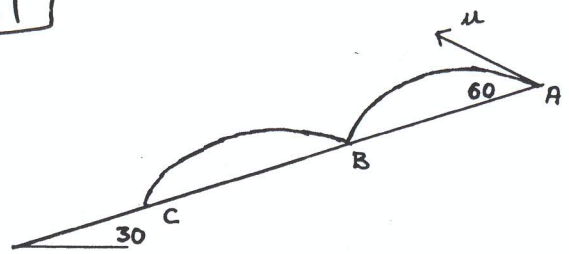
Q. 3 (i) 1991



At B: $\vec{r}\cdot\vec{j} = 0$

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

$t = 2u/g$

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

$= 2u^2/g$

(ii) At B: $v = (u\cos60+g\sin30.2u/g)\,\vec{i} + (u\sin60-g\cos30.2u/g)\,\vec{j}$

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

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

At C: $\vec{r}\cdot\vec{j} = 0$

$(e\sqrt{3}u/2)t - 0.5g\cos30.\, t^2 = 0$

$t = 2eu/g$

$|BC| = (3u/2)(2eu/g) + 0.5g\sin30(2eu/g)^2$

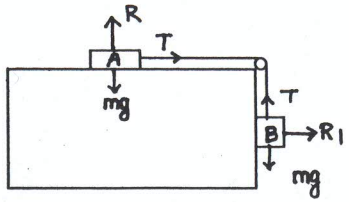
$= (3+e)eu^2/g$

$|BC| = 2|AB|$

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

$\Rightarrow \quad e = 1$

Q. 4 (i)



A: $T = m(f + g/3)$ ..... (i)

B: $mg - T = mf$ ..... (ii)

$R1 = mg/3$

Eliminate f from equations (i) and (ii)

$T = 2mg/3$

(ii) A: $T - \mu mg = mg/3$ ..... (iii)

B: $mg - T - \mu R1 = 0$ ..... (iv)

$R1 = mg/3$

Add equations (iii) and (iv)

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

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

$\Rightarrow \quad \mu = 0.5$