Q1. 22 January Shift 2

Given below are two statements :

Statement I: For a mechanical system of many particles total kinetic energy is the sum of kinetic energies of all the particles.

Statement II: The total kinetic energy can be the sum of kinetic energy of the center of mass w.r.t to the origin and the kinetic energy of all the particles w.r.t. the center of mass as the reference.

In the light of the above statements, choose the correct answer from the options given below :

(1) Statement I is true but Statement II is false
(2) Both Statement I and Statement II are false
(3) Statement I is false but Statement II is true
(4) Both Statement I and Statement II are true

Q2. 23 January Shift 1

In a perfectly inelastic collision, two spheres made of the same material with masses 15 kg and 25 kg, moving in opposite directions with speeds of 10 $\mathrm{m/s}$ and 30 $\mathrm{m/s}$, respectively, strike each other and stick together. The rise in temperature (in °C), if all the heat produced during the collision is retained by these spheres, is : (specific heat of sphere material $31\mathrm{cal/kg.^\circ C}$ and $1\mathrm{cal} = 4.2$ J)

(1) 1.15 (2) 1.75 (3) 1.44 (4) 1.95

Q3. 23 January Shift 2

A body of mass 14 kg initially at rest explodes and breaks into three fragments of masses in the ratio 2 : 2 : 3. The two pieces of equal masses fly off perpendicular to each other with a speed of 18 $\mathrm{m/s}$ each. The velocity of the heavier fragment is ____ $\mathrm{m/s}$.

(1) 12 (2) $10\sqrt{2}$ (3) $24\sqrt{2}$ (4) $12\sqrt{2}$

ANSWER KEYS

1. (4) **2.** (4) **3.** (4)