Q7> The Equations of 2 lines of regression, Obtained in a Correlation analysis betn variables X and Y are as follows:

$2x+3y-8=0$

$2y+x-5=0$

The Variance of $x=4$ Find the

a) Variance of y

b) Coefficient of determination of C & y

c) Standard error of estimate of x on y & y on x

Soln =>

The given eqn of lines of regression are

$2x+3y-8=0$ .... (i)

$2y+x-5=0$ .... (ii)

From eqn (i)

$$y = \frac{8}{3} - \frac{2x}{3}$$

$\boxed{y = -0.66x + 2.66}$ → Regression line of y on x

From eqn $b_{yx} = -0.66 = r\frac{\sigma_y}{\sigma_x}$ .... (iii)

From eqn (ii)

$\boxed{x = -2y+5}$ → Regression line of x on y

From above eqn

$b_{xy} = -2 = r\frac{\sigma_x}{\sigma_y}$ .... (iv)

From eqn (i)

$\boxed{C = 2.66}$

From eqn (ii)

$\boxed{C = 5}$

$r^2 = b_{yx} \times b_{xy}$

From eqn (iii) & (iv)

$r^2 = -0.66 \times -2$

$r^2 = 1.32$

$r = \pm 1.148$

But b_{xy} and b_{yx} being both -ve therefore, r is also -ve

$\boxed{\text{Correlation Coefficient } (r) = \cancel{-0.866}}$
-1.148

Variance of x i.e, $\sigma_x^2 = \cancel{2}\ 4$

$\therefore \sigma_x = \sqrt{4} = 2$

From eqn (iii)

$r \dfrac{\sigma_y}{\sigma_x} = -0.66$

$-1.148 \times \dfrac{\sigma_y}{2} = -0.66$

$\sigma_y = 1.1498$

$\boxed{\therefore \text{Variance of } y \text{ i.e., } \sigma_y^2 = 1.322}$