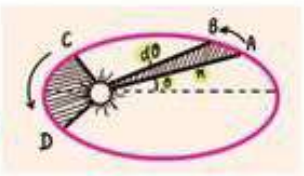
UNIT VI GRAVITATION

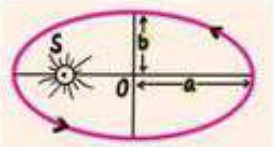
- Kepler's law of Planetary motion

  First law : Law of orbits ⇒ Planets move in eliptical orbits.

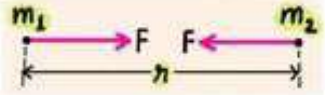
  Second law : Law of Areal Velocity ⇒ $\frac{dA}{dt} = \frac{L}{2m}$

  Third law : Law of Periods ⇒ $T^2 \propto a^3$

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

- Intensity of Gravitational field $I = \frac{F}{m}$

- Relation between acceleration due to Earth's gravity g and Gravitational constant G $g = \frac{GM_e}{R_e^2}$

- Computation of mass of Earth $M_e = \frac{gR_e^2}{G}$

- Density of Earth $\rho = \frac{3g}{4\pi R_e G}$

- Variation in acceleration due to gravity g in going above the surface of the Earth $g' = \frac{g}{\left[1 + \frac{h}{R_e}\right]^2}$

- Variation in acceleration due to gravity g in going below the surface of the Earth $g' = g\left[1 - \frac{h}{R_e}\right]$

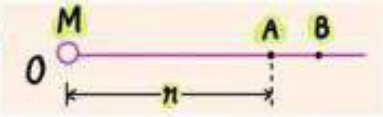
  

- Expression for variation of g with Latitude $g' = g - R_e\omega^2\cos^2\lambda$

- Gravitational Potential $V = \frac{-W}{m}$

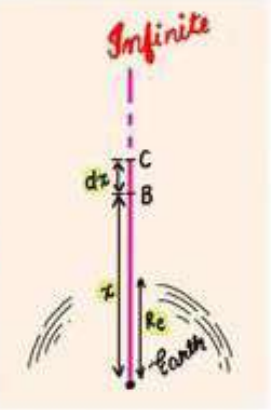
- Gravitational Potential due to a Point - Mass $V = -\frac{GM}{r}$

- Gravitational Potential Energy $U = -\frac{GMm}{r}$

- Gravitational Potential Energy of a body on Earth's surface

  $U = -\frac{GM_e m}{R_e}$ and $U = -\frac{GM_e m}{r}$ $\because GM_e = gR_e^2$

- Orbital Speed of Satellite $v_0 = \sqrt{\frac{GM_e}{R_e + h}}$ $v_0 = R_e\sqrt{\frac{g}{R_e + h}}$