STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted during the academic year 2011 – 12)

SUBJECT CODE : 11MT/PC/ME14

M. Sc. DEGREE EXAMINATION, NOVEMBER 2011
BRANCH I - MATHEMATICS
FIRST SEMESTER

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

SECTION – A **(5 X 2 = 10)**
ANSWER ALL THE QUESTIONS

1. Define generalized coordinates.
2. Explain Lagrange undetermined multipliers.
3. Define Dyad.
4. State modified Hamilton's Principle.
5. Define Canonical Transformation.

SECTION – B **(5X 6 = 30)**
ANSWER ANY FIVE QUESTIONS

6. Define Holonomic Constraint with an example.
7. State and prove Hamilton's Principle.
8. Obtain the moment of Inertia about the axis of rotation.
9. Explain Coriolis Force.
10. Obtain Lagrangian equations interms of Routhian function.
11. Obtain Hamilton's Canonical equations of motions.
12. State and prove Jacobi' identity relating Poisson Brackets.

SECTION – C **(3X20 = 60)**
ANSWER ANY THREE QUESTIONS

13. a) State and Prove D'Alemberr's Principle.
    b) Explain principle of virtual work.
14. a) Obtain the standard form of Lagrange's Equations for a non-holonomic system.
    b) Obtain Lagrange equation for a hoop rolling, without slipping, down an inclined plane.
15. State and prove principle of least action.
16. Show that for any point in a rigid body one can find a set of Cartesian axes for which the inertia tensor I will be diagonal and obtain secular equation.
17. a) Obtain canonical equations of motion for the major four generating functions.
    b) Show that the transformation $Q = \log\frac{\sin p}{q}$, $P = q\cot p$ is canonical.

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