EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
TERNAL DEGREE EXAMINATION IN SCIENCE - 2008/2009
ECOND YEAR FIRST SEMESTER (March/May, 2016)
EXTMP ~~AM 215~~ - CLASSICAL MECHANICS II
(REPEAT)

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ver all Questions **Time: One hour**

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 flexible chain of length ℓ and weight per unit length ω, rest in a vertical plane with length $k\ell\,(0 < k < \ell)$ in contact with the smooth plane inclined at an angle α to the horizontal and upper end of the chain is attached to a point P. Show that the tension at P is $\omega\ell\{1-k(2-k)\cos^2\alpha\}^{1/2}$ and find the horizontal, vertical distance of P from lower end.

2. If S and M are shearing force and bending moment respectively at a po uniformly loaded beam, then prove that

$$\frac{dS}{dx} = \omega \qquad \text{and} \qquad \frac{dM}{dx} = -S$$

where ω is the weight per unit length of the beam.

State the Bernoulli-Euler law of flexure.

A uniform elastic beam AB of length $3a$, weight W and flexural rigidity B is cl horizontally at it ends, which are at the same horizontal level.Two concen loads, W and $2W$ are placed at the points of trisection of the beam with load near to A. Show that reaction at A and B are $\frac{95W}{54}$ and $\frac{121W}{54}$ respe Find also bending moment at each point.