

# Question 1-1.4-9p

EE24BTECH11041 - Mohit

- 1) Let **A** (4, 2), **B** (6, 5) and **C** (1, 4) be the vertices of  $\triangle ABC$ . Find the coordinates of points **Q** and **R** on medians  $BE$  and  $CF$  respectively such that  $BQ : QE = 2 : 1$  and  $CR : RF = 2 : 1$ .

Solution:-

$F$  is the mid point of  $AB$

$$F = \frac{A + B}{2} = \frac{\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 6 \\ 5 \end{pmatrix}}{2} = \begin{pmatrix} 5 \\ \frac{7}{2} \end{pmatrix}$$

$E$  is the mid point of  $AC$

$$E = \frac{A + C}{2} = \frac{\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ 4 \end{pmatrix}}{2} = \begin{pmatrix} \frac{5}{2} \\ 3 \end{pmatrix}$$

By section formula,

$$R = \frac{B + KA}{1 + K}$$

It is given that  $\frac{BQ}{QE} = \frac{2}{1}$

So,

$$Q = \frac{B + 2E}{1 + 2} = \frac{\begin{pmatrix} 6 \\ 5 \end{pmatrix} + 2\begin{pmatrix} \frac{5}{2} \\ 3 \end{pmatrix}}{3} = \begin{pmatrix} \frac{11}{3} \\ \frac{11}{3} \end{pmatrix}$$

It is given that  $\frac{CR}{RF} = \frac{2}{1}$

So,

$$R = \frac{C + 2F}{1 + 2} = \frac{\begin{pmatrix} 1 \\ 4 \end{pmatrix} + 2\begin{pmatrix} 5 \\ \frac{7}{2} \end{pmatrix}}{3} = \begin{pmatrix} \frac{11}{3} \\ \frac{11}{3} \end{pmatrix}$$

Hence, Co-ordinates of  $Q$  and  $R$  are

$$\mathbf{Q}\left(\frac{11}{3}, \frac{11}{3}\right) \text{ and } \mathbf{R}\left(\frac{11}{3}, \frac{11}{3}\right)$$