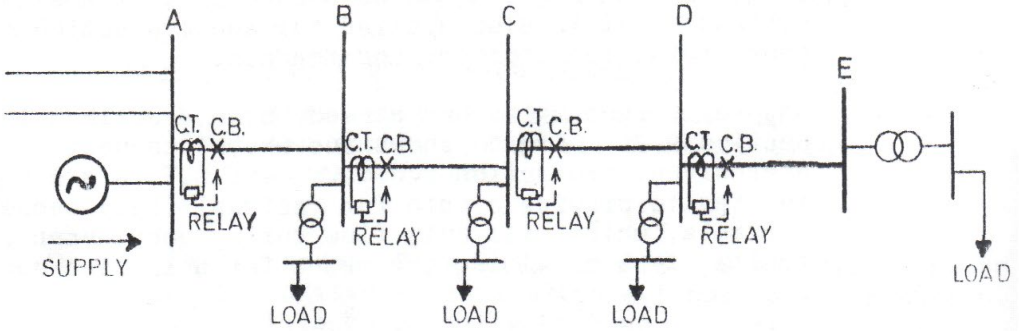
2.1 *Protection relay* refers to a design to initiate disconnection of part of an electrical installation or to operate a warning signal in the case of a fault or other abnormal condition in the installation. (2)

2.2
- Pilot wire polarity
- Tripping time
- Through fault
- Reverse pilot wire open
- Pilot wire insulation
- Polarity at both ends
- CT's ratio
- CT magnetisation curves
- CT polarity
- Relay operation
- Relay characteristics
- Pilot wire resistance

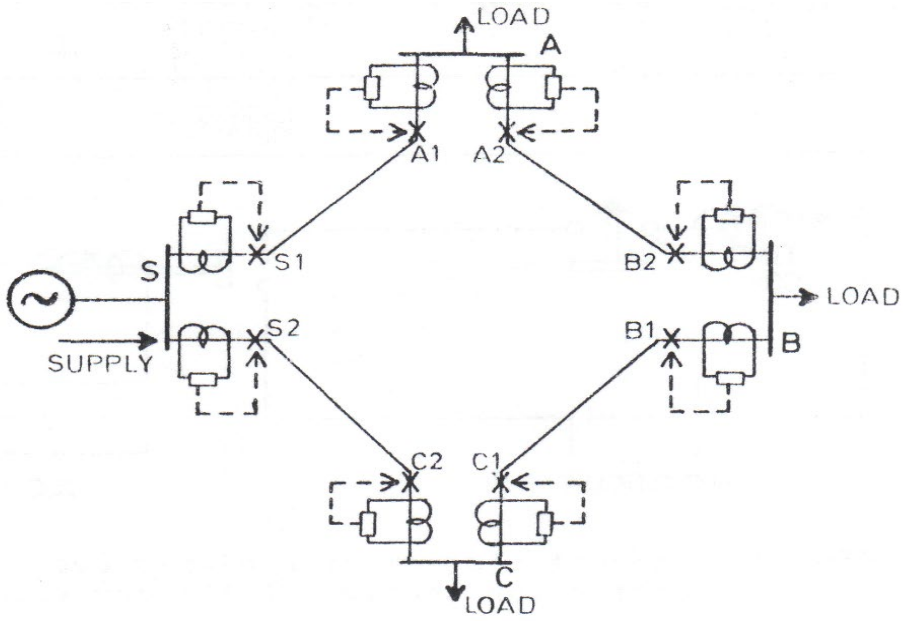
(12 × ½) (6)

2.3

2.3.1



2.3.2



(2 × 4) (8)

2.4 100% current setting = 5A in relay
5A × 1,3 factor ✓ = 6.5 A in relay✓
Primary current = CT ratio x relay current✓
= 400/5 × 6,5✓
= 520 A✓ (5)
[21]

QUESTION 3

3.1
- Spark-over test
- Operating duty cycle
- Surface contamination
- Unipolar oscillating impulse
- Duty test with repeated spark-over
- Partial discharge test
- Corrosion test
- Exposure to changing temperature
- Vibration seismic test (Any 8 × 1) (8)

3.2
- Impulse test
- Power frequency test
- Temperature test
- Short-circuit test
- Verification of making and breaking test
- Mechanical operation test
- Weather proofing test (Any 6 × ½) (3)

3.3
- The instant the contacts of a circuit breaker part or begin to part there is a large current and a small voltage drop.
- A small separation of contacts does not result in an immediate cessation of the current, for as the contacts separate, the resistance between them increase and causes ohmic loss.
- The ionised air or oil vapour acts as a conductor because of the number of free electrons present, and current flows without immediate change across the arc that is formed.
- The potential drop between the contacts is quite small and just sufficient to maintain the arc.
- Separation of the contacts draws the ARC out, but it is not practical to draw the arc out to such a length that the voltage available is insufficient to maintain the arc.
- What can be done, is to decrease the density of the free electrons, i.e. reduce the ionisation and decrease the diameter of the ARC (Any 5 × 1) (5)

[16]

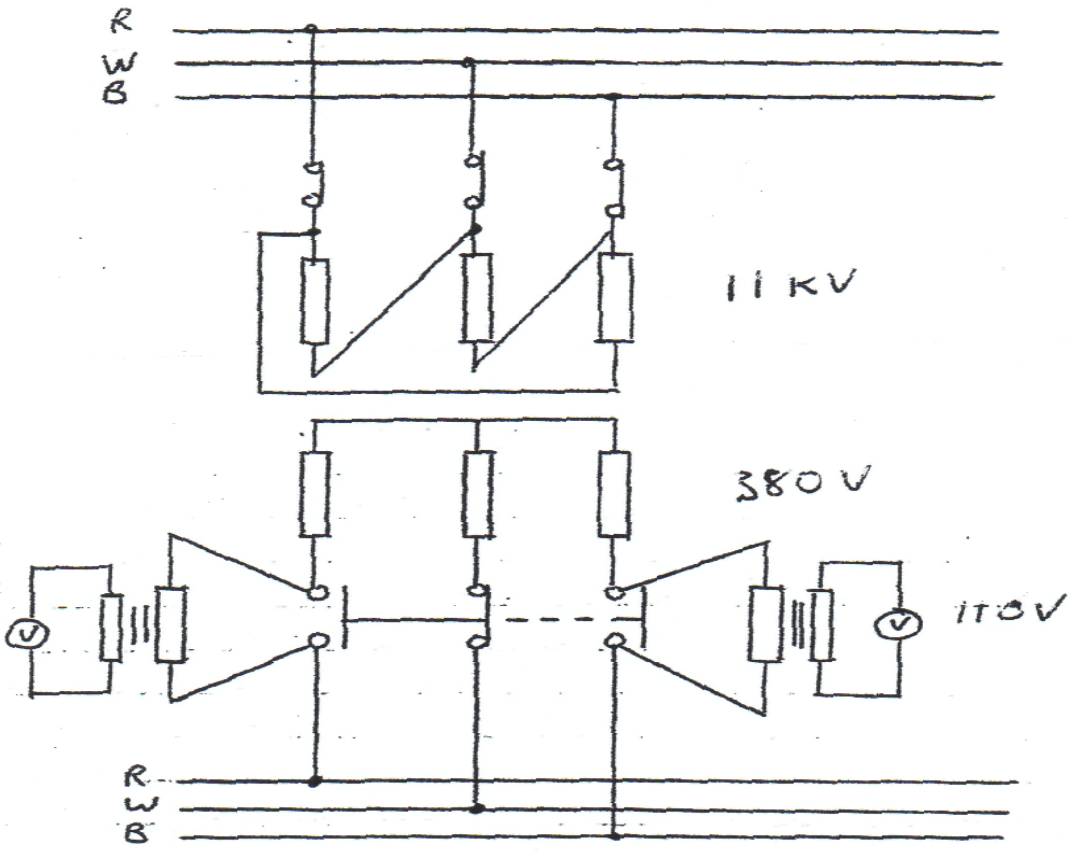
QUESTION 4

4.1
- Hot spot in the core to eddy currents where lamination insulation is poor.
- Failure of core bolt insulation.
- High-resistance joints causing heating.
- Interterm fault which dissipate only a small amount of power. (4)

4.2 Alarm; 90 ac.
Trip: 100 ac. (2)

4.3
- Electric strength
- Moisture content
- Flash point
- Pour point
- Acidity
- Viscosity
- Sludge
- Density
- Oxidation
- Corrosive sulphur
- Neutralisation
- Dielectric dissipation (Any 8 × ½) (4)

4.4



(6)
[16]

QUESTION 5

5.1 5.1.1
- Wrong type of material
- Wrong type of tape
- Wrong type of resin
- Wrong type of heat shrinks
- Moisture
- Poor workmanship
- Faulty materials (Any 3 × 1)

5.1.2
- Bad design
- Voids between insulation layers
- Migration of oil
- Moisture
- Burst lead sheath
- Too much heat (Any 3 × 1)

5.1.3
- Pick holes
- Too sharply bent
- Excavation damage
- Spikes
- Corrosion
- Electrolysis (Any 3 × 1)

(3 × 3) (9)

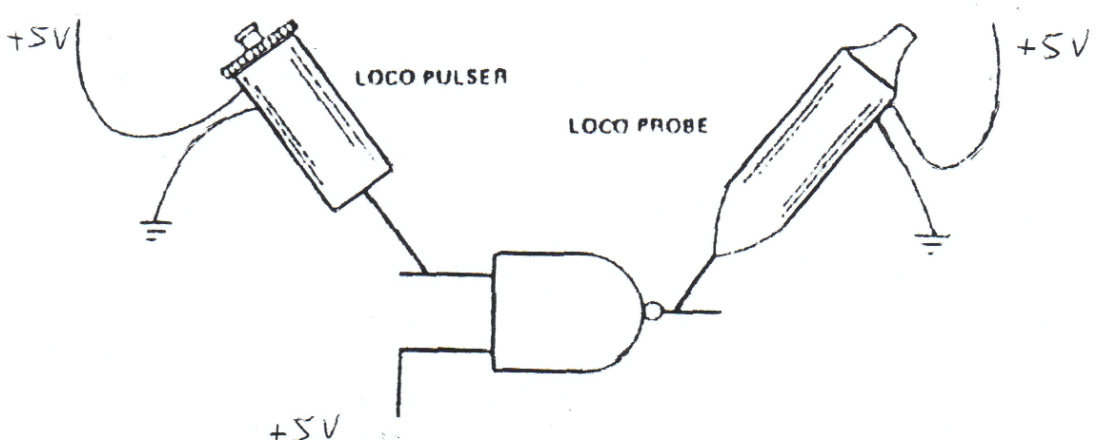
5.2
- When a cable stretch is opened for cutting a cable,✓ it is difficult to identify the correct cable from the many cables.✓
- Before cutting the cable, it must be de-energised.✓
- The spike method is a positive method to ensure de-energisation.✓
- The spike method is a safety device for the electrician to prevent injury or loss of life. ✓ (5)

5.3
- Trip OCB.
- Rack down.
- Test for inductive voltage with an HV tester.
- Earth OCB.
- Lock all possible entrances.
- Use safety tapes.
- Use safety notices.
- Withdraw the voltage transformer used for HV. (8)

[22]

QUESTION 6

6.1



(4)

6.2
- Open bond
- Short between input and output
- Short between two pins
- Internal circuit failure

(4)

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

[10]

TOTAL: 100

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