LGS GROUP OF COLLEGES
A PROJECT OF LAHORE GRAMMAR SCHOOL

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Subject: Physics Test No. # 5 Date: 18-11-2024

	A	B	C	D
1	○	○	○	○
2	○	○	○	○
3	○	○	○	○
4	○	○	○	○
5	○	○	○	○
6	○	○	○	○
7	○	○	○	○
8	○	○	○	○
9	○	○	○	○
10	○	○	○	○
11	○	○	○	○
12	○	○	○	○
13	○	○	○	○
14	○	○	○	○
15	○	○	○	○
16	○	○	○	○
17	○	○	○	○
18	○	○	○	○
19	○	○	○	○
20	○	○	○	○

Marks Obtained

QUESTION 1:-

When a hoop.....?

speed of sphere $= v = \sqrt{\frac{10gh}{7}}$

$K.E = K.E_{trans} + K.E_{rot}$

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

$= \frac{1}{2}mv^2 + \frac{1}{2}\left(\frac{2}{5}mr^2\right)w^2$

$= \frac{1}{2}mv^2 + \frac{1}{5}m(rw)^2$

$= \frac{1}{2}mv^2 + \frac{1}{5}mv^2$

$= \frac{5mv^2 + 2mv^2}{10}$

$K.E = \frac{7mv^2}{10}$

Potential energy = kinetic energy

$mgh = \frac{7}{10}mv^2$

$10gh = 7v^2$

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

$v = \sqrt{10/7\, gh}$

QUESTION 2:-

Prove that critical velocity is 7.9 kms^{-1}

FORMULA:-

$$v = \sqrt{gR}$$

$g = 9.8 \text{ ms}^{-2}$, $R = 6.4 \times 10^6 \text{ m}$

So

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

$$v = \sqrt{7.9 \text{ kms}^{-1}}$$

QUESTION 3:-

Weight of a ---------- equal to g.

When a body is moving in the upward direction $a = g$ and weight = dobble so $2W$.

Tension in rope is:-

$$T = W + F$$

$$T = mg + ma$$

$$T = mg + mg \quad (a = g)$$

$$T = 2mg$$

$$W = mg$$

$$T = 2w$$

QUESTION 4:-

Given DATA:-

speed = $v = 1.01 \text{ kms}^{-1}$

$v = 1010 \text{ ms}^{-1}$

radius = $r = 390400 \text{ km}$

$r = 390,400,000 \text{ m}$ $(k = 1000)$

To Find:-

Time Period = $T = ?$

Solve:-

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

$$T = \frac{2\pi}{10^6} \times 790,400,000$$

$$T = 2,428,668 \text{ days}$$

QUESTION 5:-

$$r = \left[\frac{GMT^2}{4\pi^2}\right]^{\frac{1}{2}} \quad \text{---(i)}$$

$G = 6.673 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$

$M = 6.4 \times 10^{24} \text{ kg}$

$T = 24 \text{ hour} = 86400 \text{ s}$

$\pi = 3.14$

Putting values in eq(i)

$$r = \left[\frac{6.673 \times 10^{-11} \times 6 \times 10^{24} \times (86400)^2}{4(3.14)^2}\right]^{\frac{1}{2}}$$

$r = 4.23 \times 10^7 \text{ m}$

$r = 42.3 \times 10^6 \text{ m}$

$r = R + n$ if the body is at the height $h = r - R$

$= 6.423 \times 10^6 - 6.4 \times 10^6$

$= 35.9 \times 10^4 \text{ m}$

$n = 3.59 \times 10^5 \text{ m}$

QUESTION 6:-

Given DATA:-

$S = 2.5$

Find:-

Distance between

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

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

$$r = \frac{2.S}{6.6 \times 10^{-9}}$$

$$r = 0.38 \times 10^{-9}$$

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

QUESTION 7:-

Given DATA:-

$r_o = 3.85 \times 10^{8} m$

$r_s = 1.74 \times 10^{6} m$

To Find:-

ratio between orbital momentum and angular momentum $= \frac{L_s}{L_o} = ?$

Solve:-

$$\frac{L_s}{L_o} = \frac{I_s \omega}{I_o \omega}$$

$$\frac{L_s}{L_o} = \frac{I_s}{I_o}$$

$$= \frac{\frac{2}{5} m r_s^2}{m r_o^2}$$

$$= \frac{2 r_s^2}{5 r_o^2}$$

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

$$= \frac{6.1 \times 10^{12}}{74.11 \times 10^{16}}$$

$$= 0.817 \times 10^{12-16}$$

$$= 0.0817 \times 10^{-4}$$

$$\frac{L_s}{L_o} = 8.17 \times 10^{-6} \text{ Ans.}$$