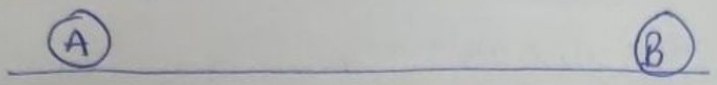
Two particles A and B initially at rest, move towards each other by mutual force of attraction. At the instant when the speed of A is v and the speed of B is $2v$, the speed of the centre of mass of the system is **(1982, 3M)**

(a) $3\ v$ (b) v

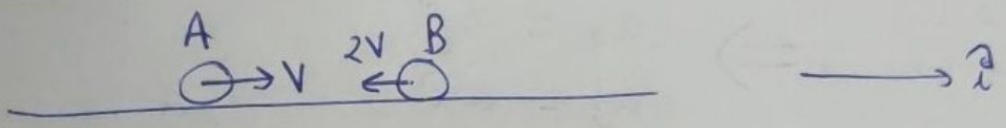
(c) $1.5\ v$ (d) zero

Solution

Initially



Instant



Since Net force acting along direction of motion is Zero. Hence momentum conservation can be used

Initial Momentum = Final Momentum

$$0 = m_A V \hat{i} - m_B 2V \hat{i}$$

$$\Rightarrow m_A = 2m_B$$

$$V_{com} = \frac{m_A V \hat{i} - m_B 2V \hat{i}}{m_A + m_B} = 0$$

d, option is correct.