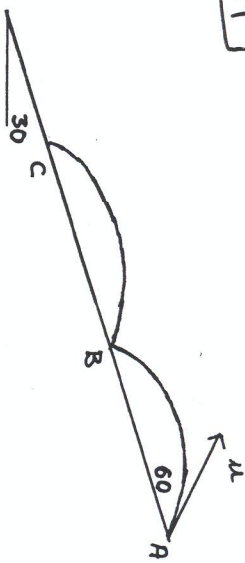


Q.3 (i)

1941



At B:

$$r_j = 0$$

$$u \sin 60 \cdot t - 0.5 g \cos 30 \cdot t^2 = 0$$

$$t = 2u/g$$

$$|AB| = u \cos 60 \cdot (2u/g) + 0.5 g \sin 30 \cdot (2u/g)^2$$

$$= 2u^2/g$$

(ii)

$$\text{At B: } v = (u \cos 60 + g \sin 30 \cdot 2u/g) \vec{i} + (u \sin 60 - g \cos 30 \cdot 2u/g) \vec{j}$$

$$= 3u/2 \vec{i} - \sqrt{3}u/2 \vec{j}$$

$$\text{Rebound velocity} = 3u/2 \vec{i} + e\sqrt{3}u/2 \vec{j}$$

At C:

$$r_j = 0$$

$$(e\sqrt{3}u/2)t - 0.5g \cos 30 \cdot t^2 = 0$$

$$t = 2e u/g$$

$$|BC| = (3u/2)(2eu/g) + 0.5g \sin 30 (2eu/g)^2$$

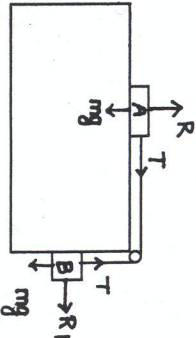
$$= (3+e)eu^2/g$$

$$|BC| = 2|AB|$$

$$(3+e)eu^2/g = 4u^2/g$$

$$\Rightarrow e = 1$$

Q.4 (i)



A:

$$T = m(f + g/3) \quad \dots\dots (i)$$

B:

$$mg - T = mf \quad \dots\dots (ii)$$

$$R1 = mg/3$$

Eliminate f from equations (i) and (ii)

$$T = 2mg/3$$

A:

$$T - \mu mg = mg/3 \quad \dots\dots (iii)$$

B:

$$mg - T - \mu R1 = 0 \quad \dots\dots (iv)$$

$$R1 = mg/3$$

Add equations (iii) and (iv)

$$mg - \mu mg - \mu mg/3 = mg/3$$

$$1 - \mu - \mu/3 = 1/3$$

$$\Rightarrow \mu = 0.5$$