Physics
Theory Part 23

Topics: Mechanics/ Heat/ Electricity

Course: B.Sc/ Physics

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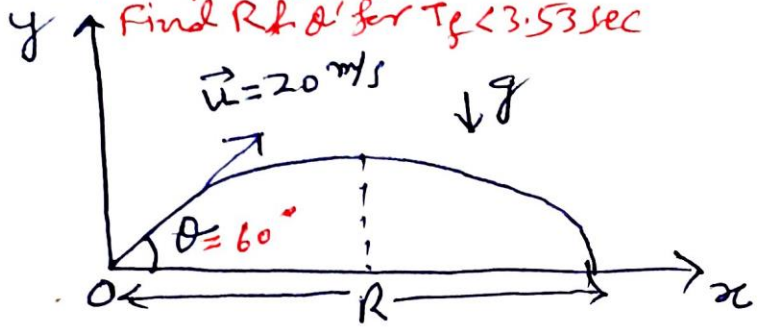
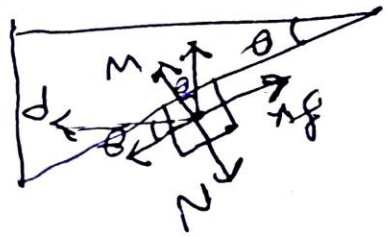
Mechanics of Projectile Motion.

Find R & θ' for $T_f < 3.53$ sec





From Projectile motion formula

$$R = \frac{u^2 \times \sin 2\theta}{g}, \quad T_f = \frac{2u\sin\theta}{g} = \frac{2\times 20\times \sin 60^\circ}{9.8}$$

$$= 3.53 \text{ sec}$$

$$= \frac{20^2 \times \sin 120^\circ}{9.8} = 35.4 \text{ m}$$

let the new angle be $\theta = \theta'$ & $R = R'$ & $T_f > T_f'$

$$\therefore T_f' = \frac{2u\sin\theta'}{g} < 3.53$$

or, $\frac{2\times 20}{9.8} \sin\theta' < 3.53$

or $4.08 \times \sin\theta' < 3.53 \Rightarrow \sin\theta' < \frac{3.53}{4.08}$

< 0.86

or $\theta' < \sin^{-1}(0.86)$

$\boxed{\theta' < 59.31^\circ}$

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Find I at t = 3 sec

Q1 $q = 2t^3 + 4t + 10$, $I = \frac{dq}{dt}$

$\therefore I = 6t^2 + 4$ at $t = 3$ sec

$I = 6 \times 3^2 + 4 = \boxed{58.0 \text{ sec}} \Rightarrow E)$

Q2 Find the change of Temp. t

$\alpha = 3.92 \times 10^{-3}\ \Omega \cdot m$, $R_t = 120\Omega$, $R' = 50\Omega$

$R_t = R'(1 + \alpha \Delta t)$

$\text{or, } \Delta t = \frac{R_t - R'}{\alpha R'} = \frac{120 - 50}{3.92 \times 10^{-3} \times 50} = 357.14^\circ C$

Now $\Delta t = t - t' = 357.14^\circ C$

or, $t - 20^\circ C = 357.14^\circ C$

or, $t = 357.14^\circ C + 20^\circ C = \boxed{377.14^\circ C} \Rightarrow A)$

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