QUES 05:-
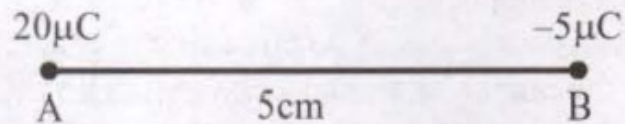
Two particles A and B having charges 20 μC and −5 μC respectively are held fixed with a separation of 5 cm. At what position a third charged particle should be placed so that it does not experience a net electric force?
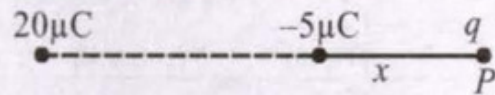
[Aug. 31, 2021 (I)]

20μC   −5μC

A   5cm   B

(a) At 5 cm from 20 μC on the left side of system

(b) At 5 cm from − 5 μC on the right side

(c) At 1.25 cm from − 5 μC between two charges

(d) At midpoint between two charges

SOL:-

(b)   20μC   −5μC
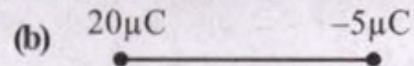
Let, charge q be placed at P.

At point P forces due to 20 μC & −5μC should be in opposite direction

20μC   −5μC q

                             x P

For net force $\vec{F} = 0$ & from coulomb's law force

$$F = \frac{k\, q_1\, q_2}{r^2}$$

$$\Rightarrow \quad k\frac{20q}{(5+x)^2} = \frac{k5q}{x^2}$$

$$\Rightarrow \quad x = 5\,cm$$