30.5.3 Physics Paper 3 (232/3)

1. (c) (i) amplitudes of the two pendulums increase from zero to maximum and then decrease to zero alternately. *(1 mark)*

(ii) alternate interchange/transfer of energy from one pendulum to the other. *(1 mark)*

(e)

D (cm)	20	25	30	35	40	45	50
T (s)	12.8	10.2	7.7	5.6	4.4	3.4	2.8
$f = \frac{1}{T}$ (s^{-1})	0.08	0.10	0.13	0.18	0.23	0.30	0.36

Table 1 7 marks

(f) see graph
axes labeled + units *(1 mark)*
scale *(1 mark)*
points plotted *(2 marks)*
smooth curve *(1 mark)*

(g) $f_b = 0.21 s^{-1}$ *(1 mark)*

(h) n = 3 *(1 mark)*
t = 4.7s *(1 mark)*

(i) $f_o = \frac{3}{4.7} = 0.64\ s^{-1}$ *(1 mark)*

(j) $f_b = f_1 - f_o$
$0.21 = f_1 - 0.64 s^{-1}$ *(1 mark)*
$f_o = 0.85 s^{-1}$ *(1 mark)*

2. (b) E = 1.55 ± 0.05V *(1 mark)*

(c) I = 0.35A *(1 mark)*
V = 1.45 ± 0.05V *(1 mark)*

(d) $X = \frac{1.45}{0.35} = 4.1\Omega$ *(1 mark)*
$r = \frac{0.1}{0.35} = 0.29\Omega$ *(1 mark)*

(g)

Number of carbon resistors	One	Two	Three	Four	Five	Six
PB = a (cm)	70.1	56.0	44.2	39.0	33.0	29.1
$\frac{1}{R}$ (Ω^{-1})	0.1	0.2	0.3	0.4	0.5	0.6
a^{-1} (cm^{-1})	1.43	1.79	2.26	2.56	3.03	3.43

Table 2 *(6 marks)*

(h) Graph
Axes labeled + units *(1 mark)*
Scale *(1 mark)*

Points correctly plotted *(2 marks)*
Straight line through points *(1 mark)*

(i) Slope – correct extraction *(1 mark)*
Evaluation
Slope $\approx 4.0 \times 10^{-2}\ \Omega\ cm^{-1}$ *(1 mark)*

(j) $m = \frac{X}{100\ cm} = 4.0 \times 10^{-2}\ \Omega\ cm^{-1}$ *(1 mark)*

$X = 4.0 \pm 0.1\Omega$ *(1 mark)*