Summary

From this lecture students learn that

Co-planer lines are the lines which lies on the same plane

$$\begin{vmatrix} x-\alpha_1 & y-\beta_1 & z-\gamma_1 \\ l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \end{vmatrix} = 0$$

Is the required plane where the two lines are lying.

The required condition for two lines to be co-planer is $\frac{a_1\alpha + b_1\beta + c_1\gamma + d_1}{a_1 l + b_1 m + c_1 n} = \frac{a_2\alpha + b_2\beta + c_2\gamma + d_2}{a_2 l + b_2 m + c_2 n}$ when one line is in general form and the other is symmetrical form.

The required condition for two lines to be co-planer when the lines are in general form is

$$\begin{vmatrix} a_1 & b_1 & c_1 & d_1 \\ a_2 & b_2 & c_2 & d_2 \\ a_3 & b_3 & c_3 & d_3 \\ a_4 & b_4 & c_4 & d_4 \end{vmatrix} = 0$$

Shortest distance between skew lines in the length between than which is perpendicular to both skew lines.

In projection method the length of the shortest distance given by

$$l(\alpha_1 - \alpha_2) + m(\beta_1 - \beta_2) + n(\gamma_1 - \gamma_2)$$