## ASIAN PHYSICS OLYMPIAD - 2012

Sr. No.	EXPERIMENT 1	Marks	Maximum Marks	
PART 1				
1	For observations of $M_P$ corresponding to values of $M_W$ for $\theta = \pi$			
	4 readings	0.4		
	5 readings	0.5		
	6 readings	0.6		
	7 readings	0.7	1 5	
	8 readings	0.8	1.5	
	5 readings with $\Delta M_{\rm P} < 5$	0.4		
	6 readings with $\Delta M_P < 5$	0.5		
	7 readings with $\Delta M_{\rm P} < 5$	0.6		
	8 readings with $\Delta M_{\rm P} < 5$	0.7		
	Ear anoth of M. vo M.			
	For graph of $M_p$ vs $M_w$			
	Choice of Scale (to cover 70% or more space on graph sheet)	0.1	0.4	
	3 points on straight line	0.1	0.4	
	4 points on straight line	0.2		
	Both Axis labeled with proper units	0.1		
3	For value of slope $b:0.6 \le b \le 0.8$	0.3		
3	For value of slope $b : 0.5 \le b \le 0.6$ For value of slope $b : 0.5 \le b < 0.6$ or $0.8 < b \le 0.9$	0.3	0.3	
	1 of value of slope b . 0.5 <u>0</u> 0 × 0.6 of 0.6 × 5 <u>0</u> 0.9	0.1		
4	For observations of $M_P$ corresponding to values of $\theta$ for $M_w = 800.0$ g			
	6 to 7 readings	0.5	2.6	
	8 readings	1		
	9 readings	1.1		
	10 readings	1.2		
	11 readings	1.3		
	12 readings	1.4		
	8 readings with $\Delta M_{\rm P} < 5$	0.8		
	9 readings with $\Delta M_P < 5$	0.9		
	10 readings with $\Delta M_P < 5$	1		
	11 readings with $\Delta M_{\rm P} < 5$	1.1		
	12 readings with $\Delta M_{\rm P} < 5$	1.2		
5	For graph of $M_P$ versus $\theta$			
	Proper Choice of Scale (to cover 70% or more space on graph sheet)	0.2	1	
	Both Axis labeled with proper units	0.2		
	Smooth Curve	0.6		
	Moderately smooth curve (atleast half the points on the curve)	0.4		

6 For graph of $\ln M_P$ (or $\ln(M_P/M_W)$ ) vs $\theta$		
Choice of Scale (to cover 70% or more space on graph sheet)	0.2	0.9
4 points on straight line	0.4	
5 points on straight line	0.5	
6 points on straight line	0.6	
Both Axis labeled with proper units	0.1	
7 For value of slope, b: $0.09 \le k \le 0.13$	0.5	0.5
For value of slope, b: $0.08 < k < 0.09$ and $0.13 < k < 0.14$	0.4	0.5
8 Valid method for estimation of uncertainty	0.1	0.2
Uncertainty in $\mu \le 0.02$ (Expanded uncertainty)	0.1	
	0.1	0.1
9 Identifying coefficient of θ as μ	0.1	0.1
10 α	0.5	
Correct Equation: $P = W e^{-\mu\theta}$ or $M_p g = M_w g e^{-\mu\theta}$		0.5
Incorrect Equation: $M_p = M_w e^{-\mu\theta}$	0.2	
Incorrect Equation: $P = CW e^{-\mu\theta}$ or $M_p g = CM_w g e^{-\mu\theta}$	0.2	
PART 2		
11 Correct Equations for determining $M_{\rm u}$ and $\mu_{\rm u}$	0.4	1
Correct method to obtain $M_{\rm u}$ and $\mu_{\rm u}$	0.6	1
12 Observations: $[M_{p1-}, M_{p1+}]$ and $[M_{p2-}, M_{p2+}]$	0.4	0.4
13 Value of $M_{\rm u}$		0.2
$115 \le M_{\rm u} \le 121$	0.2	
$113 \le M_{\rm u} < 115 \text{ and } 121 < M_{\rm u} \le 123$	0.1	
14 Uncertainty in $M_u \le 4$ g (Expanded uncertainty)	0.1	0.1
15 Value of $\mu$		0.2
$0.13 \le \mu \le 0.20$	0.2	
16 Uncertainty in $\mu \le 0.01$ (Expanded uncertainty)	0.1	0.1
	Total	10