Assignment 7

The due date for submitting this assignment has passed.

Due on 2021-03-10, 23:59 IST.

As per our records you have not submitted this assignment.

1) A particle of mass m is moving vertically, under the action of gravity and resistive force numerically equal to c times its velocity v. Which of the following is the form of its Hamilton’s principle equation?

- $\delta \int_{t_1}^{t_2} \left( \frac{1}{2} m \dot{y}^2 - mg \dot{y} \right) dt - \int_{t_1}^{t_2} c \dot{y} \dot{y} dt$
- $\delta \int_{t_1}^{t_2} \left( \frac{1}{2} m \dot{y}^2 - mg \dot{y} \right) dt + \int_{t_1}^{t_2} c \dot{y} \dot{y} dt$
- $\delta \int_{t_1}^{t_2} \left( \frac{1}{2} m \dot{y}^2 + mg \dot{y} \right) dt - \int_{t_1}^{t_2} c \dot{y} \dot{y} dt$
- $\delta \int_{t_1}^{t_2} \left( \frac{1}{2} m \dot{y}^2 + mg \dot{y} \right) dt + \int_{t_1}^{t_2} c \dot{y} \dot{y} dt$

No, the answer is incorrect.

Score: 0
Accepted Answer:
$\delta \int_{t_1}^{t_2} \left( \frac{1}{2} m \dot{y}^2 + mg \dot{y} \right) dt - \int_{t_1}^{t_2} c \dot{y} \dot{y} dt$

2) Three masses are connected in series to a fixed support by linear springs. Let $x_i$ represent displacement from equilibrium and $k_i$ be the spring constant. Assuming that only the spring forces are present, what would be the Lagrangian function L of the system?

- $L = \frac{1}{2} [m_1 \dot{x}_1^2 + m_2 \dot{x}_2^2 + m_3 \dot{x}_3^2 - k_1 (x_1 - x_2)^2 - k_2 (x_2 - x_3)^2] \pm \text{constant}$
- $L = \frac{1}{2} [m_1 \dot{x}_1^2 + m_2 \dot{x}_2^2 + m_3 \dot{x}_3^2 + k_1 (x_1 - x_2)^2 + k_2 (x_2 - x_3)^2 + k_3 (x_3 - x_4)^2]$
- $L = \frac{1}{2} [m_1 \dot{x}_1^2 + m_2 \dot{x}_2^2 + m_3 \dot{x}_3^2 - k_1 (x_1 - x_2)^2 - k_2 (x_2 - x_3)^2 - k_3 (x_3 - x_4)^2] + \text{constant}$
- $L = \frac{1}{2} [m_1 \dot{x}_1^2 + m_2 \dot{x}_2^2 + m_3 \dot{x}_3^2 - k_1 (x_1 - x_2)^2 - k_2 (x_2 - x_3)^2 + k_3 (x_3 - x_4)^2] + \text{constant}$

No, the answer is incorrect.

Score: 0
Accepted Answers:
$L = \frac{1}{2} [m_1 \dot{x}_1^2 + m_2 \dot{x}_2^2 + m_3 \dot{x}_3^2 - k_1 (x_1 - x_2)^2 - k_2 (x_2 - x_3)^2] + \text{constant}$

3) A particle moves on the surface $\phi(x, y, z) = 0$ from the point $(x_1, y_1, z_1)$ to the point $(x_2, y_2, z_2)$ in time T. If it moves in such a way that the integral of its kinetic energy over that time is minimum, which of the following equations must the coordinates of the particle satisfy?

- $\dot{\phi}_x = \frac{\dot{x}}{\phi_x} = \frac{\dot{z}}{\phi_z}$
- $\dot{\phi}_y = \frac{\dot{y}}{\phi_y} = \frac{\dot{z}}{\phi_z}$
- $\dot{\phi}_z = \frac{\dot{y}}{\phi_y} = \frac{\dot{z}}{\phi_z}$
- $\dot{\phi}_z = \frac{\dot{y}}{\phi_y} = \frac{\dot{z}}{\phi_z}$

No, the answer is incorrect.

Score: 0
Accepted Answers:
$\dot{x} = \frac{\dot{y}}{\phi_y} = \frac{\dot{z}}{\phi_z}$