EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
EXTERNAL DEGREE EXAMINATION IN SCIENCE - 2009/2010
SECOND YEAR, FIRST SEMESTER(JUNE/SEPT., 2012)
EXTMT 215 - CLASSICAL MECHANICS
(PROPER)

Answer all Questions   **Time: One hour**

Q1. With the usual notation, for a common catenary, prove that

  (i) $y = c \cosh\left(\dfrac{x}{c}\right)$;

  (ii) $s = c \sinh\left(\dfrac{x}{c}\right)$,

A uniform heavy flexible string of length $2l$ has its ends attached to light smooth rings which can slide on a fixed circular wire of radius $a(> \ast)$. If the system is in equilibrium when the rings are at the non-zero distance $2d$ apart at the same horizontal level. Prove that $(a^2 - d^2)^{1/2} = d \sinh \dfrac{(a^2 - d^2)^{1/2}}{l}$. Find also the depth of lowest point of the string below the rings.

Q2. Prove the Claypeyron's equation for the moment of a slightly elastic beam.

A heavy uniform elastic rod rests on 5 supports which are in a horizontal line. Two of the supports are ends of the rod. One is at a middle point and two bisects the distance between the middle point and the ends. Show that the bending moment at the center and at each of the sopport next to its are $\dfrac{W\ell}{56}$ and $\dfrac{3W\ell}{112}$, where W is the weight of the rod and 4ℓ is the length of the rod. Show that the reaction on the points of supports are in the ratio 11:26:32.

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