PHYSICS - 2019

PART B – Answer Booklet

Fill in the codes for the province and school and your 3-digit candidate number.

Year		Province		School			Candidate Number		
1	9								

ANSWER KEY

Write your name and school in the spaces provided.

Candidate Name: Roberto Soto

School Name: 25/03/19

Answers written on the QUESTION paper or any other paper will NOT be marked.

Write answers neatly in the spaces provided in this answer booklet

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FOR MARKERS USE ONLY

	Score	Markers' Initials	
		Marker 1	Marker 2
PART B			
QUESTION 31			
QUESTION 32			
QUESTION 33			
QUESTION 34			
QUESTION 35			
QUESTION 36			
QUESTION 37			
QUESTION 38			
QUESTION 39			
QUESTION 40			
FINAL TOTAL	/70		

START YOUR WORK ON THE NEXT PAGE

Part B – ANSWERS

Write your answer in the space provided below. Your answers must be clear and precise.

QUESTION 31	Mark/Q	Marker 1	Marker 2
a) i. $N + f\sin\theta = mg$ (1) $N = mg - f\sin\theta$ $= 20*10 - 50\sin 30^\circ$ $= 200 - 25 = 175\ N$ (1) 175 N	2		
ii. $F_{applied} - f_{fK} = ma$ $a = \frac{F\cos 30^\circ - \mu_K mg}{m}$ (1) $a = \frac{F_{applied} - f_{fK}}{m} = \frac{50\cos 30^\circ - 0.2*20*10}{20}$ $= 0.165\ m/s^2$ $0.165\ ms^{-2}$ (1)	2		
b). i) $M_x u_x + M_y u_y = (M_x + M_y)v$ (1) $v = \frac{M_x u_x + M_y u_y}{M_x + M_y} = \frac{(10)(15) + (20)(-10)}{10+20} = \frac{150-200}{30}$ $= -1.67\ m/s$ $-1.67\ ms^{-1}$ (1)	2		
ii). Both move to the left	1		
For Markers Use Only — **Q 31 Total**			

QUESTION 32	Mark/Q	Marker 1	Marker 2

a). i). Ammeters are always connected in series and voltmeters are connected in parallel. Therefore, the ammeters & voltmeters are connected correctly (1)

1

ii). $I_T = \frac{V_T}{R_T} = \frac{4.50}{4} = 1.125$ Amps. (1)

$V_1 = R_1\left(\frac{I_T}{2}\right) = 2\left(\frac{1.125}{2}\right) = 1.125$ volts (1) OR

$= R_2\left(\frac{I_T}{2}\right)$

1.125 volts

2

iii). $A_2 = \frac{I_T}{2} = \frac{1.125}{2} = 0.5625$ Amps

0.5625 Amps (1)

1

b) $I_5 = 4.0 - 2.0 = 2.0$ mA

$I_3 = I_5 + I_4 = 2.0 + 1.5 \cong 3.5$ mA

$I_1 = I_3 + I_2 = 3.5 + 2.0 = 5.50$ mA

(1) (1) (1)

I_1 5.50 mA I_3 3.50 mA I_5 2.0 mA

3

For Markers Use Only	Q 32 Total		

QUESTION 33	Mark/Q	Marker 1	Marker 2
a). i). White surface absorb and radiate heat heat much less than black surfaces thus keeping the body cool.	1		
ii). Heat is transfer of energy from a region of higher temperature to a region of lower temperature. Temperature is a measure of how hot or cold a body is	1		
iii). Energy = Power * time = $mc\Delta T$ (1) $m = \frac{P*t}{c\Delta T} = \frac{125000*2*60}{4200*80} = 44.64kg$ 44.64 Kg (1)	2		
b). i). $V - V_o = \beta V_o (T - T_o)$ (1) $\beta = \frac{V - V_o}{V_o (T - T_o)} = \frac{1.1*10^{-6} - 1.0*10^{-6}}{1.0*10^{-6}(36.8-36.0)} = \frac{0.1*10^{-6}}{1.0*(10^{-6})(0.8)}$ $= \frac{1}{10*0.8} = \frac{1}{8} = 0.125$ (1) $\beta = 0.125 /^oC$	2		
ii). $\beta = 3\alpha$ (3 alpha) (1)	1		
For Markers Use Only	Q 33 Total		

QUESTION 34	Mark/Q	Marker 1	Marker 2

a). Doping leads to the production of a large number of charge carriers of one type or the other (either n-type or p-type) therefore increasing the conduction properties of the material. — 2

b). i).

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

— 2

ii). EXOR — 1

c). i). To provide a current to the base of the transistor to put it to work — 1

ii). very close to zero (≈0.01) 1
or (term of a voltage)

For Markers Use Only	Q 34 Total		

QUESTION 35	Mark/Q	Marker 1	Marker 2
a) $B_1 = B_2$ Both in opposite direction hence they will cancel each other at point P $B_1 = B_2$ (1) $\frac{\mu_0 I_1}{2\pi x} = \frac{\mu_0 I_2}{2\pi(3x)} \Rightarrow I_1 = \frac{I_2}{3} = \frac{2}{3} = 0.66$ Amps 0.66 Amps (1)	2		
b). i). W	1		
ii). Y	1		
iii). X	1		
c) Power loss $= I^2R$ (1) $I = \sqrt{\frac{\text{Power loss}}{R}} = \sqrt{\frac{10\,000}{2}} = \sqrt{50000}$ $= 70.71$ Amps 70.71 Amps (1)	2		
For Markers Use Only — **Q 35 Total**			

QUESTION 36	Mark/Q	Marker 1	Marker 2

a) i). $v = \frac{d}{t}$ $d = v \times t = 8\frac{m}{s} \times 8s = 64m$

64m

1

ii). $t = \frac{d}{v} = \frac{160m}{8\ ms^{-1}} = 20\ Sec$

20 Seconds

1

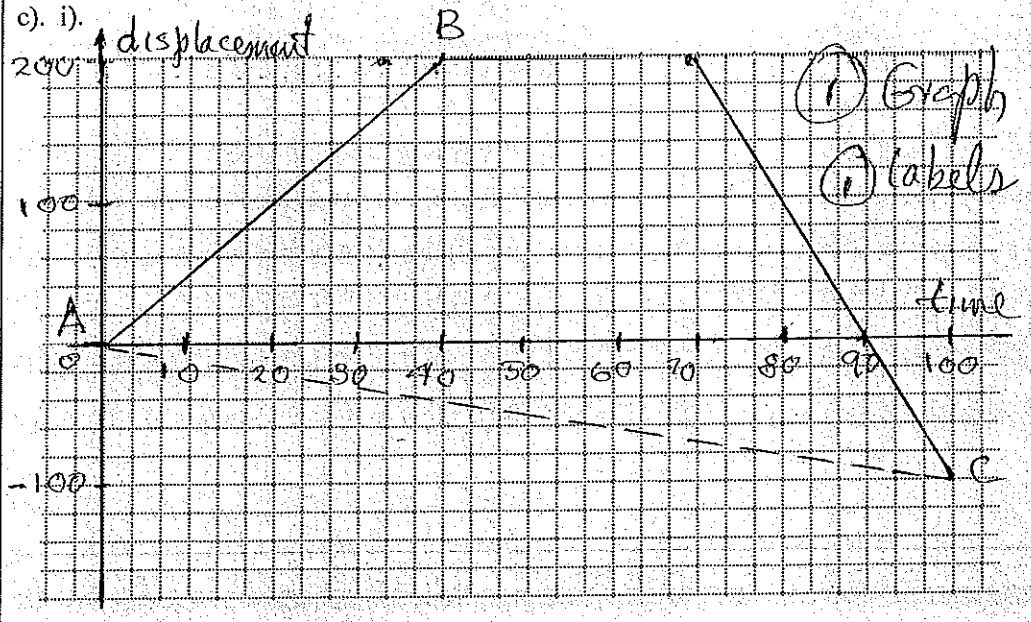
b). i). We mean that the rate of change of its velocity is 2 m/s (Its velocity is increasing 2m per second)

1

ii). We mean that its velocity is decreasing 2 m/s (It is slowing down at a rate of 2 m per second).

1

c). i).



2

ii). $-100/100 = -1\ m/s$ (This is the gradient of the curve from A to C

1

For Markers Use Only

Q 36 Total

QUESTION 37	Mark/Q	Marker 1	Marker 2
a). i). In an enclosed fluid, the pressure is transmitted undiminished to all parts of the fluid.	1		
ii). The magnitude of the buoyant force is equal to the weight of the fluid being displaced by the object.	1		
b). Applying Bernoulli's Equation $P_1 + \rho g h_1 + \frac{\rho v_1^2}{2} = P_2 + \rho g h_2 + \frac{\rho v_2^2}{2}$ $P_1 - P_2 = \frac{\rho}{2}(v_2^2 - v_1^2) \rightarrow v_2^2 = v_1^2 + \frac{2}{\rho}(P_1 - P_2)$ (1) $v_2 = \sqrt{\frac{2(P_1-P_2)}{\rho} + v_1^2} = \sqrt{\frac{2(3000)}{1000} + 10.5625} = 4.07 \frac{m}{s}$ $4.07\ m\ s^{-1}$ (1)	2		
c). (1) $v = \frac{1000}{10*60} = 1.67$ litres/sec $= \left(1.67 \frac{L}{s}\right)\left(10^3 \frac{1}{L}\right)$ (1) Flow rate $= Av =$ $= 1.67 * 10^3 \frac{cm^3}{s}$ $1.67 * 10^3$ cm^3/sec (1)	3		
For Markers Use Only	Q 37 Total		

QUESTION 40	Mark/Q	Marker 1	Marker 2

a)

$T - 3g = 3a$ accel ①

$5g - T = 5a$ accel ①

adding ① & ②

$2 \cdot g = 8a$ accel

$a = \frac{1}{4} \cdot g$ (1)

By substitution of accel in ①

$T = \frac{3}{4} \cdot g + 3g = \frac{15}{4} \cdot g = \frac{15}{4} \cdot 10 = \frac{150}{4} = 37.5\,N$

37.5 Newton (1)

3

b) gravitational potential Energy = Kinetic Energy (1)

$mgh = \frac{1}{2}mv^2$

then $v = \sqrt{2gh} = \sqrt{2 \cdot 10 \cdot 2} = 6.3\,m/s$

$K = \frac{1}{2}mv^2$

$= \frac{1}{2}(60)6.3^2 = 1190.7$ Joules

1190.7J (1)

2

c). F = resistive force $= 20000N$

$P = F \cdot v = 20000 \cdot 50 = 10 * 10^5 = 1000kw$

(1)

1000Kw (1)

2

For Markers Use Only	Q 40 Total		