# QUESTION 2

EE22BTECH11059

**1.3.1** $D_1$ is a point on BC such that $AD_1 \perp BC$and $AD_1$ is defined to be the altitude. Find the normal vector of $AD_1$.

**Solution:** Given:

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \tag{2}$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \tag{3}$$

$$\tag{4}$$

Direction vector $\mathbf{m}_{BC}$

$$= \mathbf{C} - \mathbf{B} \tag{5}$$

$$= \begin{pmatrix} -3 \\ -5 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \end{pmatrix} \tag{6}$$

$$= \begin{pmatrix} 1 \\ -11 \end{pmatrix} \tag{7}$$

Normal vector of $AD_1$ is orthogonal to $AD_1$ and hence parallel to $BC$.

Normal vector of $AD_1 = \begin{pmatrix} 1 \\ -11 \end{pmatrix}$