higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

18 November 2022

This marking guideline consists of 5 pages.

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QUESTION 1

- No supply at L,N.✓ → Connect supply✓
- Open circuit✓ → Test for fault and rectify✓
- Open coil✓ → Change coil✓
- Armature mechanically prevented✓ → Open coil from pulling✓
- Air gap too big✓ → Set air gap✓ (5 × 2) **[10]**

QUESTION 2

2.1 A = Brushes
B = Shaft
C = Armature winding
D = Feet
E = Armature core
F = Commutator (6)

2.2
- Not expensive
- Simple construction
- Low maintenance
- Explosion proof
- Runs at constant speed (Any 4 × 1) (4)

[10]

QUESTION 3

3.1 3.1.1 The field coils produce the main magnetic flux in a DC machine.

3.1.2 The pole shoes evenly distribute the main magnetic flux over the air gap.

OR

The pole shoes hold the field coils in position.

OR

The pole shoes increase the efficiency of the magnetic path.

(2 × 2) (4)

3.2 Ball bearings✓ and roller bearings.✓ (2)

3.3 The field poles and armature cores are laminated in order to ensure that losses due to eddy currents are minimised. (2)

3.4 3.4.1 Lap winding
3.4.2 Wave winding

(2 × 1) (2)

[10]

QUESTION 4

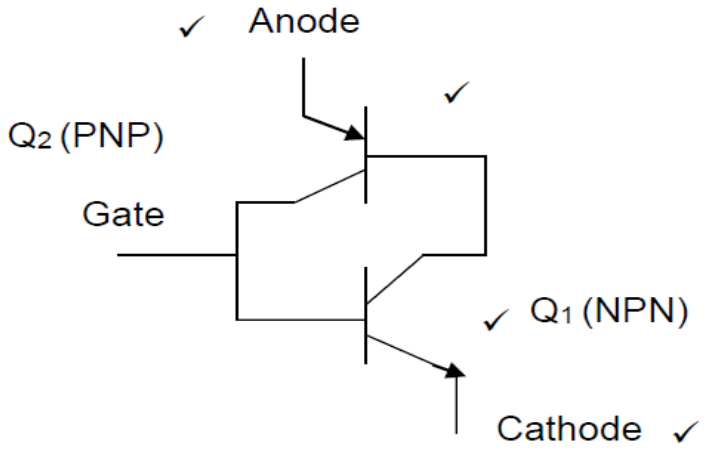
4.1
- It is performed with the maximum rated current, full load voltage and full load speed if possible.
- For multi speed motors at full speed must be reached for the first half of the test.
- Low speed for the second half of the test.
- Duration test must be at least half an hour. (4 × 2) (8)

4.2 To check the correct polarity of the field winding or to check whether the supply is in the correct direction as to set up the magnetic field with required polarity. (2)

[10]

QUESTION 5

5.1



(4)

5.2 When a positive signal is applied to the gate terminal, the NPN transistor Q_1 is forward biased and conducts, producing a collector current. This collector current forward biases the-emitter of the PNP transistor Q_2 which produces the collector current on Q_2 and this current becomes the base current to transistor Q_1. (4)

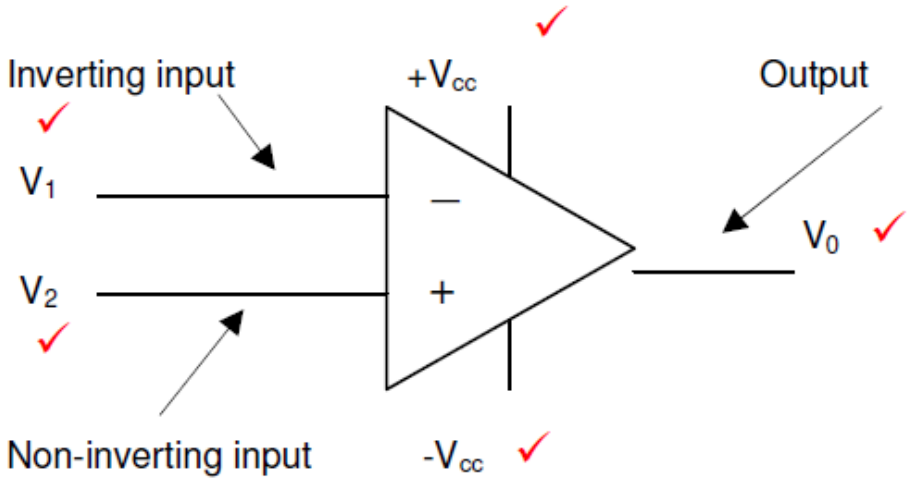
5.3
- High 'Off' resistance
- Rapid switching
- Low-control power
- Long life
- Low 'On' resistance (Any 2 × 1) (2)

[10]

QUESTION 6

6.1 6.1.1 8-Pin✓ and 16-Pin✓ (2)

6.1.2



(5)

6.2
- Low output impedance.
- High input impedance.
- High voltage gain
- Wide bandwidth.
- Its parameters are matched and track well with temperature change.

(Any 3 × 1) (3)
[10]

QUESTION 7

7.1
- FIGURE 1 (a) is unrectified waveform/sine wave.
- FIGURE 1 (b) is a half wave rectified.
- FIGURE 1 (c) is a full wave rectified. (3)

7.2 Oscilloscopes can be used to:
- Measure frequency
- Time measurement
- Measure phase angle
- Measure amplitude
- Measurement of amplifier voltage gain
- Measure wave distortion
- Study of waveforms (Any 4 × 1) (4)

7.3 Remove the batteries (1)

7.4 Read the instruction manual (2)
[10]

QUESTION 8

8.1 A flip flop is an electronic device that changes between two states, e.g. 1 and 0, High and low etc. as used in digital theory OR Is a memory element/device that can store data. (2)

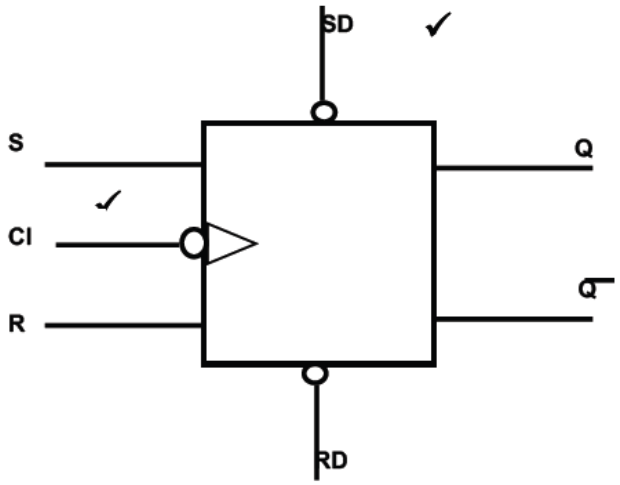
8.2 8.2.1 Clocked S-R flip-flop (1)

8.2.2

S	R	Q	Q
0	0	Q_n	Q_n
0	1	0	1
1	0	1	0
1	1	x	x

✓✓✓✓

Truth table (4)



IEC symbol (3)
[10]

QUESTION 9

9.1 9.1.1 A
9.1.2 A
9.1.3 C
9.1.4 C
9.1.5 B
9.1.6 D

(6 × 1) (6)

9.2

A	B	C	Z
0	0	0	**1**
0	0	1	**1**
0	1	0	**1**
0	1	1	**1**
1	0	0	**1**
1	0	1	**1**
1	1	0	**1**
1	1	1	**0**

(4)
[10]

QUESTION 10

10.1 $4A,6_{16}$
10.2 $3,6_{8}$
10.3 $10011001,01_{2}$
10.4 $7,25_{10}$
10.5 $10001010,0010_{2}$

(5 × 2) **[10]**

TOTAL: 100

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