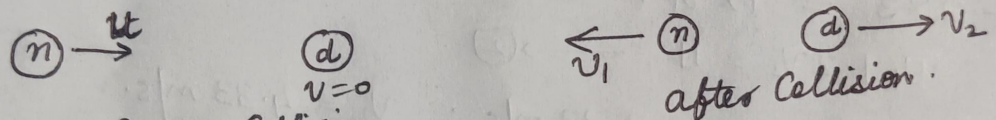
ANSWER KEY

DATE: SEPT 6. XI- PHYSICS

1. (a)
2. (b)
3. (a)
4. (d)
5. Derivation. $u_1 - u_2 = v_2 - v_1$

$$e = \frac{v_2 - v_1}{u_1 - u_2} = 1.$$

6. 

$m_d = 2m_n$

$m_d = 2m$

Applying law of cons. of linear momentum;

$$mu = mv_1 + 2mv_2$$

$$v_1 + 2v_2 = u \quad \text{——} (1)$$

As, $e = 1 \Rightarrow u = v_2 - v_1$ —— (2)

Adding above two equations.

$$v_1 = -\frac{u}{3}.$$

Fractional loss of K.E. of neutron $= \dfrac{\frac{1}{2}mu^2 - \frac{1}{2}mv_1^2}{\frac{1}{2}mu^2}$

$$= 1 - \left(\frac{v_1}{u}\right)^2 = 1 - \frac{1}{9} = \frac{8}{9}.$$

7. (a) $W = \frac{1}{2}kx^2$ (derivation)

(b) $W = \int_{x_i}^{x_f} F(x)\,dx$ (derivation).

8. CASE STUDY BASED QUESTION:

(1) Perfectly Inelastic Collision

(2). $m_1 = 1kg$, $m_2 = 2kg$

$u_1 = 5 m/s$ $u_2 = 3 m/s$

$v_1, v_2 = ?$

As $e = 1$; $u_1 - u_2 = v_2 - v_1$

$5 - 3 = v_2 - v_1$

$v_2 - v_1 = 2 \longrightarrow (1)$

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

$1 \times 5 + 2 \times 3 = 1 \times v_1 + 2 \times v_2$

$v_1 + 2v_2 = 11 \longrightarrow (2)$

Solving (1) & (2); $v_1 = 2.33 m/s$; $v_2 = 4.33 m/s$.

(3). $0 \leq e \leq 1$.

(4). Perfectly elastic Collision

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