LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

MOGALAKWENA DISTRICT

PHYSICAL SCIENCES

NATIONAL SENIOR CERTIFICATE

TERM 1 CONTROL TEST
07 MARCH 2023
GRADE 10

MEMORANDUM

MARKS : 100 **DURATION: 2 hours**

STARTING TIME: 08H00

This question paper consists of 7 pages including this one

QUESTION 1

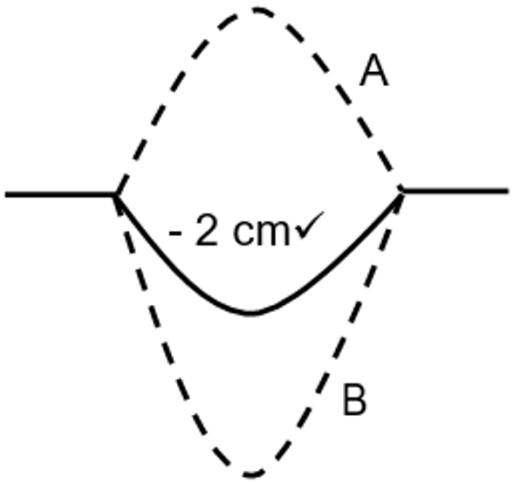
1.1 C✓✓
1.2 D✓✓
1.3 C✓✓
1.4 C✓✓
1.5 A✓✓
1.6 B✓✓
1.7 D✓✓
1.8 D✓✓
1.9 A✓✓
1.10 C✓✓

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QUESTION 2

2.1 Superposition of pulses. ✓Algebraic sum of the amplitudes of two pulses that occupy the same space at the same time. ✓✓ (3)

2.2 (2)



Both (A and B) ✓

2.3 Destructive (interference) ✓✓ (2)

2.4 Amplitude = (+4) + (-6) (2)
= - 2 cm✓✓
(Marks: 2 or/of 0)

2.5 REMAIN THE SAME✓ (1)

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QUESTION 3

3.1 Transverse ✓ (1)

3.2 1,25 m✓✓ (2)

3.3 The distance between two consecutive points in phase✓✓ (2)

OR

The distance between two consecutive crests or two consecutive troughs.

3.4 λ = 3 m ✓✓✓(1.5 m =0,5 wave) (3)

3.5 Any one of: A and C; E and G; B and F; D and H; F and J ✓✓ (2)

3.6 4 crests implies 3 waves (3)

3 ✓x 0,5 ✓= 1,5 s ✓

(3 waves x 0,5 seconds per wave)

3.7 (4)

$\text{Speed}=\frac{\text{distance}}{\text{time}}$ ✓ $=\frac{9✓}{1.5✓}$ $=6\text{m}\cdot\text{s}^{-1}$✓	Positive marking from 3.4 $v=\frac{\Delta x}{\Delta t}$ ✓ $=\frac{3✓}{0.5✓}$ $=6\text{m}\cdot\text{s}^{-1}$✓	$v=f\lambda$✓ $=\frac{1}{T}\times\lambda$ $=\frac{1}{0,5}$✓×3✓ **OR** =(2✓×3✓) $=6\text{m}\cdot\text{s}^{-1}$✓

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QUESTION 4

4.1 (2)

Marking guidelines
If any of the underlined key words/phrases are omitted: minus 1 mark

A wave in which the <u>particles of the medium vibrate parallel to the direction of motion</u> of the wave. ✓✓

4.2 (4)

OPTION 1	**OPTION 2**
$v=\frac{\Delta x}{\Delta t}$ ✓	$v=\frac{\Delta x}{\Delta t}$ ✓
$340\checkmark=\frac{\Delta x}{4}$ ✓	$340\checkmark=\frac{\Delta x}{8}$
$\Delta x = 1360m\checkmark$	$\Delta x = 2720m$
	$D=2720\div 2\checkmark$
	$=1360m\checkmark$

Marking criteria
• Formula $v=\frac{\Delta x}{\Delta t}$ ✓ • Substitute $340m\cdot s^{-1}$✓ • Divide time or final distance by 2. ✓ • Final answer 1360m✓

4.3 Frequency ✓✓ (2)

4.4 20 KHz ✓✓ (2)

4.5 Diagnosis of medical condition/pregnancy. ✓✓ (2)

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QUESTION 5

5.1 An oscillating electric field in one plane ✓produces an (oscillating) magnetic field ✓at right angles/perpendicular to it. ✓ (3)

5.2 The higher the frequency, the higher the energy of the wave. ✓✓ (2)

OR

Frequency is directly proportional to energy. ✓✓

5.3

5.3.1 $E = hf$ ✓ (4)

$4,97 \times 10^{-14} = 6,67 \times 10^{-34} f$ ✓

$f = 7,5 \times 10^{19}$ Hz ✓✓

5.3.2 (4)

OPTION 1	**OPTION 2**
$c=f\lambda$ ✓	$F=\frac{hc}{\lambda}$ ✓
$3\times10^{8}=(1,8\times10^{18})\lambda$ ✓	$1,8\times10^{8}=\frac{(6,63\times10^{-34})(3\times10^{8})}{\lambda}$ ✓
$\lambda=1,67\times10^{-10}$m✓✓	$\lambda=1,67\times10^{-10}$m✓✓

5.4 B ✓ (2)

Highest frequency/energy✓

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QUESTION 6

6.1

6.1.1 Less than ✓ (1)

6.1.2 (4)

$n=\frac{Q}{e}$

10^{13}✓$=\frac{Q}{-1,6\times10^{-19}}$ ✓

$Q=-1,6\times10^{-19}$C

Q new = $(-1,6 \times 10^{-19}) + (2 \times 10^{-19})$ ✓ = 4×10^{-20}C✓

6.2

6.2.1 The net charge of an isolated system remains constant. ✓✓ (2)

6.2.2 (6)

$$Q_b = Q_c = \frac{Q_{net}}{2} \quad ✓$$

$$= \frac{(4\times10^{-6})+(-6\times10^{-6})}{2} \quad ✓$$

$$= -1\times10^{-6}\text{C} \ ✓$$

$$n = \frac{\Delta Q}{e}$$

$$= \frac{(-6\times10^{-6}+1\times10^{-6}) \ ✓}{-1.6\times10^{-19} \ ✓}$$

$$= 3{,}13\times10^{13} \text{ electrons} \ ✓$$

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QUESTION 7

7.1

7.1.1 $V_1 = 24$ ✓ (1)

7.1.2 $A_1 = 0$ (A) ✓ (1)

7.2 (4)

OPTION 1	**OPTION 2**
$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓	$R_p = \frac{\text{product}}{\text{sum}}$ ✓
$= \frac{1}{8} + \frac{1}{8}$ ✓	$= \frac{1}{8} + \frac{1}{8}$ ✓
$R_p = 4\Omega$	$= 4\Omega$
$R_T = R_s + R_p$	$R_T = R_s + R_p$
$= 8+4$ ✓	$= 8+4$ ✓
$= 12\Omega$ ✓	$= 12\Omega$ ✓

7.3 (3)

OPTION 1

V divide in a ratio 8 : 4 ✓ (series)

$V_2 = \frac{8}{12} \times 24$ ✓

$= 16V$ ✓

OPTION 2

$V = IR$

$24 = I(12)$

$I = 2A$

$V = IR$ ✓

$= (2)(8)$ ✓

$= 16V$ ✓

7.4 $A_2 = A_3$. ✓ (1)

7.5

7.5.1 Resistance is directly proportional to the length of the conducting wire. ✓ (1)

OR

As the length of the wire increases, the resistance increases.

7.5.2 1,35Ω ✓✓ (Range: 1,3 Ω to 1,4 Ω) (2)

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GRAND TOTAL: 100 MARKS