

Name:

Quiz ( 7)-Sec (7)-Ch(9&10)

S.N:

ID :

**KEY**

Phys 101 ( Term 041)-( F. Enaya)

*Show your steps clearly for full credit!!*

(Q1)A 10 kg bomb at rest explodes, breaking into three pieces of masses 2.0 kg, 2.0 kg, and 6.0 kg. The two 2.0 kg pieces fly off perpendicular to each other, one along the +x-axis and the other along the +y-axis, with the same speed 30 m/s. Find the **speed** of the 6.0 kg piece.

$P_i = P_f$  , where  $P_i = 0$ .

$$\text{So : } 0 = m_1 \vec{V}_1 + m_2 \vec{V}_2 + m_3 \vec{V}_3$$

$$0 = 2 ( 30 i ) + 2 ( 30 j ) + 6 ( \vec{V}_3 )$$

$$\Rightarrow \vec{V}_3 = - 10 i - 10 j \Rightarrow \left| \vec{V}_3 \right| = \sqrt{(10^2 + 10^2)} = 14.14 \text{ m/s}$$

(Q 2)A ball having a mass of 35 grams strikes a wall with a velocity of 8 m/s perpendicular to the wall and rebounds in the opposite direction with only 50 % of its initial kinetic energy. What is the magnitude of the impulse that acts on the ball while it is in contact with the wall during collision?

$K_f = 50/100 K_i \Rightarrow \frac{1}{2} m V_f^2 = \frac{1}{2} (\frac{1}{2} m V_i^2) \Rightarrow$  after substituting the value of  $V_i \Rightarrow V_f = 5.6 \text{ m/s}$ .

*But since the ball rebounds in the opposite direction  $\vec{V}_f = - 5.6 \text{ m/s}$ .*

$$\vec{J} = m(\vec{V}_f - \vec{V}_i) = 35 \times 10^{-3} (-5.6 - 8) = -0.476 \text{ kg.m / s}$$

$$\left| \vec{J} \right| = 0.476 \text{ Kg.m / s}$$