Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a) Max to zero to max with zero at 0 displacement and correct amplitude correct shape drawn with reasonable attempt to keep total energy constant, crossing at 1×10^{-2} J

A1

(2)

(b) (i) 0.044 m

B1

(1)

(ii) $x = 0.044 \cos 2\pi 3.5t$ ($0.044 \cos 22t$) or $x = 0.044 \sin 2\pi 3.5t$ etc
ecf for A

B1

(1)

(iii) $\alpha_{max} = (2\pi 3.5)^2\ 0.044$

C1

21 (21.3) m s^{-2} ecf for A and incorrect $2\pi f$ from (ii)
(0.042 gives 20.3; 0.04 gives 19.4)

A1

(2)

[6]

Q2.

(a) *period* time for one **complete** oscillation

B1

amplitude maximum displacement from undisturbed (equilibrium) position

B1

(2)

(b) clear description + repeat at least 10 times overall + averaging process

B1

beginning or end measurement at equilibrium / use of datalogger (explicit) / fiducial mark

B1

(2)

(c) same time period

B1

significant and gradual reduction in amplitude compared to original

B1

(2)

[6]

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Q3.

(a) displacement negative cosine

B1

velocity consistent with first graph

B1

acceleration consistent with first or second graph

B1

at least one cycle, constant amplitude (condone small decay), include A for displacement, reasonably drafted

B1

(b) use of $T = 2\pi\sqrt{\frac{m}{k}}$ i.e. substituted values or 0.74 seen

C1

use or implied use of $T = \frac{1}{f}$

C1

1.34 Hz

A1

[7]

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