higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

3 APRIL 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- Design according to the instruction
- Find suitable contact to retain the circuit
- Use golden rules for the coil
- Switch out the timer when work is done
- Look for feedback
- Simplify the circuit
- Find a suitable place for a stop button (7 × 1) (7)

1.2
- Fuse
- Circuit breaker
- Overload relay (3)

[10]

QUESTION 2

2.1
- Squirrel cage
- Wound rotor (2)

2.3 Bedding in of brushes means shaping the brushes according to the commutator. (2)

2.4
- Make sure that the supply is interrupted.
- Ensure that the supply cannot be switched on accidentally.
- Verify that the circuit is dead.
- Only you must be able switch the supply on again. (4)

2.4 To obtain the short-circuit current flowing at rated voltage to be able to draw a circuit diagram (2)

[10]

QUESTION 3

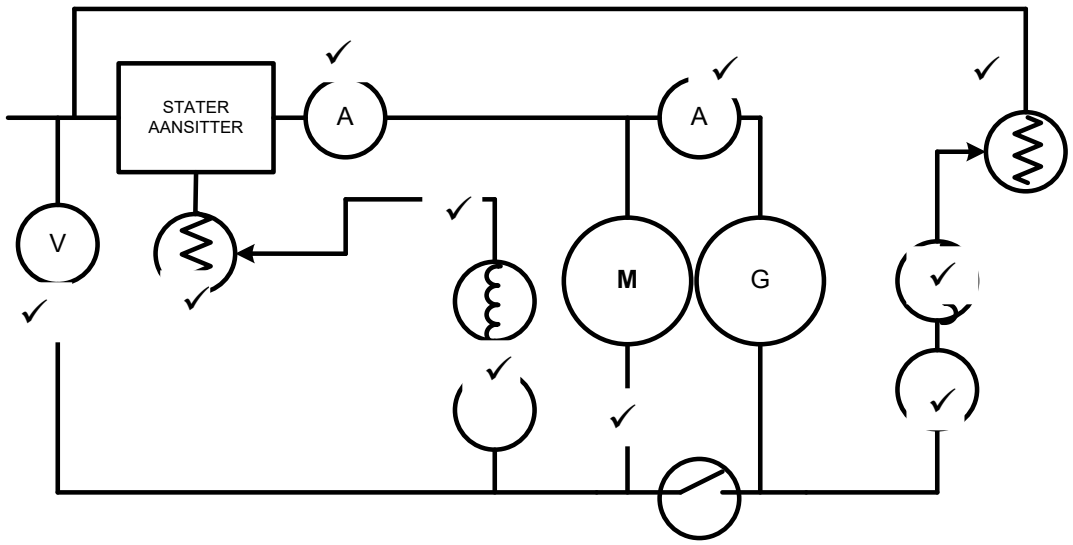


FIGURE 1 **[10]**

QUESTION 4

4.1
- Reversal phase
- Reversal coil
- Shorted turns
- High-resistance connection (4)

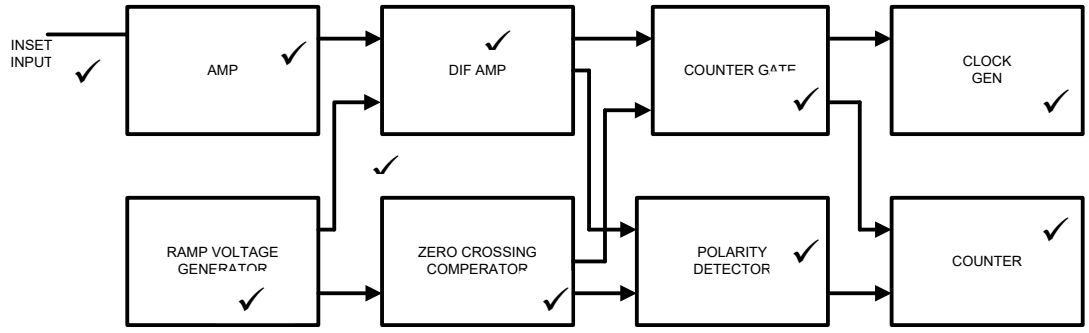
4.2 ADVANTAGES
- Reduced current
- No energy loss across resistors (as in slip-ring motors)
- Cheap

(3)

DIADVANTAGES
- The torque is reduced by a $\frac{1}{3} rd$
- Current reduction is limited (2)

4.3 To change the rotation of the motor safely and effectively. (1)
[10]

QUESTION 5



BLOCK DIAGRAM OF A DIGITAL VOLTMETER

[10]

QUESTION 6

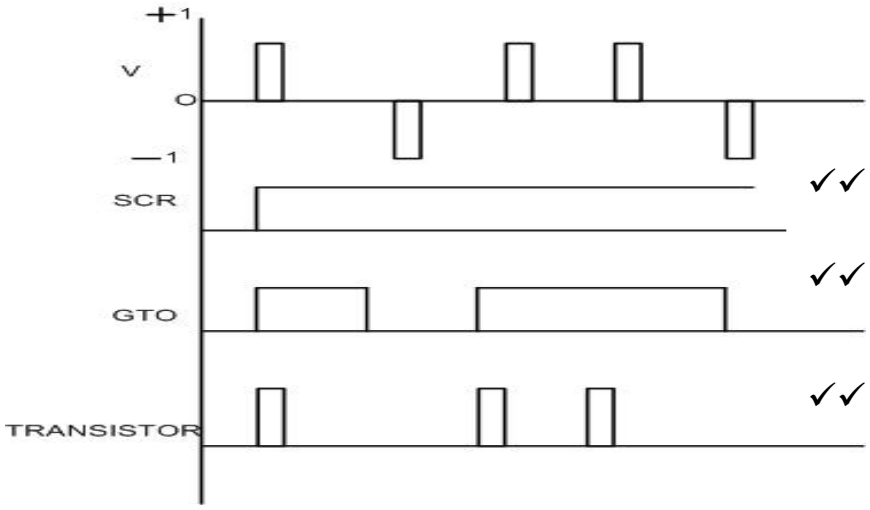
6.1
- Megger insulation and continuity tests
- High voltage insulation tests
- Martindale short and open circuit fault-finding tests
- Resistance measurements
- Induction tests
- High-frequency tests (Any 5 × 1) (5)

6.2
- Megger insulation and continuity tests
- High voltage insulation tests
- Martindale test on armature
- Resistance and polarity tests on field windings
- Drop tests on armature
- High-frequency tests (Any 5 × 1) (5)

[10]

QUESTION 7

7.1



7.1.1 ✓✓

7.1.2 ✓✓

7.1.3 ✓✓

(3 × 2) (6)

7.2
- To stabilise the gain
- To increase the input impedance and decrease the output Impedance
- To reduce noise and reduce distortion
- To increase its operating bandwidth
- To achieve more linear operation
- To decrease thermal effect (Any 4 × 1) (4)

[10]

QUESTION 8

8.1 8.1.1

S	R	Q	$\overline{Q}$	
0	0	Invalid		✓
0	1	1	0	✓
1	0	0	1	✓
1	1	Q_n	$\overline{Q_n}$	✓

(4)

8.1.2

J	K	Q	$\overline{Q}$	
0	0	Q_n	$\overline{Q_n}$	✓
0	1	1	0	✓
1	0	0	1	✓
1	1	$\overline{Q_n}$	Q_n	✓

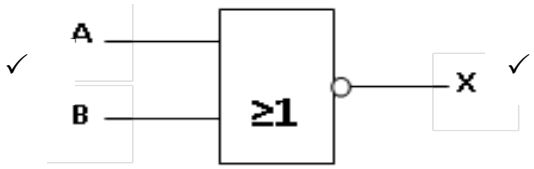
(4)

8.2 By connecting them in series so that the output of one triggers the next and so on (2)

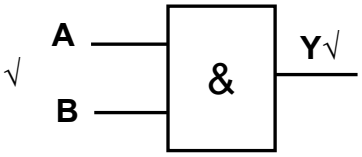
[10]

QUESTION 9

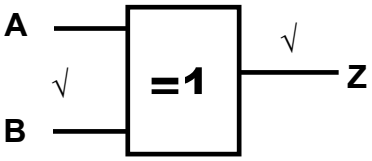
9.1 9.1.1



9.1.2



9.1.3

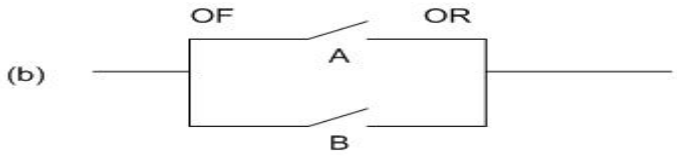


(3 × 2) (6)

9.2



√√ (2)



√√ (2)

[10]

QUESTION 10

10.1 1111001_2

10.2 $0111\ 0110\ 1011_2$

10.3 $66{,}75_{10}$

10.4 729_{10}

10.5 1267_8

(5 × 2) **[10]**

TOTAL: 100

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