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Ans-4

	Sec urities	
	X	Y
Expected Return ($\bar{R}$)	12%	8%
Standard Deviation	8%	4%
Weightage	50%	50%

(i) Expected Return of portfolio = $\bar{R}P$

$$\bar{R}P = \bar{R}x \, wx + \bar{R}y \, wy$$

$$= 0.12 \times 0.50 + 0.08 \times 0.50$$

$$= 0.06 + 0.04$$

$$= 0.10$$

$$\bar{R}P = 10\%$$

(ii) $\gamma = -1$

minimum Risk = -1

$$\sigma p = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2 w_x \, wy \; \sigma_x \sigma_x \cdot \gamma}$$

$$\sigma p = \sqrt{(0.5)^2 (0.08)^2 + (0.5)^2 (0.04)^2 + 2 (0.5)(0.5)(0.02)}$$
$$(0.04)(-1)$$

$$\sigma p = \sqrt{0.25 \times 0.0064 + 0.25 \times 0.0016 - 0.0016}$$

$$= \sqrt{0.0016 + 0.0004 - 0.0016}$$

$$\sigma \beta = \sqrt{0.0004}$$

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$\sigma\beta = 0.02$

$\sigma\beta = \boxed{2\%}$

(iii) minimum Risk Portfolio

$$wx = \frac{\sigma_y}{\sigma_x + \sigma_y} = \frac{0.04}{0.08 + 0.04}$$

$$= \frac{0.04}{0.12}$$

$$= 0.33$$

$$w_y = \frac{\sigma_x}{\sigma_x + \sigma_y} = \frac{0.08}{0.04 + 0.08}$$

$$= \frac{0.08}{0.12}$$

$$= 0.67$$

$w_y = 33\%$ & $w_y = 67\%$

Hence, if Rajan invests ~~$65,000 into X and 3,35,000~~
~~into Y, his risk will become zero.~~

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Portfolio Rish $(\sigma\beta)$ = $\sqrt{W_x^2 \sigma_x^2 + W_y^2 \sigma_y^2 + 2 W_x W_y \sigma_x \sigma_y}$

= $\sqrt{0.33^2 \times (0.08)^2 + 0.67^2 + (0.04)^2 + 2(0.33)(0.67)}$
$(0.08)(0.04)(-1)$

= $\sqrt{0.003 + 0.000174 - 0.00.142}$

= $\sqrt{0}$

= 0

When weight of portfolio X and Y are 33%. and 67% respectively where id is possible to create zero rish portfolio.

Hence, if Rojan invests 1,65,000 into X and 3,35,000 into Y, his rish will become zero.

Jd can be concluded from above that diversification reduces rish in all cases except when the security returns are perfectly positively correlated to P_{xy} reduces from +1 to -1, the rish of portfolio reduces to 0.

By adding more and more uncorrelated securities that rish of portfolio can be reduced significantly. However, combining securities with perfect Negative correlation can help eliminate the rish altogether.