



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N4

7 AUGUST 2019

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1
- Situation:✓ What happened and exactly how did it happen?✓
 - Human:✓ Who was involved?✓
 - Place:✓ Where did the fault occur?✓
 - Time:✓ When did the fault occur?✓
 - Cause:✓ Why did the fault occur?✓
- (5 × 2) (10)
- 1.2
- Examine the records.
 - Determine which rules are applicable.
 - Communicate with the people involved.
- (3)
- 1.3
- What is the problem?
 - What is the objective?
 - What is the possible cause?
 - What are the facts?
 - What is the actual cause/problem?
 - Which possible steps must be taken?
 - Take action.
 - What has been achieved?
- (8 × ½) (4)
[17]

QUESTION 2

- 2.1
-
- (8)
- 2.2
- Accurate hoisting or lowering
 - Setting up of the machine
 - Positioning of the workpiece
- (3)

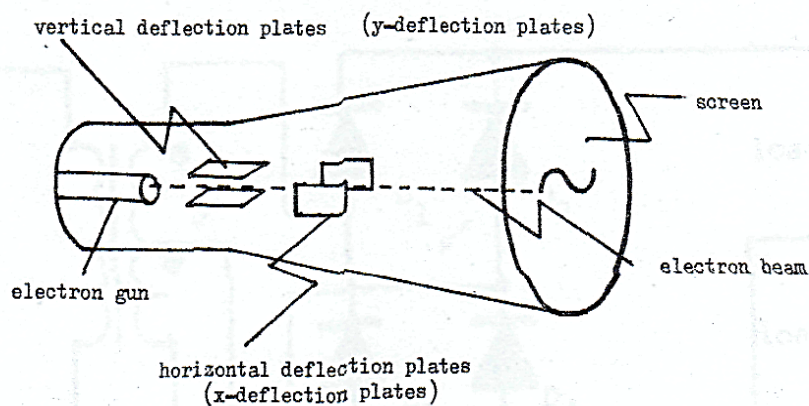
- 2.3
- Equipment downtime period
 - Indication of equipment reliability
 - Equipment/Component failure patterns
 - Performance guide/Criteria of personnel
 - Maintenance effort
 - Ratio of preventive work to corrective work
 - Percentages of planned work achieved in the period
 - Guide for spare restocking and usage trends
 - Indication of possible standardisation policies
- (9)
- 2.4
- There are basic rules that must be complied with.
 - Different fault-location methods should be known.
- (2)
- [22]**

QUESTION 3

- 3.1
- Dielectric constant
 - Cross-sectional area of plates
 - Distance between plates
- (3)
- 3.2
- Ceramic
 - Silver-mica
 - Polystyrene
 - Polycarbonate
 - Polyester
 - Paper-dielectric
- (6)
- 3.3
- Thermal overload unit
 - Electromagnetic overload unit
- (2)
- 3.4
- Meter not zeroed
 - Low battery voltage
 - Error of parallax
 - Incorrect scale selection (DC instead of AC)
 - Wrong circuit being checked
 - Ripple blowing the fuse when using millimetres on DC range
 - Filter on digital meter when checking amplifier circuits
 - Funny or odd results should be questioned, the test repeated and the procedure checked for correctness
- (8)
- [19]**

QUESTION 4

4.1



(6)

4.2 The ability of a conductor to produce induced voltage when the current varies (2)

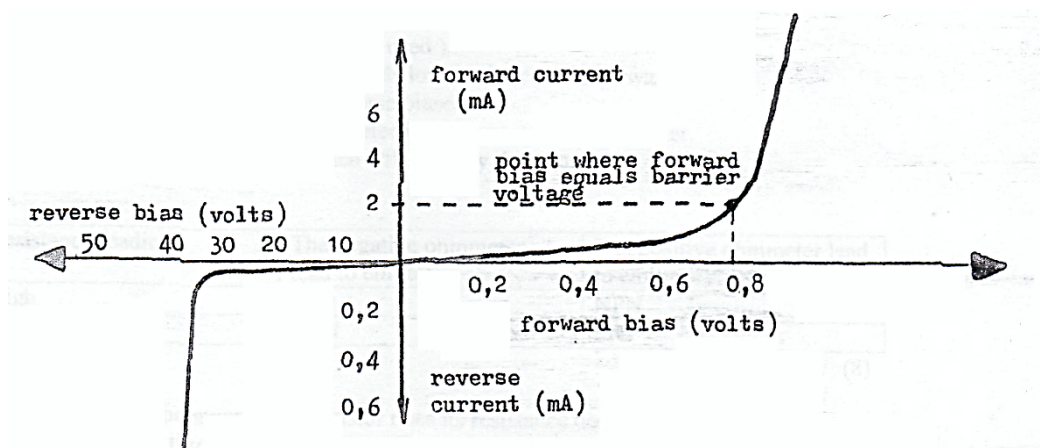
- 4.3
- Not easily damaged by overheating
 - High stability figures
 - High power ratings for physical size
- (3)

4.4 When the base of the transistor is made more positive than the emitter and the collector is much more positive than the base, ✓ the transistor is forward biased (turned on). ✓ A small current would flow from the base to the emitter ✓ and a much larger current would flow from the collector to the emitter. ✓ Conventional current flows in the direction of the emitter. ✓✓

(6)

[17]**QUESTION 5**

5.1



(5)

5.2 Maximum voltage = $5,5 + 0,51 = 6,01$ volts

$$I_{zm} = \frac{\text{Device power rating}}{\text{Zener voltage}}$$

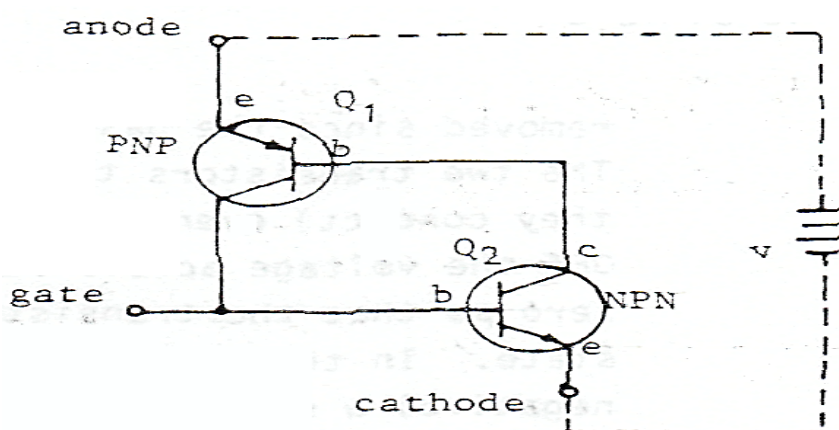
$$= \frac{500 \times 10}{6,01}$$

$$= 0,0822 \text{ A}$$

$$= 82,2 \text{ mA}$$

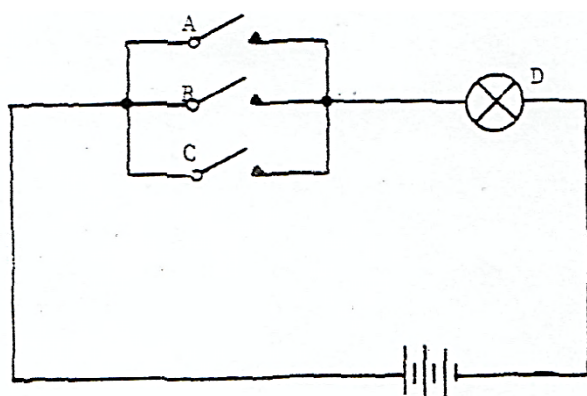
(3)

5.3

(6)
[14]

QUESTION 6

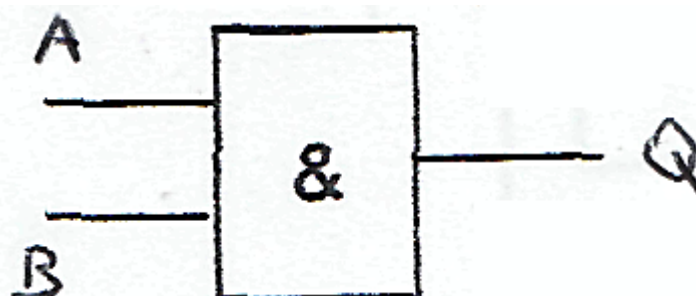
6.1



A	B	C	D
0	0	0	0
0	0	1	1
0	1	0	1
0	1	0	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

(6)

6.2



(2)

6.3	$ABC + ABC + ABC$	$ABC + ABC + ABC$	
	$AC(B + \bar{B}) + ABC$	$AB(C + \bar{C}) + \bar{A}\bar{B}\bar{C}$	
	$AC + ABC$	$AB + ABC$	
	$A(C + BC)$	$A(B + BC)$	(3)
			[11]
		TOTAL:	100