$$\frac{d}{dt}(v) = a(t)$$

$$dv = a(t) \cdot dt$$

$$\int dv = \int a(t) \cdot dt$$

$$v = \int a(t) \cdot dt + A$$

$$v = b(t) + A \rightarrow (1)$$

where $b(t) = \int a(t) \cdot dt$ and A is constant of Integration

$$v = b(t) + A$$

$$(1) \Rightarrow \quad \frac{dx}{dt} = b(t) + A$$

$$\Rightarrow \int dx = \int (b(t) + A)\, dt$$

$$\Rightarrow \int dx = \int b(t)\, dt + \int A\, dt$$

$$\Rightarrow x = \int b(t) \cdot dt + At + B \rightarrow (2)$$

where B is another constant of Integration.
The above method is used to solve a problem of time-dependent acc.

(ii) <u>Velocity-dependent acc:-</u>

velocity-dependent acc depends on velocity only i.e $a = a(v)$. In such case we have

$$v\frac{dv}{dx} = a(v)$$

$$\Rightarrow dx = \frac{v\,dv}{a(v)}$$

$$\Rightarrow \int dx = \int \frac{v\,dv}{a(v)}$$

$$x = \int \frac{v}{a(v)} \cdot dv + C \rightarrow (i)$$

where C is constant of Integration