Class Test 01

PH3101, Spring 2024 DPS, IISER Kolkata

Instructor: Dr. Rajesh Kumble Nayak
5:00 PM, 02 September, 2024.
Duration 50 Min.

- Read the question carefully.
- Write neatly, and keep the rough work on the answer script.
- Answer all questions.
- No writing on the question paper.

Good luck!

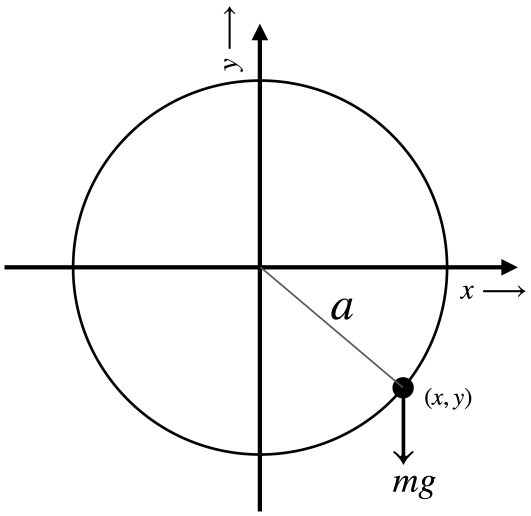
Q - 1(20 Marks)

In a generalised coordinate system $\{\sigma, \tau\}$ the Lagrangian is given by

$$\mathcal{L} = \frac{m}{2}\left(\frac{1}{\sigma^2+\tau^2}\right)\left[\dot{\sigma}^2+\dot{\tau}^2\right]$$

Find the Lagrange equation of motion.

Q - 2(20 Marks)



A particle of mass m is confined to move along a vertically oriented circle under the influence of gravity. Find a generalised coordinate for this problem and write the Lagrangian for it.

Q - 3(10 Marks)

Consider a free particle in two-dimensional inertial frame,

(1) Write the equation of motion in a plane polar coordinates.

(2*) Show that the particle moves along a straight line.