

# PROBLEM DISCUSSION

FUTURING LEARNING SOLUTIONS

May 27, 2022

When Hamiltonian  $H = H(q, p, t)$  then which of the following is correct option? ( $t$ -time,  $T$ -kinetic energy,  $V$ -potential energy)

**a.**  $\frac{\partial H}{\partial t} = \frac{\partial T}{\partial t} + \frac{\partial V}{\partial t}$

**b.**  $\frac{\partial H}{\partial t} = \frac{\partial T}{\partial t} - \frac{\partial V}{\partial t}$

**c.**  $\frac{\partial H}{\partial t} = -\frac{\partial T}{\partial t} - \frac{\partial V}{\partial t}$

**d.**  $\frac{\partial H}{\partial t} = -\frac{\partial T}{\partial t} - \frac{\partial V}{\partial t}$

Lagrangian of a system is given by  
 $L = \left(\frac{1}{2}m\dot{x}^2 - \frac{1}{2}kx^2\right) e^{-\gamma t}$  write down Hamiltonian of the system.

Hamiltonian of a system is given by  
 $H = \frac{p_x^2}{2m}e^{\gamma t} + \frac{1}{2}kx^2e^{-\gamma t}$  write down the Lagrangian.

Hamiltonian of a system is given by  $H(q, p, t) = \sqrt{p^2 + 1}$  where  $q$  is the generalized coordinates and  $P$  is generalized momentum. Find the Lagrangian of the system

The Lagrangian of a system is given by

$$L = \frac{1}{2}m \left( \dot{r}^2 + r^2\dot{\theta}^2 \right) - \frac{1}{2}kr^2$$

- a.** Write down the Hamiltonian of system
- b.** Find Hamiltonian equation of motion
- c.** Discuss conservation of momentum and energy

Hamiltonian of a system is given by  $H = \frac{P_x P_y}{m} - \frac{P_y^2}{2m}$  Find  
Lagrangian  $L(x, y, \dot{x}, \dot{y})$

Hamiltonian of a system is given by

$$H = xP_x - P_y - \frac{1}{2}x^2 + \frac{1}{2}y^2 \text{ plot } y \text{ v/s } x \text{ graph}$$
$$(x(0) = y(0) = 1), (P_x(0) = \frac{1}{2}, P_y(0) = \frac{-1}{2})$$