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
$f = \dfrac{1}{T}$ (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) $f_b = 0.21 \text{ s}^{-1}$ *(1 mark)*
    (h) n = 3   *(1 mark)*
         t = 4.7 s   *(1 mark)*

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

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

2. (b) E = 1.55 $\pm$ 0.05V   *(1 mark)*

    (c) I = 0.35A   *(1 mark)*
         V = 1.45 $\pm$ 0.05V   *(1 mark)*

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

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

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