1.1.5.14

EE24BTECH11018 - Durgi Swaraj Sharma

Question:
Points **P** and **Q** trisect the line segment joining the points **A** $(-2, 0)$ and **B** $(0, 8)$ such that **P** is nearer to **A**. Find the coordinates of points **P** and **Q**. $(10, 2019)$

Solution:

Point	Description	Coordinate
A	One end of the line segment	$A = \begin{pmatrix} -2 \\ 0 \end{pmatrix}$
B	Other end of line segment	$B = \begin{pmatrix} 0 \\ 8 \end{pmatrix}$
P	Point trisecting the line segment and closer to point **A**	$P = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$
Q	The other point trisecting the line segment	$Q = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$

TABLE 0

Using the section formula:

$$\mathbf{C} = \left(\frac{\mathbf{B} + k\mathbf{A}}{1 + k}\right) \tag{0.1}$$

$$\mathbf{P} \text{or} \mathbf{Q} = \begin{pmatrix} \frac{-2+0k}{1+k} \\ \frac{0+8k}{1+k} \end{pmatrix} \tag{0.2}$$

P divides **BA** in the ratio 2 : 1, so

$$k = \frac{1}{2} \tag{0.3}$$

Plugging this value in 0.2, we get

$$\mathbf{P} = \begin{pmatrix} \frac{-4}{3} \\ \frac{8}{3} \end{pmatrix} \tag{0.4}$$

Similarly, in case of **Q**,

$$k = \frac{2}{1} \tag{0.5}$$

Again, putting this value in place of m in 0.2, we get

$$\mathbf{Q} = \begin{pmatrix} \frac{-2}{3} \\ \frac{16}{3} \end{pmatrix} \tag{0.6}$$

Thus, we have found the points of intersection viz. $\mathbf{P} = \begin{pmatrix} \frac{-4}{3} \\ \frac{8}{3} \end{pmatrix}$ and $\mathbf{Q} = \begin{pmatrix} \frac{-2}{3} \\ \frac{16}{3} \end{pmatrix}$.

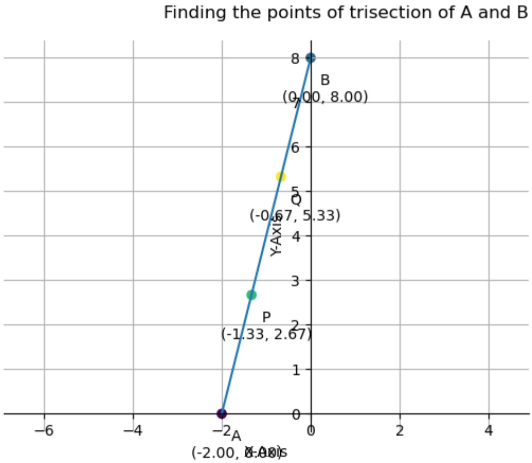

Fig. 0.1