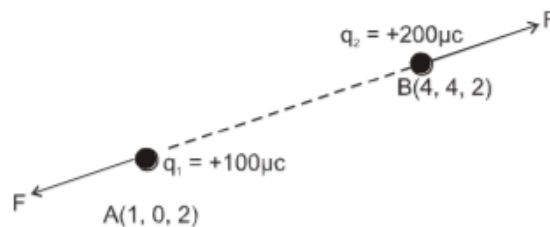


- Problem 2) A point charge  $q_A = +100 \mu\text{C}$  is placed at point A (1, 0, 2) m and another point charge  $q_B = +200 \mu\text{C}$  is placed at point B (4, 4, 2) m. Find :
- Magnitude of electrostatic interaction force acting between them
  - Find  $F_A$  (force on A due to B) and  $F_B$  (force on B due to A) in vector form.

Solution:-

(i)



$$\text{Value of } F : |\vec{F}| = \frac{kq_A q_B}{r^2} = \frac{(9 \times 10^9) (100 \times 10^{-6}) (200 \times 10^{-6})}{\left(\sqrt{(4-1)^2 + (4-0)^2 + (2-2)^2}\right)^2} = 7.2 \text{ N}$$

$$(ii) \text{ Force on B, } \vec{F}_B = \frac{kq_A q_B}{|\vec{r}|^3} \vec{r} = \frac{(9 \times 10^9)(100 \times 10^{-6})(200 \times 10^{-6})}{\left(\sqrt{(4-1)^2 + (4-0)^2 + (2-2)^2}\right)^3} \left[ (4-1)\hat{i} + (4-0)\hat{j} + (2-2)\hat{k} \right]$$

$$= 7.2 \left( \frac{3}{5} \hat{i} + \frac{4}{5} \hat{j} \right) \text{ N}$$

$$\text{Similarly } \vec{F}_A = 7.2 \text{ N} \left( -\frac{3}{5} \hat{i} - \frac{4}{5} \hat{j} \right) \text{ N}$$