higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RADIO THEORY N1

29 NOVEMBER 2023

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 True
1.2 True
1.3 False
1.4 True
1.5 False
1.6 True
1.7 False
1.8 False
1.9 False
1.10 False

(10 × 1) **[10]**

QUESTION 2

2.1 The smallest part✓ of an element✓ (2)

2.2 Valence electrons✓✓ (2)

2.3 $R = \frac{\rho.\ell}{A}$ ✓

$A = \frac{\rho.\ell}{R}$ ✓

$A = \frac{0{,}0035x10^{-6}x4}{2}$ ✓ = 0,007 µm²✓ (4)

2.4
- Electrostatic force
- Centrifugal force
- Positive force

(Any 2 × 1) (2)
[10]

QUESTION 3

3.1 3.1.1 Internal resistance of one cell = $r = \frac{1{,}5}{3}$ ✓= 0,5 Ω✓ (2)

3.1.2 Current flow through circuit

$I_T = \frac{EMF}{R + r_T}$

$I_T = \frac{4{,}5}{20 + 1{,}5}$✓

IT = 0,21 Ω✓ (3)

3.1.3 Potential difference of circuit

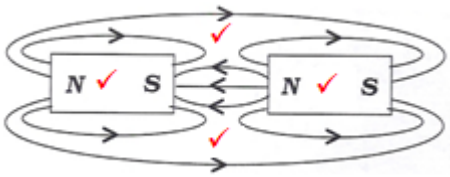
PD = EMF - It × (r + R)
= 4,5 - 0,21 × (1,5 + 20)✓
= 4,5 - (0,21 × 21,5)✓
= 1,92 V✓ (3)

3.2 The currents flowing towards a junction✓ are equal to the currents flowing away from the junction.✓ (2)
[10]

QUESTION 4

4.1 The direction of the induced current in a conductor✓ is such that the direction of its own magnetic field will oppose the action✓ that caused that magnetic field.✓ (3)

4.2



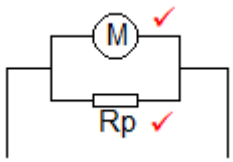
(4)

4.3
- The forefinger represents the direction of the magnetic field.
- The thumb represents the direction of motion of the conductor.
- The middle finger shows the direction of induced EMF or current. (3)

[10]

QUESTION 5

5.1 5.1.1



(2)

5.1.2 Value of shunt resistor

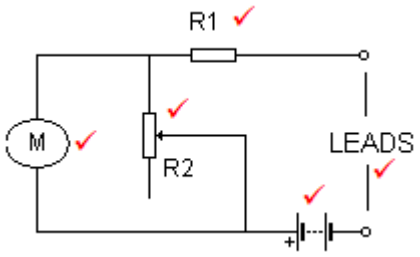
$$R_p = \frac{I_m \times R_m}{(I_t - I_m)}$$

$$= \frac{12 \times 10^{-3} \times 300}{3 - 12 \times 10^{-3}} \checkmark$$

$$R_p = \frac{3,6}{2,988} \checkmark$$

R_p = 1,205 Ω✓ (3)

5.2

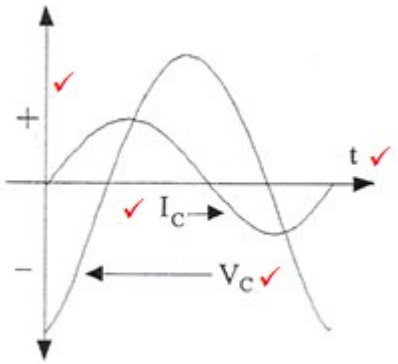


(5)
[10]

QUESTION 6

6.1 $F = \frac{1}{t} = \frac{1}{10^{-3}}$ ✓
= 100 Hz✓ (2)

6.1



(4)

6.3 As the coil is rotated through 360º✓ in a magnetic field,✓ electricity is generated in the coil✓ in the shape of a sine wave.✓ (4)
[10]

QUESTION 7

7.1 When current goes through the coil of the speaker,✓ a magnetic field is induced.✓ This magnetic field opposes or attracts the permanent magnet fields,✓ causing the diaphragm of the speaker to move.✓ (4)

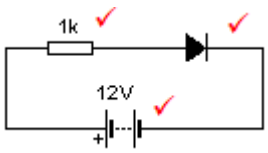
7.2 Groundwaves are radio waves that travel along the surface of the earth for communication.✓✓ (2)

7.3
7.3.1 Transverse waves
7.3.2 Longitudinal waves
7.3.3 Transverse waves
7.3.4 Transverse waves

(4 × 1) (4)
[10]

QUESTION 8

8.1



(3)

8.2 Protective device✓ or rectifier✓ (2)

8.3 N-type semiconductor material is made by adding pentavalent atoms,✓ which have five valence electrons, to pure silicon or germanium, which has four valence electrons.✓ This generates extra electrons✓ and is called donor doping.✓ (4)

8.4 Controls the emitter collector current (1)
[10]

QUESTION 9

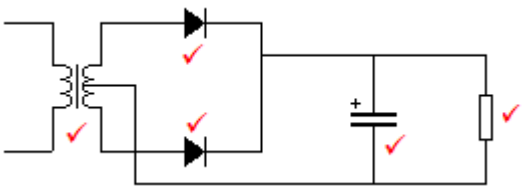
9.1 9.1.1 Preset capacitor
9.1.2 Polarised capacitor
9.1.3 Variable coil

(3 × 2) (6)

9.2 Green, blue, brown, silver (4)
[10]

QUESTION 10

10.1



(5)

10.2 The function of the local oscillator is to generate✓ a constant frequency.✓
OR
It oscillates at a frequency equal to the IF signal above the incoming signal. (2)

10.3 Part of the output✓ is fed back to the input to cause oscillations.✓ Positive feedback is used.✓
OR
Part of the output is fed back in phase to the input to cause oscillations. (3)
[10]

TOTAL: 100

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