MEMO MARCH 2011

PHYSICAL SCIENCES GRADE 12

QUESTION 1

1.1 **Watt (W) or J.s^{-1}** (1)

1.2 **Doppler effect** (1)

1.3 Infrared (1)

[3]

QUESTION 2

2.1	~~A~~	B	C	D
2.2	A	~~B~~	C	D
2.3	A	~~B~~	C	D
2.4	A	B	C	~~D~~
2.5	A	B	C	~~D~~
2.6	A	B	C	~~D~~

[6 X 2 = 12]

TOTAL SECTION A : 15

QUESTION 3

3.1 Velocity after:

$v_f^2 = v_i^2 + 2a\Delta y$ ✓

$= 0 + 2(9,8)(50 - 20)$ ✓

$v_f = 24,25\ m\cdot s^{-1}$ ✓

OR

$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$

$30 = (0)\Delta t + ½(9,8)\ \Delta t^2$ ✓

$\therefore\ \Delta t = 2,47\ s$

$v_f = v_i + a\Delta t \quad = 0 + (9,8)(2,47)$ ✓ $= 24,25\ m\cdot s^{-1}$ ✓ (3)

3.2 Velocity after a further

$v_f^2 = v_i^2 + 2a\Delta y$ ✓

$= 24,25^2 + 2(9,8)(20 - 1,8)$ ✓

$\therefore v_f = 30,74\ m\cdot s^{-1}$

$v_f = v_i + a\Delta t$ ✓

$30,74 = 24,25 + 9,8t$ ✓

$\therefore t = 0,66\ s$ ✓

He will not be struck – reaction time is shorter than the time for the brick to reach his head. ✓

OR

Distance fallen in 0,4 s

$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓= (24,25)(0,4) + ½(9,8)(0,4)^2 ✓= 10,45 m✓

Distance above head of supervisor after 0,4 s: 20 – 1,8 – 10,45 = 7,75 m✓✓
He will not be struck – the brick is still 7,75 m above his head ✓ (5)

[8]

QUESTION 4

4.1 $W_{net} = \Delta K$✓

$(F_{gll} - f)\ \Delta x \cos\theta = {}^1/_2 mv^2 - {}^1/_2 mv^2$

$(mg \sin\theta - f)\ \Delta x \cos\theta$✓$= {}^1/_2 mv^2 - {}^1/_2 mv^2$

$(70.\ 9{,}8\ .\ \sin 20 - 50)\ 30 \cos 0$✓✓ $= {}^1/_2(70)v^2 - {}^1/_2(70)4^2$✓

$5538{,}77455 = 35\ v^2 - 560$✓

$v^2 = 174{,}2507014$

$v = 13{,}20\ m{\cdot}s^{-1}$✓ (7)

OR

$W_f + E_{\text{mechanical at top}} = E_{\text{mechanical at bottom}}$✓

$-1500 + 7038{,}36 + 560 = 0 + 35\ v^2$✓✓✓✓

$6098{,}36 = 35\ v^2$ ✓

$174{,}23 = v^2$

$v = 13{,}20\ m{\cdot}s^{-1}$✓

[7]

QUESTION 5

5.1 Towards✓ (1)

5.2 $f_l = \frac{v + v_l}{v - v_s} f_s$ ✓

$450 = \frac{340 + 0}{340 - 10} f_s$✓✓ ✓ (5)

$450 = \frac{340}{330} f_s$

$450 = 1.03 f_s$

$f_s = {}^{450}/_{1.03} = 436.76 Hz$ ✓

5.3 436,76Hz✓ (1)

[7]

QUESTION 6

6.1 $\tan\theta = {}^{35 \times 10^{-3}}/_{04} = 0.0875$ ✓✓✓

$\theta = 5^0$

$\sin\theta = m\lambda/a$ ✓

$\sin(5) = 1\lambda/7.25\times10^{-6}$ ✓✓

$\lambda = (7.25\times10^{-6})(\sin(5)) = 6.32\times10^{-7}\,m$ ✓ (7)

6.2 INCREASES✓ (1)

[8]

QUESTION 7

7.1 AC ✓

7.2 1800W ✓

7.3 1800J energy is disipated in 1 second ✓

7.4 V_{max}= √2 x V_{rms} = √2 x 230 = 325.27V ✓✓✓

7.5 P = V I = 230 x I = 1800 I = 7,83A ✓✓✓✓

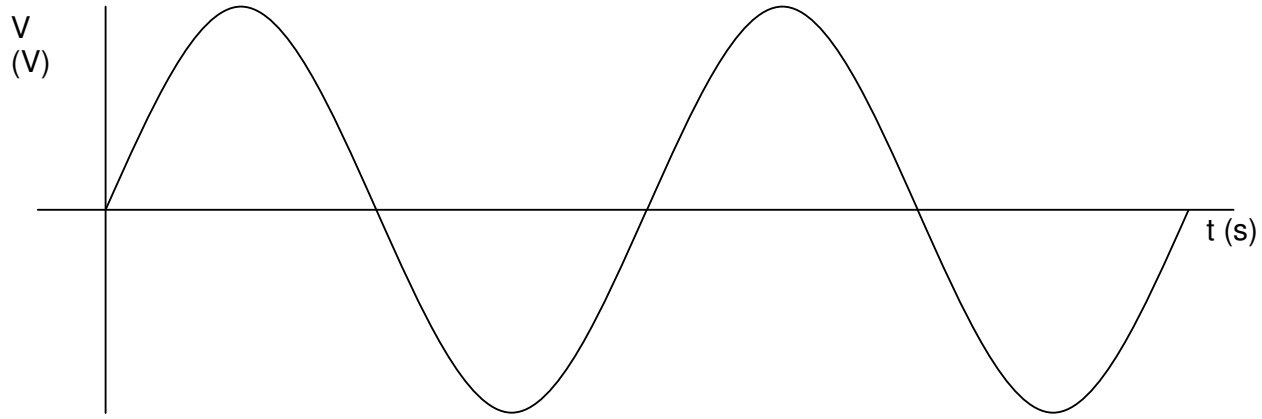
[10]

QUESTION 8

8.1 AC✓

8.2 High✓, need high voltage (and low current) to travel over long distance✓

8.3 ✓axes ✓shape



[5]

TOTAL: 60 MARKS