MANIPAL UNIVERSITY, MANIPAL

FIRST SEMESTER M.Sc(Physics) END SEMESTER EXAMINATION, DECEMBER, 2015

SUB: CLASSICAL MECHANICS (PHY- 603)
(REVISED CREDIT SYSTEM)
TIME: 3 HRS.   **MAX.MARKS : 50**

NOTE:(A) ANSWER ANY FIVE FULL QUESTIONS. (B) EACH QUESTION CARRIES 10 MARKS.

1A Show that the total energy of a particle in a conservative field is constant. [5]

1B Discuss the motion of a projectile in a resistive medium, with the retarding force proportional to its velocity. Obtain the position of the projectile at any instant. [5]

2A Obtain the equation of the parabolic orbit for a body in a two-body system in an inverse-square-law field, and discuss the case of circular orbits for the body. [5]

2B Using variational principle, obtain the path of a particle moving in minimum transit time, in a conservative force field, starting from rest. [5]

3A Obtain the general expression for kinetic energy in the case of a double pendulum in terms of generalized coordinates. [4]

3B Show that the plane of oscillation of Focault pendulum at latitude θ rotates through $2\pi \sin \theta$ everyday. [6]

4A Prove the following properties of the poisson brackets:
(i) $[u+v, w] = [u, w] + [v, w]$ (ii) $[u, v\, w] = [u, v]\, w + v\, [u, w]$. [4]

4B Obtain the solution of the one-dimensional harmonic oscillator by Hamilton-Jacobi method. [6]

5A Discuss the oscillations in 2 coupled simple pendulums: Obtain the expressions for coordinates of the pendulum. [4]

5B Explain: (i) strain tensor, (ii) dilation, with reference to elasticity. [6]

6A Obtain the equation of continuity for mass densities. [5]

6B State and prove Bernoulli's theorem. [5]

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