EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
SECOND EXAMINATION IN SCIENCE - 2014/2015
FIRST SEMESTER (Nov./Dec., 2016)
AM 215 - CLASSICAL MECHANICS II
(PROPER

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swer all Questions **Time: One hour**

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1. With the usual notations, obtain the following equations for a common catenary:

(a) $s = c\tan\psi$;

(b) $y = c\sec\psi$;

(c) $T = wy$;

(d) $y^2 = s^2 + c^2$.

A uniform chain of length $2l$, has its ends attached to two points in the same horizontal line at a distance $2a$ apart. If l is slightly greater than a, show that the tension of the chain is approximately equal to the weight of the length $\sqrt{\dfrac{a^3}{6a(l-a)}}$ of the chain and that the sag in the middle is almost equal to

$$\frac{1}{2}\sqrt{6a(l-a)}.$$

2. With the usual notations, prove the Claypeyron's equation

$$M_1a + 2M_2(a+b) + M_3b = -\frac{\omega}{4}(a^3+b^3) + 6EI\left(\frac{y_a}{a} + \frac{y_b}{b}\right)$$

for the moment of a slightly elastic beam.

A uniform slightly elastic beam AD of length $4a$ weight W rests on four supports which are in the same horizontal level. The supports are placed at the end points of the beam and at a point B and C such that $AB = 2a, BC = a$ and $CD = a$. Show that magnitude of the bending moments at B and C are $\frac{17Wa}{184}$ and $\frac{3Wa}{368}$ respectively. Find the ratio of the reactions at the four supports.