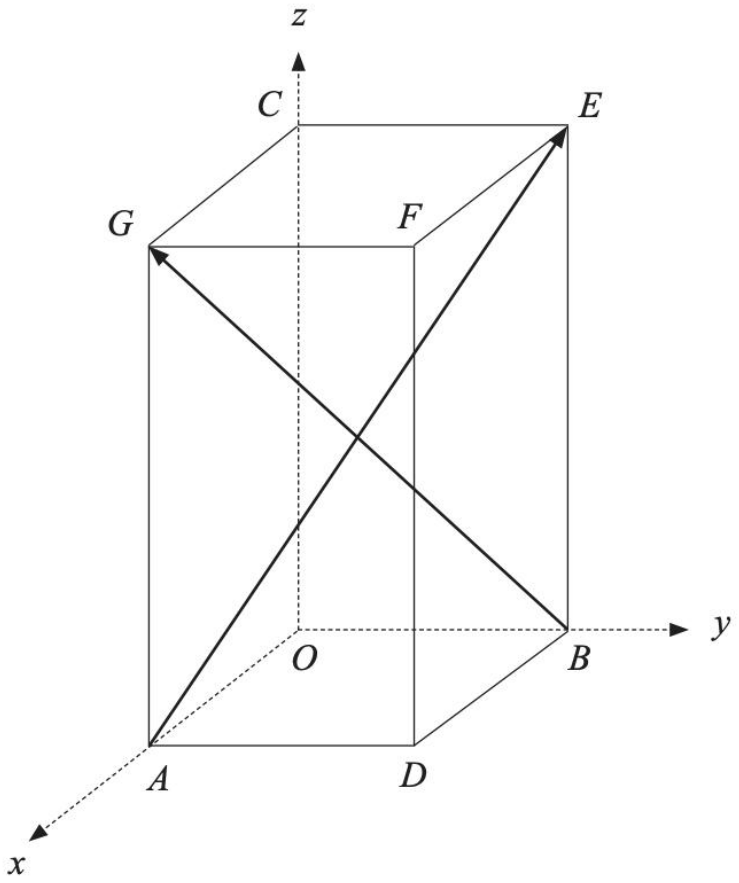
Question 7 **(10 marks)**

A right rectangular prism, with square base $OADB$, is shown below. Point O is the origin and points A,B,C have respective position vectors $\begin{bmatrix}4\\0\\0\end{bmatrix}, \begin{bmatrix}0\\4\\0\end{bmatrix}, \begin{bmatrix}0\\0\\c\end{bmatrix}$ where $c > 0$.



(a) Determine, in terms of c, the:

(i) vector equation for the line containing points A and E. (3 marks)

(ii) Cartesian equation for the plane $ADEC$. (4 marks)

In general, the main diagonals $\overrightarrow{AE}$, $\overrightarrow{BG}$ are not perpendicular to each other.

(b) Determine the value of c so that the main diagonals of the prism are perpendicular to each other. (3 marks)