Home assignment :-

1> How does the force of gravitational between two objects change when the distance between them is reduced to half?
Ans> The force of gravitational between two objects is inversely proportional to the square of the distance between them therefore the gravity will become four times if the distance between them is reduced to half.

2> Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object doesnot fall ~~free~~ faster than a light object ?
Ans> In free fall of objects the acceleration in velocity due to gravity is independent of mass of those objects hence heavy objects doesnot fall faster than light object.

3> The Earth and the moon are attracted to each other by gravitational force. Does the Earth attract the moon with a force that is greater or smaller or the same as the force with which moon attracts Earth? Why?
Ans> The Earth attracts the moon with a force equal to the force with which the moon

attracts the Earth. This is because as per Newton's Third Law of motion, forces of action and reaction are always equal & opposite.

4) What happens to the force between two objects, if :-

i) the mass of one object is doubled ?

Ans) the force between two objects will be doubled.

ii) the distance between the objects is doubled & tripled ?

Ans) the force between two object will become $\frac{1}{4}^{th}$ and $\frac{1}{9}^{th}$ of the present force.

iii) the masses of the bodies are doubled ?

Ans) force will become $\times 4$

Assertion & Reasoning :-

(1) When distance is doubled & mass is doubled. Gravitation remains same

(2) According to gravitation Law, force $\propto \frac{1}{\text{mass}}$

Ans) Statement 2 is true, 1 is false

(1) Define acceleration due to gravity.

Ans> Acceleration of free falling bodies due the force of attraction of the other body is called acceleration due to gravity.

(2) The Earth attracts falling apple, but do you think, the apple also attracts Earth? If yes, then why the Earth doesnot move towards apple?

Ans> * Yes, the apple attracts the Earth with the same force as the Earth attracts the apple.

* But the Earth doesnot move towards apple because there is not enough force to move an object ~~with~~ with huge mass.

(3) What is the importance of universal law of gravitation?

Ans> * It is the force that binds us to the Earth.

* It allows motion of moon around Earth & Earth around Sun.

Q2 At what height above the earth surface, the value of g will be half of that on the Earth surface?

$g_h = g/2$

$g_h = g\left[\frac{R}{R+h}\right]^2$

$\frac{g}{2} = g\left(\frac{R}{R+h}\right)^2$ or $\left(\frac{R}{R+h}\right)^2 = \frac{1}{2}$

$\frac{R+h}{R} = \sqrt{2}$

$h = (\sqrt{2}-1)R$

$= 0.414\,R$

$= 0.414 \times 6400$

$= 2649.6$ km

(1) Value of universal gravitational constant.

Ans> Doesnot change from place to place.

(2) 80 N.

Asseration & Reasoning :-

Both statement are true. Statetement 2 is correct explanation of statement 1.