

Q. 6. (i) **Before** (Mass) **After**

$$5\vec{i} - 8\vec{j} \quad 2\text{kg} \quad 5\vec{i} + p\vec{j}$$

$$\frac{\text{NEW}}{\text{OLD}} = -e$$

$$\Rightarrow \frac{p}{-8} = -\frac{3}{4}$$

$$\Rightarrow p = 6$$

$$\text{Ans} = 5\vec{i} + 6\vec{j}$$

$$(ii) \frac{1}{2}Mu^2 - \frac{1}{2}Mv^2 = \frac{1}{2}(2)(25 + 64) - \frac{1}{2}(2)(25 + 36)$$

$$= 28 \text{ J}$$

$$(iii) \vec{l} = M\vec{v} - M\vec{u}$$

$$= 2(5\vec{i} + 6\vec{j}) - 2(5\vec{i} - 8\vec{j})$$

$$= 28\vec{j} \text{ Ns}$$

Q. 7. (i) **Before** (Mass) **After**

$$8\vec{i} - 15\vec{j} \quad 0.2 \text{ kg} \quad 8\vec{i} + p\vec{j}$$

$$\frac{\text{NEW}}{\text{OLD}} = -e$$

$$\Rightarrow \frac{p}{-15} = -\frac{2}{5}$$

$$\Rightarrow 5p = 30 \Rightarrow p = 6$$

$$\Rightarrow \text{New velocity} = 8\vec{i} + 6\vec{j} \text{ m/s}$$

$$(ii) \text{Speed before} = \sqrt{8^2 + (-15)^2}$$

$$= 17 \text{ m/s}$$

$$\text{Speed after} = \sqrt{8^2 + 6^2}$$

$$= 10 \text{ m/s}$$

$$\Rightarrow \text{Fall in speed} = 17 - 10$$

$$= 7 \text{ m/s}$$

$$(iii) \text{K.E.}_{\text{before}} = \frac{1}{2}(0.2)(17)^2$$

$$= 28.9 \text{ J}$$

$$\text{K.E.}_{\text{after}} = \frac{1}{2}(0.2)(10)^2$$

$$= 10 \text{ J}$$

$$\text{Loss} = 28.9 - 10$$

$$= 18.9 \text{ J}$$

Q. 8. (i) $\frac{\text{NEW}}{\text{OLD}} = -e$

$$\Rightarrow \frac{4}{-6} = -e$$

$$\Rightarrow e = \frac{2}{3}$$

$$(ii) \text{K.E.}_{\text{before}} = \frac{1}{2}(4)(64 + 36)$$

$$= 200 \text{ J}$$

$$\text{K.E.}_{\text{after}} = \frac{1}{2}(4)(64 + 16)$$

$$= 160 \text{ J}$$

$$\% \text{ Loss} = \frac{40}{200} \times \frac{100}{1}$$

$$= 20\%$$

$$(iii) \tan A = \frac{6}{8} = \frac{3}{4}, \quad \tan B = \frac{4}{8} = \frac{1}{2}$$

$$\frac{\tan B}{\tan A} = \frac{\frac{1}{2}}{\frac{3}{4}} = \frac{2}{3}$$

Q. 9. (i) **Before** (Mass) **After**

$$4\vec{i} + 3\vec{j} \quad 0.2 \quad p\vec{i} + 3\vec{j}$$

$$\frac{\text{NEW}}{\text{OLD}} = -e$$

$$\Rightarrow \frac{p}{4} = -0.75$$

$$\Rightarrow p = -3$$

$$\Rightarrow \text{Velocity after impact} = -3\vec{i} + 3\vec{j} \text{ m/s}$$

$$(ii) \text{K.E.}_{\text{before}} = \frac{1}{2}(0.2)(4^2 + 3^2)$$

$$= 2.5 \text{ J}$$

$$\text{K.E.}_{\text{after}} = \frac{1}{2}(0.2)((-3)^2 + 3^2)$$

$$= 1.8 \text{ J}$$

$$\text{Loss} = 2.5 - 1.8$$

$$= 0.7 \text{ J}$$

$$\% \text{ loss} = \frac{0.7}{2.5} \times 100 = 28\%$$