1.1.4.10

EE24BTECH11032 - John Bobby

Question: If $\mathbf{P}(9a-2,-b)$ divides the line segment joining $\mathbf{A}(3a+1,-3)$ and $\mathbf{B}(8a,5)$ in the ratio $3:1$, find the values of a and b.

Solution: As $\mathbf{P}$ lies between $\mathbf{A}$ and $\mathbf{B}$, $\mathbf{P}$ can be represented as

$$\mathbf{P} = \frac{k\mathbf{B} + \mathbf{A}}{k+1} \tag{0.1}$$

where k is the ratio,here $k = 3$

$$\mathbf{P} = \frac{3\mathbf{B} + \mathbf{A}}{4} = \frac{3\begin{pmatrix}8a\\5\end{pmatrix} + \begin{pmatrix}3a+1\\-3\end{pmatrix}}{4} = \frac{\begin{pmatrix}27a+1\\12\end{pmatrix}}{4} \tag{0.2}$$

also,

$$\mathbf{P} = \begin{pmatrix}9a-2\\-b\end{pmatrix} \tag{0.3}$$

on equating both sides and solving the two equations, we get

$$a = 1, b = -3 \tag{0.4}$$

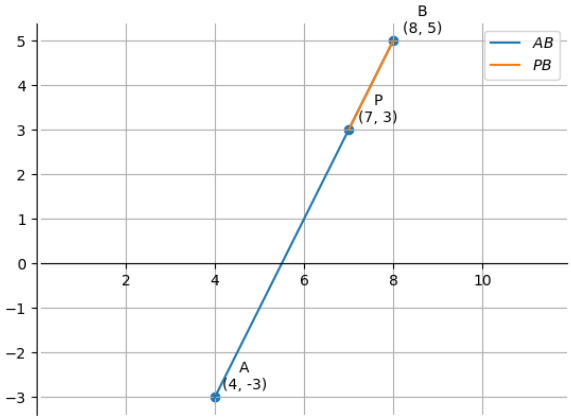

Fig. 0.1: Plot of points $\mathbf{A}$, $\mathbf{B}$ and $\mathbf{P}$