PHYSICS QUESTIONS

1. The gravitational force between two identical uniform gold spheres of radius 'r' each in contact is proportional to

(A) r^4 (B) r^2 (C) $\frac{1}{r^2}$ (D) $\frac{1}{4r^2}$

Ans: A

the distance between two spheres is 2r , the masses are same

$$F = \frac{Gm^2}{(2r)^2} = \frac{Gm^2}{4r^2} = \frac{G\left(\frac{4}{3}\pi r^3 \times \rho\right)^2}{4r^2} \Rightarrow F \text{ is proportional to } \frac{r^6}{r^2} = r^4$$

2. What will be the approximate period of Chandrayaan moving in an orbit 100 km above the moon's surface?

(A) 57 min (B) 30 min (C) 118 min (D) 79 min

Ans; C is the correct answer

Solution; Let 'R' be the radius of the moon. r = radius of the orbit

Using Kepler's law $T^2 = \frac{4\pi^2}{GM_m} r^3 = \frac{4\pi^2}{gR^2} r^3$

Radius of orbit of Chandrayaan from the center of the moon is 'r' = $1.7\times10^6\, m + 100 km$

$$T^2 = \frac{4\pi^2}{1.6\times\left(1.7\times10^6\right)^2}\left(1.8\times10^6\right)^3 \Rightarrow T \approx 118 \sec$$