

Q. Consider a one-dimensional motion of a particle with total energy E . There are four regions A , B , C and D in which the relation between potential energy V , kinetic energy (K) and total energy E is as given below

Region A : $V > E$

Region B : $V < E$

Region C : $K < E$

Region D : $V > E$

State with reason in each case whether a particle can be found in the given region or not.

Ans. We know that

$$\text{Total energy } E = \text{PE} + \text{KE}$$

$$\Rightarrow E = V + K \quad \dots (i)$$

For region A Given, $V > E$, From Eq (i)

$$K = E - V$$

as

$$V > E \Rightarrow E - V < 0$$

Hence, $K < 0$, this is not possible.

For region B Given, $V < E \Rightarrow E - V > 0$

This is possible because total energy can be greater than PE (V).

For region C Given, $K > E \Rightarrow K - E > 0$

from Eq. (i) $\text{PE} = V = E - K < 0$

Which is possible, because PE can be negative.

For region D Given, $V > K$

This is possible because for a system PE (V) may be greater than KE (K).