I 45

34. For a particle with mass m in a one dimensional potential

$$V(x) = -V_o(\exp(-2\alpha x) - 2\exp(-\alpha x)),\ V_o > 0$$

the time period of small oscillations about the equilibrium is

(A) $\frac{2\pi}{\alpha}\sqrt{\frac{m}{V_o}}$

(B) $\frac{\pi}{\alpha}\sqrt{\frac{2m}{V_o}}$

(C) $\sqrt{\frac{\pi m}{V_o \alpha}}$

(D) $\sqrt{\frac{2\pi m}{V_o \alpha}}$

35. Given that the Lagrangian of a point particle is

$$L = \frac{1}{2}m\dot{x}^2 - \frac{1}{2}\omega^2 x^2 - \alpha x^4 + \beta x \dot{x}^2 ,$$

the Hamiltonian is

(A) $\frac{p^2}{2(m+2\beta x)} + \omega^2 x^2 + \alpha x^4$

(B) $\frac{p^2}{2(m+2\beta x)} - \omega^2 x^2 - \alpha x^4$

(C) $\frac{p^2}{2m}(1+2\beta x) + \omega^2 x^2 + \alpha x^4$

(D) $\frac{1}{2}\dot{x}^2 + \omega^2 x^2 + \alpha x^4 - \beta x \dot{x}^2$

36. If the Lagrangian of a point particle is

$$L = \frac{1}{2}m\dot{x}^2 - \frac{1}{2}\omega^2 x^2 - \alpha x^4 + \beta x \dot{x}^2 ,$$

the equation of motion will be given by

(A) $m\ddot{x} + \beta\dot{x}^2 + \omega^2 x + 4\alpha x^3 = 0$

(B) $m\ddot{x} - \beta\dot{x}^2 - \omega^2 x + 4\alpha x^3 = 0$

(C) $(m+2\beta x)\ddot{x} + \beta\dot{x}^2 + \omega^2 x + 4\alpha x^3 = 0$

(D) $(m+2\beta x)\ddot{x} - \beta\dot{x}^2 + \omega^2 x + 4\alpha x^3 = 0$