1-1.4-4

AI24BTECH11026 - Pendem nitesh sri satya[*]

1) Find the coordinates of the point which divides the line segment joining the points $(4, -3)$ and $(8, 5)$ in the ratio $3 : 1$ internally
Solution: Let the position vectors of the points $(4, -3)$ and $(8, 5)$ be represented as **A** and **B** respectively. Therefore, we have:

$$\mathbf{A} = 4\mathbf{i} - 3\mathbf{j} \tag{1}$$

$$\mathbf{B} = 8\mathbf{i} + 5\mathbf{j} \tag{2}$$

Let the position vector of the point **P** that divides the line segment **AB** in the ratio $3 : 1$ internally be **P**.
Using the section formula in vector form, the position vector **P** is given by:

$$\mathbf{P} = \frac{m\mathbf{B} + n\mathbf{A}}{m + n} \tag{3}$$

where $m = 3$ and $n = 1$.
Substituting the values, we get:

$$\mathbf{P} = \frac{3(8\mathbf{i} + 5\mathbf{j}) + 1(4\mathbf{i} - 3\mathbf{j})}{3 + 1} \tag{4}$$

$$\mathbf{P} = \frac{(24\mathbf{i} + 15\mathbf{j}) + (4\mathbf{i} - 3\mathbf{j})}{4} \tag{5}$$

$$\mathbf{P} = \frac{(24\mathbf{i} + 4\mathbf{i}) + (15\mathbf{j} - 3\mathbf{j})}{4} \tag{6}$$

$$\mathbf{P} = \frac{28\mathbf{i} + 12\mathbf{j}}{4} \tag{7}$$

$$\mathbf{P} = 7\mathbf{i} + 3\mathbf{j} \tag{8}$$

Therefore, the coordinates of the point are $(7, 3)$.