

LGS GROUP OF COLLEGES

A PROJECT OF LAHORE GRAMMAR SCHOOL

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 Subject: Phy

Class: 1st year

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Test No. WT-5

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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

Assignment

Short Questions:

(i)

For sphere:

$$K.E_{\text{rotational}} = \frac{1}{2} I \omega^2$$

$$K.E_{\text{linear}} = \frac{1}{2} m v^2$$

for sphere $I = \frac{2}{5} m r^2$

$$K.E_{\text{rotational}} = \frac{1}{2} \left(\frac{2}{5} m r^2 \right) \omega^2$$

$$K.E_{\text{rotational}} = \frac{2}{10} m r^2 \omega^2$$

$$\therefore r^2 \omega^2 = v^2$$

$$K.E_{\text{rotational}} = \frac{1}{5} m v^2$$

$$K.E_{\text{total}} = K.E_{\text{linear}} + K.E_{\text{rotational}}$$

$$= \frac{1}{2} m v^2 + \frac{1}{5} m v^2$$

$$= \frac{5 m v^2 + 2 m v^2}{10}$$

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

According to the law of angular momentum
P.E at the top = R.E total at the bottom

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

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

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

$$v^2 = \frac{logh}{7}$$

Taking square root on both sides

$$v = \sqrt{\frac{logh}{7}}$$

(ii)

critical velocity = 7.9 km s^{-1} prove this

$$F_c = W$$

$$\frac{mv^2}{R} = mg$$

$$\frac{v^2}{R} = g$$

$$v^2 = Rg$$

$$v = \sqrt{Rg}$$

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

$$v = 7919.5 \text{ m s}^{-1}$$

$$v = 7.9 \text{ km s}^{-1}$$

$$\therefore R = 6.4 \times 10^6 \text{ m}$$

$$\therefore g = 9.8$$

(iv)
Find the height of geostationary orbit:

$$\therefore r = R + h$$

$$r - R = h$$

$$h = r - R \quad \text{--- (i)}$$

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

$$\therefore R = 6.4 \times 10^6$$

put the values in (i)

$$h = 4.23 \times 10^7 \text{ m} - 6.4 \times 10^6$$

$$h = 35900 \text{ km}$$

$$h = 36000 \text{ km}$$

(vii)

Given data:

$$R = 1.74 \times 10^6 \text{ m}$$

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

Find:

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

$$L_o$$

Solve:

$$I_s = \frac{2\pi R^2}{5}$$

$$I_o = \pi r^2$$

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

$$= \frac{\frac{2}{5} \pi R^2}{\pi r^2}$$

$$= \frac{2 R^2}{5 r^2}$$

$$= \frac{2 R^2}{5 r^2}$$

$$= \frac{2 R^2}{5 r^2}$$

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

$$= 8.2 \times 10^{-6}$$

(vi)

Given data:

$$r = 2.50 \text{ m} \quad 3.8 \times 10^8 \text{ m}$$

$$\theta = ?$$

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

To find:

$$\theta = ?$$

$$\therefore s = r \theta$$

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

$$\theta$$

$$\theta = \frac{2.50}{3.8 \times 10^8}$$

$$= 6.6 \times 10^{-9} \text{ rad}$$

$$\theta = 6.6 \times 10^{-9} \text{ rad}$$



(iv)

Given data:

$$v = 1.0 \text{ km s}^{-1}$$

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

$$T = ?$$

Solve:

$$s = 2\pi r$$

$$t = T$$

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

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

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

$$T = \frac{2\pi (390400)}{1.0}$$

$$T = 22299 \text{ s}$$

$$t = \frac{222936}{86400}$$

$$t = 25.81 \text{ days}$$

(iii)

When lift is moving upward with acceleration that is g

$$T - W = \text{net force}$$

$$T = W + \text{net force}$$

$$T = mg + mg$$

$$T = 2mg$$

$$\therefore mg = W$$

$$T = 2W$$