

# 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:

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (1)$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (2)$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (3)$$

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

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

$$= \mathbf{C} - \mathbf{B} \quad (4)$$

$$= \begin{pmatrix} -3 \\ -5 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (5)$$

$$= \begin{pmatrix} 1 \\ -11 \end{pmatrix} \quad (6)$$

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