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Assignment Physics

ICS-B

Q:2) The velocity of satellite orbiting around
very close to earth:

$$V = \sqrt{Rg}$$

$$= \sqrt{6.4 \times 10^6 \times 9.8}$$

$$= 7.9 \times 10^3 \text{ ms}^{-1} = 7.9 \text{ Kms}^{-1}$$

Q:1)

$$mgh = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$$

$$I = mr^2$$

$$mgh = \frac{1}{2}mv^2 + \frac{1}{2}mr^2\left(\frac{v}{r}\right)^2$$

$$mgh = \frac{1}{2}mv^2 + \frac{1}{2}mv^2$$

$$mgh = mv^2$$

$$v^2 = \frac{10}{7}gh$$

$$v = \sqrt{\frac{10}{7}gh}$$

Q:6)

$$S = 2.50 \text{ m}$$

$$\theta = ?$$

$$r = 3.8 \times 10^8 \text{ m}$$

$$\theta = ?$$

$$S = r\theta$$

$$\theta = \frac{S}{r}$$

$$\theta = \frac{2.5}{3.8 \times 10^8} = 6.6 \times 10^{-9} \text{ rad}$$

$$Q.7) R = 1.74 \times 10^6 \text{ m}$$

$$r = 3.85 \times 10^8 \text{ m}$$

$$\frac{L_s}{L_o} = ?$$

$$L_s = I\omega$$

$$L_s = \frac{2}{5} MR^2 \omega$$

$$L = Mvr$$

$$v = r\omega$$

$$L_o = Mvr$$

$$= M\omega r^2$$

$$L_o = M\omega r^2$$

$$\frac{L_s}{L_o} = \frac{\frac{2}{5} MR^2 \omega}{M\omega r^2}$$

$$\frac{L_s}{L_o} = \frac{2R^2}{r^2}$$

$$\frac{L_s}{L_o} = \frac{2}{5} \left(\frac{1.74 \times 10^6}{3.85 \times 10^8} \right)^2$$

$$\frac{L_s}{L_o} = (0.45 \times 10^{-2})^2$$

$$\frac{L_s}{L_o} \times 0.2025 \times 10^{-4}$$

$$= 0.081 \times 10^{-4}$$

$$\frac{L_s}{L_o} = 8.1 \times 10^{-6}$$

Q.3) $N - mg = ma$

$N - mg = mg$

$N = 2mg$

$N = 2W$

The person's weight becomes $2W$.

Q.5) $v = \left[\frac{6.67 \times 10^{-11} \times 5.972 \times 10^{24}}{4\pi^2} \right]^{\frac{1}{3}}$

$r = (1.01 \times 10^3)^{\frac{1}{3}} = 10.164 \text{ km}$

$h = r - R$

height = $10164 - 6378 = 35786 \text{ km}$

Q.4

$v = \frac{2\pi r}{T}$

$T = \frac{2 \times 3.14 \times 390,400}{1.01}$

$T = 2,426,883.7 \text{ sec}$

$T = \frac{2,426,883.7}{86,400}$

$T = 28.1 \text{ days}$