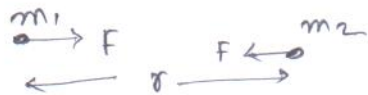# Newton's Law of Gravitation:-

According to Newton's law, every mass attracts each other with some force and this force of attraction is directly proportional to the product of masses and inversely proportional to the square of distance betn. them.

Let us consider we have two masses m_1 & m_2, separated by a distance r, as shown in fig.

Then according to Newton's law:

$$F \propto m_1 m_2 \quad \text{---①} \qquad F \propto \frac{1}{r^2} \quad \text{---②}$$

From eqⁿ ① & ②.
$$F \propto \frac{m_1 m_2}{r^2}$$

$$F = G \frac{m_1 m_2}{r^2}$$

Where G = universal gravitational const. = $6.673 \times 10^{-11} Nm^2/Kg^2$

Properties of gravitational force :-
(i) It is the force of attraction only, no repulsion.
(ii) It is not affected by medium.
iii) It acts very long distance. So it is long range force.
(iv) It is conservative force.

A particle of mass m at rest at the origin generates a gravitational force fld $\vec{F} = -\frac{Gm\vec{r}}{r^3}$. Show that $\vec{F}$ is conservative.