SUBJECT:- **PHYSICS**   **CLASS**:- **IXTH**   **DATE :- 29/07/XXI**

SUBJECT TEACHER:- MR. NEEL NIRANJAN

CHAPTER 3. (GRAVITATION)(BASED ON NCERT PATTERN)

Q1. State the universal law of gravitation.

Ans. Every object in the universe attracts every other object with a force which is proportional to the product of their masses and inversely proportional to the square of the distance between them. The force is along the line joining the centres of two objects

$$F \propto \frac{Mn}{d^2} \text{ or } F = \frac{GMm}{d^2}$$

Q2. Write the formula to find the magnitude of the gravitational force between the earth and an object on the surface of the earth.

Ans. The gravitational force between the earth and an object on its surface

M_e = Mass of the earth

Q3. What do you mean by free fall?

Ans. Whenever an object falls toward earth under the force of gravity one and no other force is present, the motion of object is said to be "free fall".

Q4. What do you mean by acceleration due to gravity?

Ans. The acceleration of free fall is the acceleration due to gravity. We can also say the acceleration of an object due to gravitational force of earth acting on it is known as acceleration due to gravity.

Q5. Why is the weight of an object on the moon 1/6th its weight on the earth?

Ans. The weight of an object depends on 'g' acceleration due to gravity, and the value of 'g' on earth: and moon is not same.

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

The mass and radius of the earth is more than the mass and radius of the moon.

As $W = G\frac{Mn}{R^2}$, the weight of a body on the earth is 6 times more than the weight of a same body on moon.

Q6. Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object?

Ans. The heavy object when falls, the acceleration due to gravity 'g' is acting which is independent of the mass of the body.

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

Gravitation force is $F \propto \frac{Mm}{R^2}$

∴ F and g are different.

Q7. What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface?

[Mass of the earth is 6×10^{24} kg and radius of the earth is 6.4×10^6 m].

Ans. The magnitude of the gravitational force between earth and an object is given by the formula.

$$F = \frac{GMm}{R^2}$$

m = 1 kg, M = 6×10^{24} kg.
R = 6.4×10^6 m, G = 6.67×10^{-11} Nm^2/kg^2

$$\therefore F = \frac{6.67 \times 10^{-11} Nm^2/kg^2 \times 6 \times 10^{24} kg \times 1 kg}{(6.4 \times 10^6 m)^2}$$

∴ F = 9.8 N