

# Physics I

## Potential function

**Problem 1.-** What would be the kinetic energy of a 0.454kg object that falls straight towards the earth from a height of  $h = 4 \times 10^6$  m when it reaches the surface of our planet?

Ignore air resistance and assume initial velocity zero.

Mass of the Earth  $M = 5.98 \times 10^{24}$  kg. Radius of the Earth  $R = 6.38 \times 10^6$  m

**Problem 2.-** The potential energy for an electron in a quantum dot is described by the equation:

$$U = \frac{a}{r^2} - \frac{b}{r}$$

- Calculate the point  $r_0$  where the potential energy reaches its minimum.
- Find the binding energy ( $U$  at the minimum point).

**Problem 3.-** How high will a projectile get if it is launched straight up with an initial velocity of 5,000 m/s from the surface of the Earth. Ignore air resistance and take  $M_{Earth} = 5.98 \times 10^{24}$  kg and

$$R_{Earth} = 6.38 \times 10^6 \text{ m}$$