STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted during the academic year 2009 – 10 & thereafter)

SUBJECT CODE : MT/PC/ME14

M. Sc. DEGREE EXAMINATION, NOVEMBER 2010
BRANCH I - MATHEMATICS
FIRST SEMESTER

COURSE : CORE
PAPER : MECHANICS
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A **(5 X 8 = 40)**

ANSWER ANY FIVE QUESTIONS

1. Explain Conservation Theorem for the Linear momentum of a system of particles.
2. Explain Brachistechrone problem.
3. Show that twice dissipation function is equal to the rate of energy dissipation.
4. Explain Euler's theorem on the motion of a rigid body.
5. Define moment of inertia and explain with an example.
6. Obtain Lagrange's equations of motion interms of Routhian function.
7. Explain canonical transformation and extended canonical transformation.

SECTION – B **(3 X 20 = 60)**

ANSWER ANY THREE QUESTIONS

8. a) State and prove D'Alembert's principle.
   b) Give example for the Icineetic energy T be always a homogeneous quadratic form in the generalized velocities.
9. a. Derive Lagrange's Equations form Hamilton's principle.
   b. Explain extension of Hamilton's principle to non-holonomic system.

10. a) State and prove principle of least action.
    b) Define Inertia Tensor and the moment of inertia.

11. a) Derive Hamilton's Canonical equations.
    b) Show that $Q = log\left[\frac{1}{q}\sin p\right], p = qcot\ p$ is Canonical.

12. a) Obtain algebraic properties of the Poisson bracket.
    b) Show that Poisson bracket and Lagrange bracket are reciprocal to each other.

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