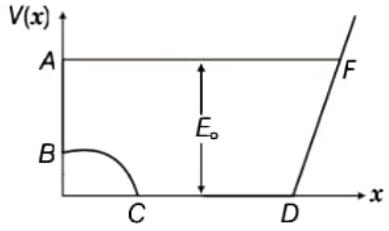
Q. A graph of potential energy $V(x)$ *versus* x is shown in figure. A particle of energy E_0 is executing motion in it. Draw graph of velocity and kinetic energy *versus* x for one complete cycle *AFA*.



Thinking Process

We will assume total mechanical energy of the system to be constant.

Ans. **KE *versus* x graph**

We know that Total ME = KE + PE

$\Rightarrow$ $E_0 = \text{KE} + V(x)$

$\Rightarrow$ $\text{KE} = E_0 - V(x)$

at A, $x = 0$, $V(x) = E_0$

$\Rightarrow$ $\text{KE} = E_0 - E_0 = 0$

at B, $V(x) < E_0$

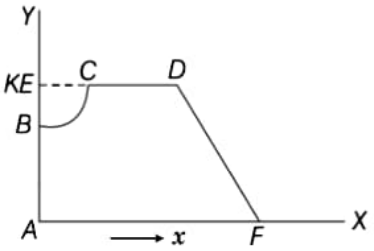
$\Rightarrow$ $\text{KE} > 0$ (positive)

at C and D, $V(x) = 0$

$\Rightarrow$ KE is maximum at F, $V(x) = E_0$

Hence, KE = 0

The variation is shown in adjacent diagram.



Velocity *versus* x graph

As $\text{KE} = \frac{1}{2}mv^2$

$\therefore$ At A and F, where KE = 0, $v = 0$

At C and D, KE is maximum. Therefore, v is $\pm$ max.

At B, KE is positive but not maximum.

Therefore, v is $\pm$ some value ($<$ max)

The variation is shown in the diagram.