GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

VOORBEREIDENDE EKSAMEN

2025

MARKING GUIDELINES
NASIENRIGLYNE

10841

PHYSICAL SCIENCES: PHYSICS
FISIESE WETENSKAPPE: FISIKA

(PAPER/*VRAESTEL* 1)

16 pages/*bladsye*

QUESTION/*VRAAG* 1

1.1 C ✓✓ (2)

1.2 D ✓✓ (2)

1.3 Accept any answer ✓✓ (2)

1.4 B ✓✓ (2)

1.5 D ✓✓ (2)

1.6 C ✓✓ (2)

1.7 A ✓✓ (2)

1.8 B ✓✓ (2)

1.9 B ✓✓ (2)

1.10 Accept any answer ✓✓ (2)

[20]

QUESTION/*VRAAG* 2

2.1 The force or the component of a force which a surface exerts on an object with which it is in contact and which is perpendicular to the surface. ✓✓

Die krag of komponent van 'n krag wat 'n oppervlak op 'n voorwerp waarmee dit in kontak is, uitoefen en wat loodreg op die oppervlak is.

Marking criteria/*Nasienkriteria:*

If any of the underlined key words/phrases in the correct context is omitted, deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.* (2)

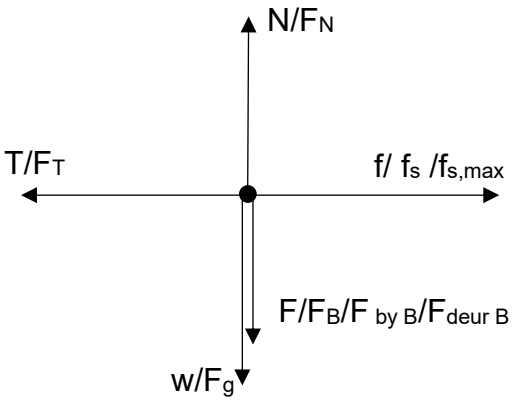
2.2 In horizontal direction/*In horisontale rigting*:

$F_{net} = 0$ (N)
$T - w = 0$
$T = mg$
✓ Any one/*Enige een*

$= (3)(9,8)$ ✓

$= 29,4$ N ✓ (3)

2.3



Accepted labels/Aanvaarde benoemings	
w	F_g/F_w/weight/gravitational force/*gewig/gravitasiekrag*
N	N/ F_N / Normal Force/*Normaalkrag*
f	f_s / Friction/*Wrywing*
T	F_T /Tension/*Spanning*
F	T/ F_B/$F_{by\ B}$/ Force applied by B/ w_B / $F_{deur\ B}$/*Krag toegepas deur B*

Marking criteria/*Nasienkriteria:*

1 mark is allocated for each correct label and arrow./*1 punt word toegeken vir elke korrekte benoeming en pyl.*

Do not penalise for length of arrows./*Moenie penaliseer vir lengte van pyle nie.*

Any additional force(s)/*Enige ekstra krag(te)*: max/maks 4/5

If everything is correct but no arrows/*Indien alles korrek is maar geen pyle*: max/maks 4/5 (5)

2.4 **POSITIVE MARKING FROM QUESTION 2.2.**
POSITIEWE NASIEN VANAF VRAAG 2.2.

OPTION 1/*OPSIE 1*:	OPTION 2/ *OPSIE 2*:
$f_{s,max/maks}$ = $\mu_s N$✓ 29,4 = 0,2N✓ N = 147 N Vertical direction/ *Vertikale rigting*: F_{net} = 0 ✓ N – w – F_B = 0 147– (5)(9,8) ✓= F_B F_B = 98 N ✓	F_{net} = 0 ✓ T – f_s^{max} = 0 T - $\mu_s N$✓ = 0 ✓ 29,4 - (0,2)(5+m_B)(9,8) ✓= 0 m_B = 10 kg F_g = mg = (10)(9,8) = 98 N ✓

OPTION 3: $f_{s,max/maks} = \mu_s N$ ✓ $29,4 = (0,2)N$ ✓ $N = 147$ N $N - F_g = 0$ ✓ $147 - 9,8(5 + m_B)$ ✓$= 0$ $m_B = 10$ kg $F_g = mg = (10)(9,8)$ $= 98$ N ✓	

Marking guidelines/*Nasienriglyne*:
- ✓ Formula for friction/*Formule vir wrywing*
- ✓ Substitution from Q 2.2 and μ_s/ *Invervanging vanaf Vr 2.2 en* μ_s
- ✓ Substitution of N/*Invervanging van N*
- ✓ Substitution of w_A/*Invervanging van* w_A
- ✓ Answer/*Antwoord* 98 N

(5)

[15]

QUESTION/*VRAAG* 3

3.1 The motion of an object under the influence of gravitational force only. ✓✓ (2 or 0)

Die beweging van 'n voorwerp slegs onder die invloed van gravitasiekrag. (2 of 0)

Marking criteria/*Nasienkriteria*
Do not accept gravity.
Do not accept if projectile is defined (when starting with the object in your sentence).
Moet nie gravitasie aanvaar nie.
Moet nie aanvaar indien projektiel gedefinieer word nie (m.a.w. begin die sin met die voorwerp)

(2)

3.2

Option 1/*Opsie 1*	
Up as positive/*Op as positief*: $v_f^2 = v_i^2 + 2a\Delta y$✓ $0^2 = (5)^2 + (2)(-9,8)\Delta y$✓ $\Delta y = 1,28$ m Maximum height = 1,28 + 5 ✓ = 6,28 m ✓ (above the ground) *Maksimum hoogte = 1,28 + 5 = 6,28 m (bokant die grond)*	**Down as positive/*Af as positief*:** $v_f^2 = v_i^2 + 2a\Delta y$✓ $0^2 = (-5)^2 + (2)(9,8)\Delta y$✓ $\Delta y = -1,28$ m Maximum height = 1,28 + 5 ✓ = 6,28 m ✓ (above the ground) *Maksimum hoogte = 1,28 + 5 = 6,28 m (bokant die grond)*

(4)

Option 2/*Opsie 2*

Up as positive/*Op as positief*

$v_f = v_i + a\Delta t$
$0 = 5 + (-9,8)\ \Delta t$
$\Delta t = 0,51$ s
$\Delta y = v_i\Delta t + ½\ g\Delta t^2$ ✓
$= 5(0,51) + ½\ (-9,8)(0,51)$ ✓
$= 1,28$ m
Maximum height/*Maksimum hoogte* =
1,28 + 5 ✓ = 6,28 m✓

Down as positive/*Af as positief*

$v_f = v_i + a\Delta t$
$0 = -5 + 9,8\Delta t$
$\Delta t = 0,51$ s
$\Delta y = v_i\Delta t + ½\ g\Delta t^2$ ✓
$= (–5)(0,516) + ½\ (9,8)(0,51)$ ✓
$= -1,28$ m
Maximum height/*Maksimum hoogte* =
1,28 + 5 ✓ = 6,28 m✓

Marking criteria/*Nasienkriteria*:
- ✓ Formula/*Formule*
- ✓ Substitution/*Invervanging*
  (v and g opposite signs./*v en g teenoorgestelde tekens*)
- ✓ Adding 5 m to answer./*Voeg 5 m by antwoord*.
- ✓ Final correct answer / *finale korrekte antwoord*

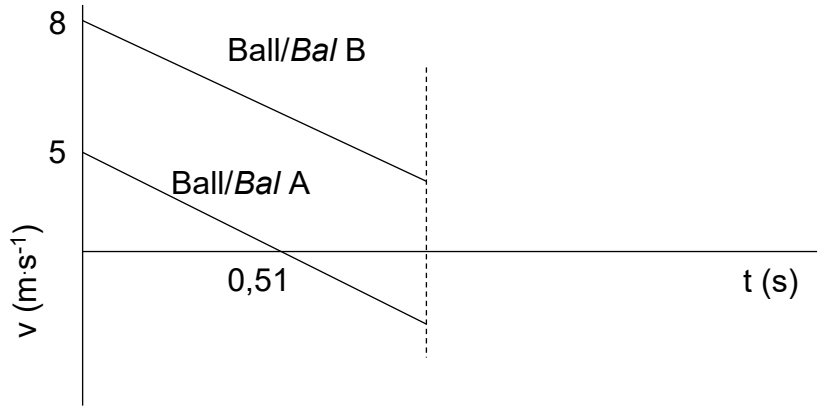
(4)

3.3 Do not mark this question
Marks have been redistributed

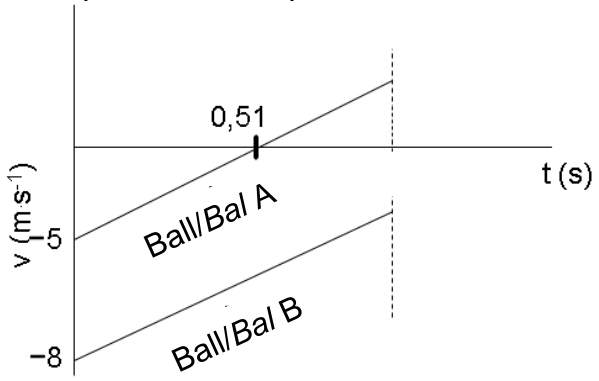
Moet nie hierdie vraag merk nie
Punte is herverdeel

3.4 $v_f = v_i + a\Delta t$ ✓
$v_f = 8 + (–9,8)(0,51)$ ✓
$v_f = 3,0\ m{\cdot}s^{-1}$ ✓ up/*op* ✓ (4)

3.5 Up as positive:/*Op as positief:*



Down as positive:/*Af as positief*:



Marking criteria/*Nasienkriteria*:
- ✓ Lines are parallel/*Lyne is parallel*
- ✓ Ball A intercepts at 0,51 s/*Bal A sny die x-as by 0,51 s*
- ✓✓ Each initial velocity/*Elke aanvanklike snelheid*
- ✓ Graphs for balls A and B are in different quadrants at end/*Grafieke vir balle A en B is in verskillende kwadrante aan die einde*
- ✓ Both graphs end at the same time./*Albei grafieke eindig op dieselfde tyd*.

If graphs are not labelled as A or B, deduct one mark /*Indien grafieke nie benoem is met A of B nie, trek een punt af*

(6)

[16]

QUESTION/*VRAAG* 4

4.1 The product of an object's mass and its velocity. ✓✓ (2 or zero)
Die produk van 'n voorwerp se massa en sy snelheid (2 of nul) (2)

4.2

OPTION 1/ *OPSIE 1*

Down is positive/Af is positief

$F_{net}\Delta t = \Delta p$✓

$F_{net}(0,2)$ ✓$= (5)(1,53 - 7,84)$ ✓

$F_{net} = -157,75$ N

$F_{net} = 157,75$ N ✓ (upwards/*opwaarts*)

OPTION 2/ *OPSIE 2*

Gradient = $\frac{1,53-7,84}{1,0-0,8}$ ✓

a = - 31,55 m·s^{-2}

$F_{net} = ma$ ✓

$= (5)(-31,55)$ ✓

$= - 157, 75$

$F_{net} = 157, 75$ N ✓ (upwards/*opwaarts*)

Marking guideline/*Nasienriglyn*:
- ✓ Formula/*Formule*
- ✓ ✓ Substitution/*Invervanging*
- ✓ Answer/*Antwoord*

(4)

4.3 Inelastic ✓
- The velocity/speed before is greater than the velocity/speed after the collision ✓ ✓
- Total kinetic energy is not conserved ✓

OR/*OF*

If calculation is given:

Total E_k before = ½ mv^2

= ½ $(5)(7,84)^2$✓

= 153,664 J

Total E_k after = ½ mv^2

= ½ $(5)(1)^2$ ✓

= 2,5 J

Total E_k before is not equal to total E_k after ✓

Onelasties
- *Die snelheid/spoed van die bal voor die botsing is groter as die snelheid/spoed van die bal na die botsing*
- *Totale kinetiese energie bly nie behoue nie.*

(4)

4.4
- The two balls will undergo the same Δp to stop. ✓
- The rubber ball will take longer to stop as it is soft. F is inversely proportional to Δt if Δp is constant. ✓
- The force needed to stop the rubber ball is small enough for the glass not to break. ✓

(3)

- *Die twee balle ondergaan dieselfde Δp om te stop.*
- *Die rubberbal sal langer neem om te stop aangesien dit sag is. F is omgekeerd eweredig aan Δt indien Δp konstant is.*
- *Die krag wat nodig is om die rubberbal te stop, is klein genoeg dat die glas nie breek nie.*

[13]

QUESTION/*VRAAG* 5

5.1 A force for which the work done in moving an object between two points depends on the path taken.
'n Krag waarvoor die arbeid verrig om 'n voorwerp tussen twee punte te beweeg, afhanklik is van die roete wat gevolg word. (2)

Marking criteria/*Nasienkriteria*:
Deduct 1 mark for each of the underlined phrases in the correct context that are omitted. If the word **work done** is left out, then zero. If conservative force is defined, then zero.
*Trek 1 punt af vir elk van die onderstreepte frases in die korrekte konteks wat uitgelaat is. Indien die woord **arbeid verrig** uitgelaat is dan geen punte. Indien die konserwatiewe krag gedefinieer word, dan geen punte.*

5.2

ANSWER FOR ENGLISH PAPER:

$W_{net} = \Delta K$ ✓

$W_{motor} + W_w + W_f = ½ m(v_f^2 - v_i^2)$

$W_{motor} + (60)(9,8)(30)\cos 115^o$✓$+ (16,2)(30)\cos 180^o$✓$= ½(60)(7,5^2 - 0^2)$ ✓

$W_{motor} = 9628,486J$

$P = \frac{W}{\Delta t}$ ✓

$= \frac{9628,486}{120}$ ✓

$= 80,24$ W ✓ (80,2374 Watt)

(If W_{nc} is used, then deduct only one mark for formula.) (7)

ANTWOORD VIR AFRIKAANSE VRAESTEL:

$W_{net} = \Delta K$✓

$W_{motor} + W_w + W_f = ½ m(v_f^2 - v_i^2)$

$W_{motor} + (60)(9,8)(30)\cos 115^o$✓$+ (16,2)(30)\cos 180^o$✓$= ½(60)(7,5^2 - 0^2)$✓

$W_{motor} = 9628,486J$

$W_{motor} = F\Delta x\cos\theta$✓

$9628,486 = F(30)\cos 0^o$ ✓

$F = 320,95$ N✓

(Indien W_{nc} gebruik word, trek slegs een punt af vir formule.) (7)

5.3 DECREASES ✓

- ΔK stays the same✓
- Work done by the motor is in the same direction as work done by the gravitational force ✓

VERLAAG

- *ΔK bly dieselfde*
- *Arbeid verrig deur die motor is in dieselfde rigting as die arbeid verri deur die gravitasiekrag.* (3)

[12]

QUESTION/*VRAAG* 6

6.1 The change in frequency (or pitch) of the sound detected by a listener, because the sound source and the listener have different velocities relative to the medium of sound propagation. ✓✓

OR

An (apparent) change in observed/detected frequency (pitch), as a result of the relative motion between a source and an observer (listener).

Die verandering in frekwensie (of toonhoogte) van die klank waargeneem deur 'n luisteraar omdat die klankbron en die luisteraar verskillende snelhede relatief tot die medium waarin die klank voortgeplant word, het.

OF

'n (Skynbare) verandering in waargenome frekwensie (toonhoogte), as gevolg van die relatiewe beweging tussen die bron en 'n waarnemer (luisteraar).

Marking criteria/*Nasienkriteria:*
If any of the underlined key words/phrases in the correct context is omitted deduct 1 mark.
Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.

(2)

6.2 What is the relationship between the speed at which a source moves and the apparent frequency detected by the observer if the speed of sound in air is constant?
Wat is die verwantskap tussen die spoed waarteen 'n bron beweeg en die skynbare frekwensie waargeneem deur die waarnemer indien die spoed van klank in lug konstant is?

Marking criteria/*Nasienkriteria:*
Relationship must be stated between dependent and independent variables.
If question has yes/no answer: max ½
Verwantskap moet gestel word tussen afhanklike en onafhanklike veranderlikes.
Indien vraag 'n ja/nee antwoord het: maks ½
Indien vraagteken uitgelaat is: maks ½ (2)

6.3 180 (Hz) ✓✓ (2)

6.4 **POSITIVE MARKING FROM QUESTION 6.3.**
POSITIEWE NASIEN VANAF VRAAG 6.3.

$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ ✓

250 ✓ $= \frac{v}{v - 100} 180$ ✓

v = 357,143 m·s^{-1} ✓

Marking guideline/*Nasienriglyn*:
✓ Complete doppler formula/*Volledige Doppler-formule*
✓ Substitution left/*Invervanging links*
✓ Substitution right with correct signs./*Invervanging regs met korrekte tekens.*
✓ Answer/*Antwoord* (4)

6.5 Graph A and/or C ✓
- As the source approaches the number of wavefronts approaching the learner per second will increase ✓
- leading to a higher frequency. ✓

OR
- As it gets closer the waves are more compressed as the frequency increases/wavelength decreases
- and the time decreases.

Grafiek A en/of C
- *Soos die bron nader kom, neem die aantal golffronte per sekonde wat na die leerling beweeg toe,*
- *wat lei tot 'n hoër frekwensie.*

OF
- *Soos dit nader kom, is die golwe meer saamgepers omdat die frekwensie toeneem/golflengte afneem*
- *en die tyd afneem.* (3)

[13]

QUESTION/*VRAAG 7*

7.1 The magnitude of the (electrostatic) force exerted by one point charge (Q_1) on another point charge (Q_2) is directly proportional to the product of the (magnitude of the) ✓ charges and inversely proportional to the square of the distance (r) between them. ✓

Die grootte van die elektrostatiese krag wat een puntlading (Q_1) op 'n ander puntlading (Q_2) uitoefen, is direk eweredig aan die produk van die groottes van die ladings en omgekeerd eweredig aan die kwadraat van die afstand (r) tussen hulle. (2)

Marking criteria/*Nasienkriteria:*
If any of the underlined key words/phrases in the correct context is omitted, deduct 1 mark.
Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.

7.2 2 negative charges ✓
- Direction of field pattern is towards the spheres ✓✓

OR
- direction in which a positive test charge will move if placed in the field.

2 negatiewe ladings
- *Rigting van die veldpatroon is na die sfere toe*

OF
- *Rigting waarin 'n positiewe toetslading sal beweeg indien dit in die veld geplaas word.* (3)

7.3 $F = \frac{kQ_1Q_2}{r^2}$ ✓

✓$3 \times 10^{-3} = \frac{(9\times10^9)Q_1Q_2}{(6\times10^{-3})^2}$ ✓

Q = $3{,}46 \times 10^{-9}C$ ✓ ACCEPT/*AANVAAR* Q = $-3{,}46 \times 10^{-9}C$

Marking criteria/*Nasienkriteria*:
- ✓ Formula/*Formule*
- ✓ Substitution left/*Invervanging links*
- ✓ Substitution right/*Invervanging regs*
- ✓ Answer/*Antwoord* (4)

7.4 **POSITIVE MARKING FROM QUESTION 7.3.**
POSITIEWE NASIEN VANAF VRAAG 7.3.

$E = \frac{kQ}{r^2}$ ✓

✓ $3{,}33 \times 10^5 = \frac{(9\times10^9)(3{,}46\times10^{-9})}{(r)^2}$ ✓

$r = 9{,}67 \times 10^{-3}$m

d = $9{,}67 \times 10^{-3} - 6 \times 10^{-3}$ ✓ (for subtraction/*vir aftrek*)

$= 3{,}67 \times 10^{-3}m$ ✓

OR/*OF*

$E = \frac{kQ}{r^2}$ ✓

✓ $3{,}33 \times 10^5 = \frac{(9\times10^9)(3{,}46\times10^{-9})\checkmark}{(0{,}006 + d)^2\checkmark}$

d $= 3{,}67 \times 10^{-3}m$ ✓

Marking criteria/*Nasienkriteria*:
- ✓ Formula/*Formule*
- ✓ Substitution left/*Invervanging links*
- ✓ Substitution right/*Invervanging regs*
- ✓ Subtracting/Adding 6 mm/ *Aftrek/Optel van 6 mm*
- ✓ Answer/*Antwoord*

If – Q is substituted./*Indien – Q invervang word.*
Max/*Maks* 3/5 (5)

[14]

QUESTION/*VRAAG* 8

8.1 The maximum energy provided by a battery per unit charge passing through it. ✓✓ (2 or 0)
Die maksimum energie wat 'n battery lewer per eenheidslading wat daardeur vloei. (2 of 0) (2)

8.2.1 $R_{ext} = R_1 + R_2 = 6 + 6 = 12\ \Omega$

$V = IR$ ✓

$10{,}8$ ✓$= I(12)$ ✓

$I = 0{,}9\ A$ ✓

Marking criteria/*Nasienkriteria*:
- ✓ Formula/*Formule*
- ✓ Substitution left/*Invervanging links*
- ✓ Substitution right *Invervanging regs*
- ✓ Answer/*Antwoord* (4)

8.2.2 **POSITIVE MARKING FROM QUESTION 8.1.1.**
POSITIEWE NASIEN VAN VRAAG 8.1.1.

Option/*Opsie* 1

$\varepsilon = I(R + r)$ ✓

$12 = 0{,}9\ (12 + r)$ ✓

$r = 1{,}33\ \Omega$ ✓

Option/*Opsie* 2

$V = Ir$ ✓

$(12 - 10{,}8) = 0{,}9\ r$

$1{,}2 = 0{,}9\ r$ ✓

$r = 1{,}33\ \Omega$ ✓

Marking Criteria/*Nasienkriteria*:
- ✓ Formula/*Formule*
- ✓ Substitution/*Invervanging*
- ✓ Answer/*Antwoord*

(3)

8.3.1

Option/*Opsie* 1

$R_p = \frac{R_2 \times R_{3+4}}{R_2 + R_{3+4}}$ ✓

$= \frac{6 \times 5}{6+5}$ ✓

$= 2{,}73\ \Omega$ ✓

$V_p = IR = 1{,}5\ (2{,}73) = 4{,}1\ V$

$V_p = V_3 + V_{bulb}$

$4{,}1 = IR_3 + IR_{bulb}$

$4{,}1 = I(R_3 + R_{bulb})$

$4{,}1 = I(3 + 2)$ ✓

$I = 0{,}82\ A$ ✓ ✓

$P = I^2R = (0{,}82)^2(2) = 1{,}34\ W$ ✓

Option/*Opsie* 2

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_{2+3}}$ ✓

$\frac{1}{R_P} = \frac{1}{6} + \frac{1}{3+2}$ ✓

$R_P = 2{,}73\ \Omega$ ✓

$V_P = IR_P = 1{,}5(2{,}73) = 4{,}1\ V$

$V_p = V_3 + V_{bulb}$

$4{,}1 = IR_3 + IR_{bulb}$

$4{,}1 = I(R_3 + R_{bulb})$

$4{,}1 = I(3 + 2)$ ✓

$I = 0{,}82\ A$ ✓ ✓ ✓

$P = I^2R = (0{,}82)^2(2) = 1{,}34\ W$

Marking citeria/Nasienkriteria:
- ✓ formula for Rp/*formule vir Rp*
- ✓ substitution for Rp*/invervanging vir Rp*
- ✓ substitution for Ohms law*/invervanging vir Ohm se wet*
- ✓ substitution for calculating current/*invervanging vir berekening van stroom*
- ✓ formula for power*/formule vir drywing*
- ✓ substitution for power*/invervanging vir drywing*
- ✓ answer for power*/antwoord vir drywing*

Option/*Opsie* 3 – using ratios/*gebruik verhoudings*

Resistance/*weerstand* 6 : 5
Current/*stroom* 5 : 6 ✓

∴ current through the bulb/*stroom deur gloeilamp* $= \frac{6}{11}\ x\ 1{,}5 = 0{,}518\ A$ ✓✓

✓ ✓ ✓

$P = I^2R = (0{,}82)^2 \times 2 = 1{,}34\ W$ ✓

(7)

8.3.2 INCREASES ✓
Internal resistance AND emf remains the same ✓
Total resistance decreases AND Total current increases ✓

VERHOOG
Interne weerstand EN emk bly dieselfde
Totale weerstand verlaag EN Totale stroom neem toe (3)

[19]

QUESTION/*VRAAG* 9

9.1.1 (split-ring) Commutator ✓✓
(Splitring) Kommutator (2)

9.1.2 A – South/*Suid* ✓
B – North/*Noord* ✓ (2)

9.2.1 The rms current is the alternating current that dissipates/produces the same amount of energy as the equivalent direct current (DC). ✓✓ (2 or zero)

If potential difference is explained – zero.

Die wgk-stroom is die wisselstroom wat dieselfde hoeveelheid energie verbruik/oordra as 'n ekwivalente gelykstroom (GS). (2 of nul)

Indien potensiaalverskil verduidelik word dan nul. (2)

9.2.2 $I_{rms} = \frac{I_{max}}{\sqrt{2}}$ ✓

$= \frac{10,6}{\sqrt{2}}$ ✓

$= 7,495\ A$ (7,50A) ✓ (3)

9.2.3

Positive marking for option 1 from 9.2.2/*Positiewe nasien vir opsie 1 vanaf 9.2.2*	
OPTION 1/*OPSIE 1* $P_{ave} = V_{rms}I_{rms}$ ✓ $= \left(\frac{V_{max}}{\sqrt{2}}\right)(7,495)$ $= (\frac{300}{\sqrt{2}})(7,495)$ ✓ $= 1\,589,93\ W$ ✓ (Accept range/*Aanvaar gebied*: 1 589,93 – 1 590,99 W)	OPTION 2/*OPSIE 2* $P_{max} = V_{max}I_{max}$ ✓ = (300)(10,6) = 3180 W $P_{ave} = \frac{3180}{2}$ ✓ = 1590 W ✓ (Accept range/*Aanvaar gebied*:1589,93 -1590,99 W)

(3)

OPTION 3/*OPSIE 3*

$R = \frac{V}{I}$

$= \frac{300}{10,6}$

=28,302 Ω

$P = I^2_{rms}R$✓ OR $P = \frac{V^2_{rms}}{R}$ ✓

$= (7,95)^2(28,302)$✓ $= \frac{(\frac{300}{\sqrt{2}})^2}{28,302}$✓

= 1591,98 W✓ =1589,99 W✓

(Accept range/*Aanvaar gebied*: 1589,93 -1591,99 W)

9.2.4 Maximum ✓/*Maksimum* (1)

9.2.5 AC can be transported over long distances as it can be transformed (Step up/ down) to <u>minimise power loss.</u> ✓
It is easier to generate AC current.
OR
Higher voltage means lower current $P \alpha I^2$.

WS kan oor groot afstande vervoer word aangesien dit met 'n transformator verhoog of verlaag kan word om energie verlies te verminder.
Dit is makliker om WS-krag op te wek.
OF
Hoër potensiaalverskil beteken laer stroom aangesien $P \alpha I^2$. (2)
[15]

QUESTION/*VRAAG* 10

10.1 The frequency of the green light is higher than the threshold/ "cut-off" frequency of the metal in the photocell. (accept $f > f_0$) ✓✓

OR

The energy of the photons of green light is greater than the work function of the metal in the photocell. (accept $E > W_0$)

OR

Accept: The photo-electric effect takes place

OR

Accept: Light of a suitable frequency is used.

Die frekwensie van die groen lig is hoër as die drumpel-/'afsny-' frekwensie van die metaal in die fotosel. (aanvaar $f > f_0$)

OF

Die energie van die fotone van groen lig is groter as die werkfunksie van die metaal in die fotosel. (aanvaar $E > W_0$)

OF

Aanvaar: die foto-elektriese effek vind plaas.

OF

Aanvaar: Lig van 'n geskikte frewkensie word gebruik

(2)

10.2.1 Increase/*Verhoog* ✓ (1)

10.2.2 Stays the same ✓

- Blue light has <u>photons</u> of higher energy. ✓
- Higher kinetic energy of the <u>electrons</u>. ✓
- Only the intensity of light has an influence on the number of electrons emitted per unit time. ✓

Bly dieselfde

- *Blou lig het <u>fotone</u> met 'n hoër energie*
- *Hoër kinetiese energie van die <u>elektrone</u>.*
- *Slegs die intensiteit van lig het 'n invloed op die aantal elektrone wat per eenheid tyd vrygestel word.* (4)

10.3 $E = W_0 + E_{k(max)}$ ✓

$\frac{hc}{\lambda} = hf_0 + {}^1/_2 mv_{max}^2$ ✓ ✓ } Any one/*Enige een*

$\frac{6,63 \times 10^{-34} \times 3 \times 10^8}{4,5 \times 10^{-7}} = 6,63 \times 10^{-34} f_0 + {}^1/_2 (9,11 \times 10^{-31})(4,62 \times 10^5)^2$ ✓

✓

$f_0 = 5,20 \times 10^{14} Hz$ ✓ (6)

[13]

TOTAL/*TOTAAL:* **150**