higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N4

9 APRIL 2018

This marking guideline consists of 5 pages.

Copyright reserved

QUESTION 1

1.1 When a fault is encountered,✓ the person who is responsible for repairing the fault should not only consider the fault itself,✓ but also the problem that caused the fault.✓✓ (3)

1.2 1.2.1 The circumstances under which a fault occurred should be investigated.✓ This include gathering and analysing the facts, what they mean and what conclusion can be made.✓ These records should be kept.✓

1.2.2 When a machine suddenly stops or does something it should not,✓ do not jump to conclusions as to what the cause is.✓ It is better to ask what the symptoms of the problem are.✓

1.2.3 This could give an indication of which fault occurred previously on the machine and in the productions process✓ and how the fault was dealt with.✓ According to these records improvement can be made.✓

1.2.4 Different people interpret facts differently.✓ Views from different perspectives could contribute to a better understanding of the problem.✓✓

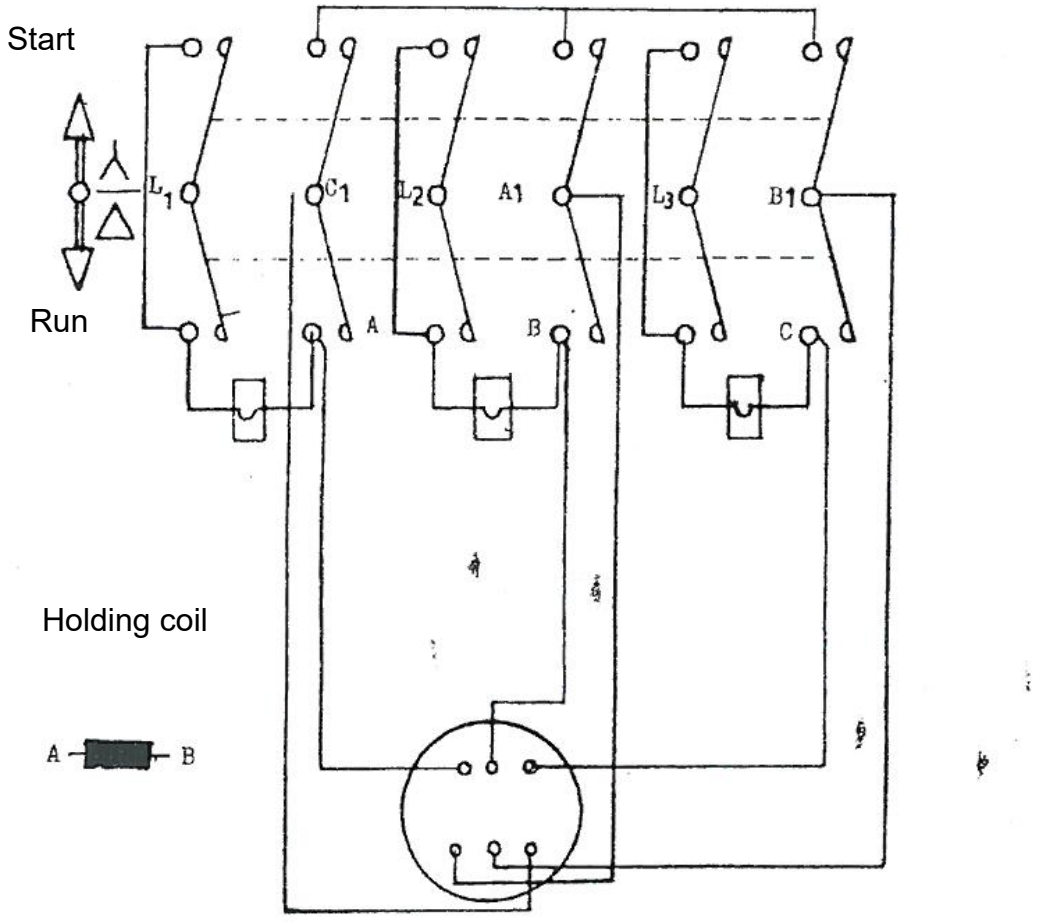
1.2.5 There are always rules that apply to the use✓ and handling of machines, i.e. care, maintenance, safety and operations.✓✓

(5 × 3) (15)
[18]

QUESTION 2

2.1 If a point is selected between X and R,✓ this point will be at a certain potential if the switch is closed. Another point at Z,✓ with the same potential as Y exists between r and R2.✓ No current flows✓ through the two points with the same potential.✓ If a connection exists and the two switches, K and S, are closed,✓ the potential across Y and Z can be balanced by adjusting the variable resistor r.✓ No deflection will be shown by the galvanometer and Y and Z will be at the same potential when the ratio between r and R✓ is equal to the ratio between r and R2.✓ (8)

2.2



(10)
[18]

QUESTION 3

3.1 It is the unit of the resistance which produces 1 joule energy✓ when 1 ampere flows through it for 1 second.✓ (2)

3.2 A steel core consists of a magnetic field.✓ The current in the conductor changes or reverses and the magnetic field also changes direction.✓ Work is done which represents a core loss.✓ (3)

3.3 3.3.1 POLARISED CAPACITORS
- Electrolytic
- Tantalum (2 x 1) (2)

3.3.2 NONPOLARISED CAPACITORS
- Silver mica
- Polystyrene
- Polycarbonate
- Ceramic
- Paper dielectric
- Polyester (Any 3 x 1) (3)

3.4
- Dielectric strength
- Distance between the plates
- Area of the plates (3 × 1) (3)

3.5 It consists of a coil which is connected in series with the main circuit,✓ a soft iron core is connected with an oil dashpot time delay mechanism✓ and a normally closed contact✓ for the control circuit.✓ (4)

[17]

QUESTION 4

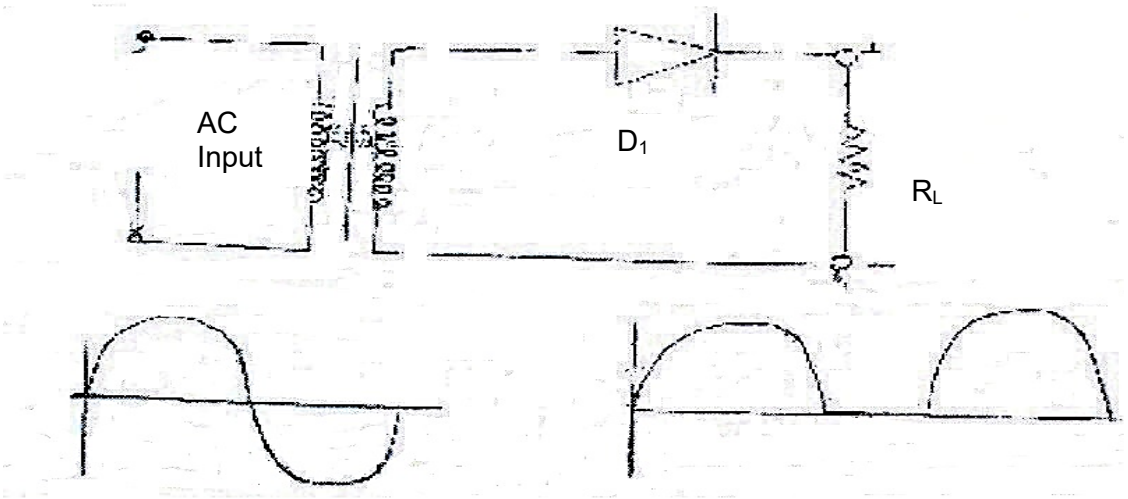
4.1 4.1.1 It gives a deflected electron the shape of the waveforms.

4.1.2 It emits electrons at a high speed towards the screen of the CRT. (2 x 2) (4)

4.2
- A relay is a magnetic switch used in low-voltage circuits.
- A contactor is a magnetic switch used in high-voltage circuits. (2 x 2) (4)

4.3 A voltage tester is used in fault finding circuits with voltages ranging between 110 V and 750 V DC✓✓ and 125 V and 750 V AC.✓✓ (2 x 2) (4)

4.4



Input waveform Output waveform (6)

[18]

QUESTION 5

5.1 5.1.1 Comparison
5.1.2 Performed
5.1.3 Lissajous figure
5.1.4 Equal
5.1.5 Difference

(5 × 1) (5)

5.2 It is to complete one cycle of changes in one second. (2)

5.3 They occur when the high-frequency signal is at its maximum✓✓ and the low-frequency signal starts its cycle.✓ A resulting pattern forms an inverted parabola.✓ (3)

5.4 Phase difference (2)

5.5 Releasing the time base to sweep when Y has reached a certain level (2)
[14]

QUESTION 6

6.1 Deflecting plates are provided inside the CRT✓ which creates an electrostatic field✓ which deflects electrode beams according to the input.✓ X-plates are used for vertical deflection while Y-plates are used for horizontal deflection.✓ (4)

6.2 They short-circuit any spikes or AC voltages that appear on the emitter to ground. (2)

6.3
- Identify the transistor's leads.
- Know exactly which one of the ohmmeter leads is the positive one and which one is the negative one.
- Connect the ohmmeter to the emitter and base leads of the transistor.
- Note the resistance reading.
- Note the polarity of the ohmmeter lead connected to the emitter. (5)

6.4 Consider the two transistors with the gate on open circuit and the anode made positive with respect to the cathode. Q2 will fail to conduct since its base emitter is not biased.
ON. The collector current of Q2 is the base current for Q1. Hence, with Q2 switched off, there is no base current to Q1 so that Q1 will also be off. The SCR is therefore off, it blocks the voltage and no current flows. (4)
[15]

TOTAL: 100

Copyright reserved