Ch 2 - 38, 39, 40, 41

(38) $\vec{v}_{1i} = \langle 0, 1800, 0 \rangle$ m/s $\quad \vec{v}_{2i} = 0$

$\vec{v}_{1f} = \langle 0, -1500, 0 \rangle$ m/s $\quad \vec{v}_{2f} = ?$

$\vec{p}_i = \vec{p}_f \Rightarrow m_1\vec{v}_{1i} + m_2\vec{v}_{2i} = m_1\vec{v}_{1f} + m_2\vec{v}_{2f}$

$(5\text{ kg})\langle 0, 1800, 0 \rangle \frac{m}{s} = (5\text{ kg})\langle 0, -1500, 0 \rangle \frac{m}{s} + \vec{p}_{2f}$

$\vec{p}_{2f} = \langle 0, 16500, 0 \rangle$ kg·m/s

(39) $m_{1i}\vec{v}_{1i} + m_{2i}\vec{v}_{2i} = m_{1f}\vec{v}_{1f} + m_{2f}\vec{v}_{2f}$

$(9\text{ kg})\langle 4100, -2600, 2800 \rangle \frac{m}{s} + (6\text{kg})\langle -450, 1800, 3500 \rangle \frac{m}{s}$

$= (7\text{ kg})\langle 1300, 200, 1800 \rangle \frac{m}{s} + 8\text{kg}\langle v_{2fx}, v_{2fy}, v_{2fz} \rangle$

$\vec{v}_{2f} = \langle 3138, -1750, 4200 \rangle$ m/s

(40) $m_1\vec{v}_{1i} + m_2\vec{v}_{2i} = m_1\vec{v}_{1f} + m_2\vec{v}_{2f}$

$(5\text{ kg})\langle 30, 45, -20 \rangle \frac{m}{s} + (8\text{kg})\langle -9, 5, 4 \rangle \frac{m}{s} = (5\text{kg})\langle -10, 50, -5 \rangle \frac{m}{s} + (8\text{kg})\vec{v}_{2f}$

$\vec{v}_{2f} = \langle 16, 1.9, -5.4 \rangle \frac{m}{s}$

(41) $m_1\vec{v}_{1i} + m_2\vec{v}_{2i} = (m_1+m_2)\vec{v}_f$

$(15\text{kg})\langle 0, -30, 0 \rangle \frac{m}{s} + (32\text{kg})\langle 15, 12, 0 \rangle \frac{m}{s} = (15\text{kg}+32\text{kg})\vec{v}_f$

$\vec{v}_f = \langle 13.4, -1.4, 0 \rangle$ m/s