



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N4

10 August 2021

This marking guideline consists of 6 pages.

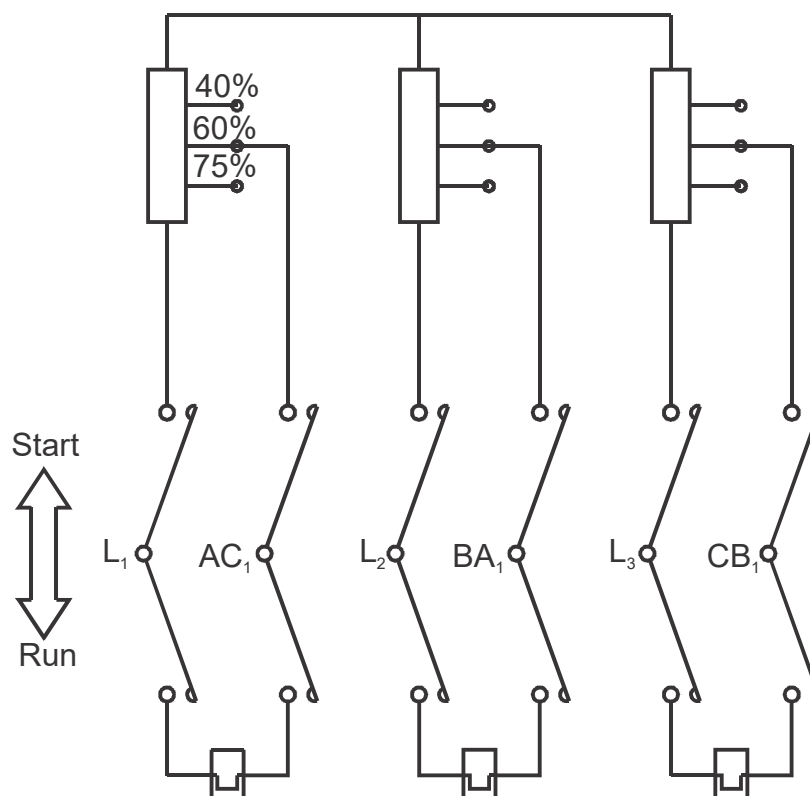
QUESTION 1

- 1.1 To decrease the down-time of equipment. (2)
- 1.2 Their reasoning and attitude affect not only the down-time period but also problems and aspects that appear due to the existence of the fault. ✓ These aspects include production problems, ✓ safety problems, friction between staff, personal problems, etc. ✓ (3)
- 1.3 A systematic approach must be followed. ✓ That means when repairing a fault, ✓ the problems encountered due the existence of the fault ✓ should also be considered. ✓ (4)
- 1.4 For making sound decisions ✓ during for fault-finding ✓ or solving any other problem in the work situation. ✓ (3)
- 1.5 When a machine does not function properly, the problem is that production is hampered. ✓ Never jump to the conclusion that present itself. ✓ Ask what the cause is and consider the symptoms. ✓ (3)
- [15]**

QUESTION 2

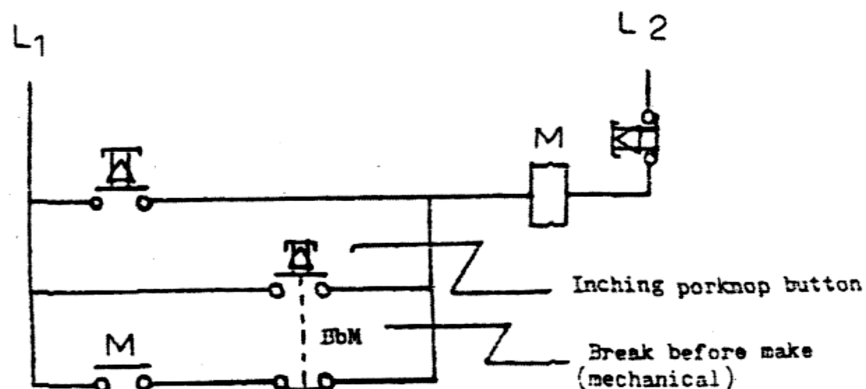
- 2.1
- Forward bias.
 - Reverse bias.
- (2)

2.2



(8)

2.3

(5)
[15]**QUESTION 3**

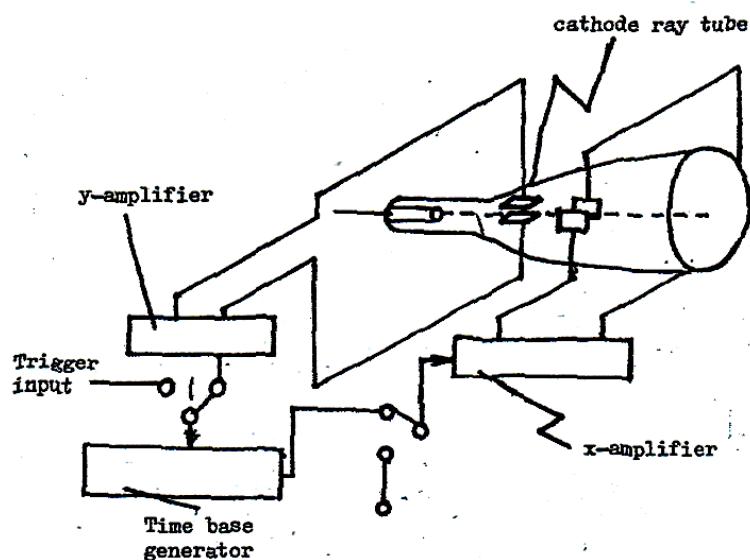
- 3.1
- Temperature.
 - Moisture.
 - Frequency.
 - Field strength.
- (4)

- 3.2
- Waveforms of currents and voltages can be examined against time.
 - The amplitude of rapidly varying periodic waves can be read.
 - Measurement and analysis of waveforms.
- (3)

- 3.3
1. Paper dielectric capacitors.
 2. Ceramic capacitors.
 3. Silver-mica capacitors.
 4. Polystyrene capacitors.
 5. Polycarbonate capacitors.
 6. Polyester film capacitors.
- (6)

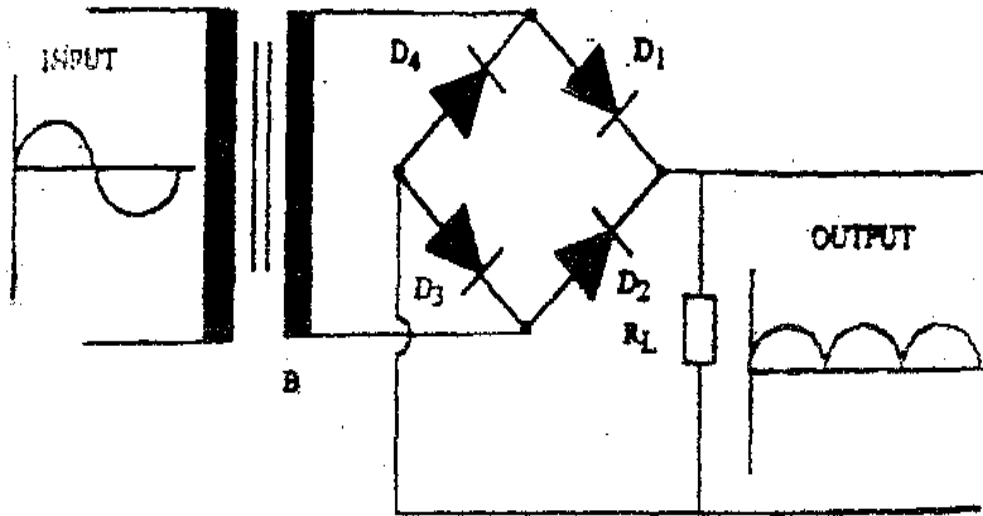
- 3.4
- By making use of laminated steel plates insulated from each other instead of a solid steel core.
- (2)

3.5

(6)
[21]

QUESTION 4

4.1



(6)

4.2

- When the temperature of a transistor rises, its resistance decrease.
- More current can now flow through the transistor.
- The transistor temperature will keep increasing and resistance will keep decreasing as more current flow.
- This process will continue until the transistor fails.

(4)

4.3

The impedance in the reverse region indicates how the Zener reverse voltage varies✓ as the current changes through the diode in the reverse direction.✓✓

(3)

4.4

If the sweep is not triggered by a certain value of the y-signal or if the y-signal✓ and time base signal are out of phase,✓ then the screen would be filled with traces,✓ not one coinciding with the previous and spaghetti effect will be created.✓

(4)

4.5

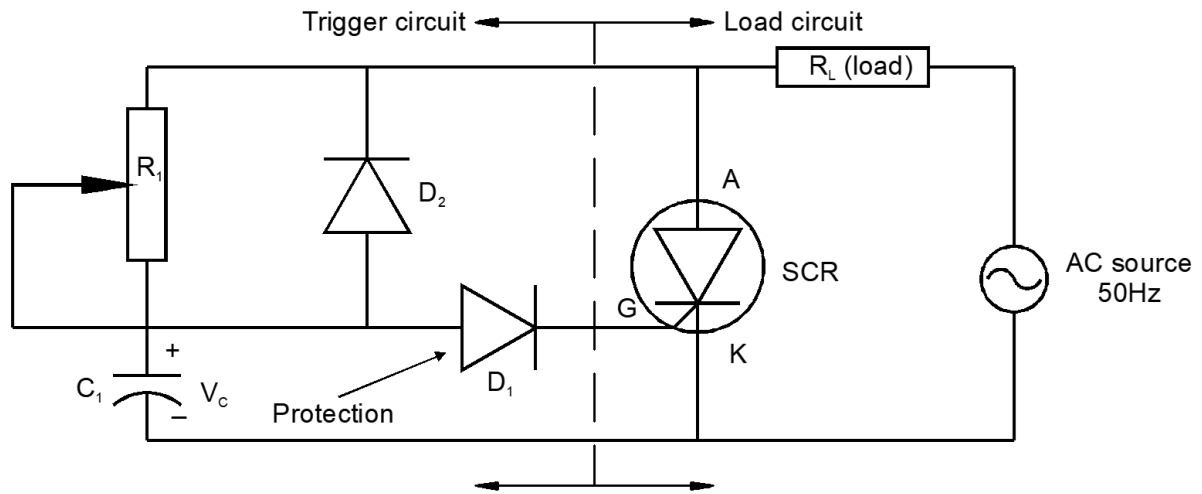
To prevent the core from saturating and losing some of its inductance.

(2)

[19]

QUESTION 5

5.1



(8)

5.2

- Further training of operation necessary.
- Further equipment redesign/modification required.
- Inadequate design or incorrect application.

(3)

5.3

The life of a component can be improved if it is operated within its set current, voltage and power values.

(2)
[13]

QUESTION 6

6.1

A	B	C	A+B	A+C	(A+B) (A+C)
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	0	0
0	1	1	1	1	1
1	0	0	1	1	1
1	0	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1

(7)

6.2

$$XY + XYZ \cdot (\bar{X}Y\bar{Z} + XYZ)$$

$$XY + YZ + (\bar{X}YZ + \bar{X}YZ)✓$$

$$\overline{\bar{X}Y} \cdot \overline{\bar{X}YZ} + \overline{XYZ} \cdot \overline{\bar{X}YZ}✓$$

$$\overline{\bar{X}Y} + \overline{\bar{X}YZ} + \overline{XYZ} + \overline{\bar{X}YZ}✓$$

$$XY + XYZ + XY\bar{Z} + \bar{X}YZ✓$$

$$XY(1 + Z) + Y(X\bar{Z} + \bar{X}Z)✓$$

$$XY + Y✓$$

$$Y(X + 1)✓$$

$$\underline{Y}✓$$

(7)

6.3

6.3.1 $A + 1 = 1$

6.3.2 $A + A = A$

6.3.3 $A \times 0 = 0$

(3 × 1)

(3)

[17]**TOTAL:****100**