LGS GROUP OF COLLEGES
A PROJECT OF LAHORE GRAMMAR SCHOOL

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Subject: Physics Test No. Date: 26-Nov-2024

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

Marks Obtained

Subjective type

Q1.

for the hoop : $v_{hoop} = \sqrt{gh}$

for the sphere : $v_{sphere} = \sqrt{\frac{10}{7}gh}$.

The Sphere's speed is higher than the hoop's by a factor of $\sqrt{\frac{10}{7}} \approx 1.195$.

Q2.

The velocity of satellite orbiting very close to earth. ie. It's height is very small as compared to the earth's radius is known as critical velocity.

it can be evaluated by:

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

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

$$= 7.9 \ kms^{-1}$$

Q3. Can be calculated:

1. The gravitational force acting on the person is $w = mg$
2. when the elevator accelerates upward with acceleration g, the total effective force is $F = m(g+g) = m(2g)$.
3. This means the effective weight is $F = 2w$.

So, the weight of the person becomes $2w$ when the elevator accelerates upward with acceleration equal to g.

Q4:

Solution:

Circumference = 24518056.76 km

Time = 242080.56 seconds

Days = 242080.56 seconds, 86400 seconds

seconds/days = 28.05 days

it takes approximately 28.05 days to complete one revolution.

Q5: To find the height of a geostationary satellite

1. The orbital radius (r) is approximately 42164 km.
2. The Earth's radius is about 6371 km.

Height (h) = r - Earth's radius = 42164 km - 6371 km

$\approx$ 35793 km

So the height is 35793 km.

Q6: to find the distance of the moon from the earth.
using the formula $L = D/\theta$ and given $D = 2.5\,cm$ and $\theta = 6.6 * 10^{-6}$ radian

Calculation: $L = 2.50m / 6.6\,10^{-6} = 378787.88m$

convert into km: $L = 378.79\,km$.

so the distance of the moon is 378.79 km.

Q7:

$$\frac{L_{orbital}}{L_{spin}} = \frac{m_{moon} \cdot v_{orbital} \cdot r_{orbital}}{I_{moon} \cdot \omega_{moon}}$$

where:
- $v_{orbital} = \sqrt{\frac{GM_{earth}}{r_{orbital}}}$ (orbital speed)
- $I_{moon} = \frac{2}{5} m_{moon} R^2_{moon}$ (moment of inertia of the moon, assuming it's spherical).
- $\omega_{moon} = \frac{2\pi}{T_{moon}}$

Putting in the values

$\frac{L_{orbital}}{L_{spin}} = 4.84 \times 10^3 = km$