Ramesh recently forecasted four economic situations which he believes are likely to occur with the given probabilities. Based on these situations, an analyst made the following forecasts of the returns of stock A, B and C.

Situation	Probability (P)	Conditional Returns %		
		A	B	C
High growth	0.20	– 13	– 4	– 9
Low growth	0.15	16	– 2	8
Stagnation	0.40	32	21	16
Recession	0.25	12	20	20

Calculate the mean return and standard deviation of stocks A, B and C and advise which stock is good for investment.

Following is the data relating to five securities.

Security	A	B	C	D	E
Return (%)	8	8	12	4	9
Risk (S.D.) (%)	4	5	12	4	5

(i) Which of the securities should be selected for investment?

Given below are the likely returns in case of shares of VCC Ltd. and LCC Ltd. in the various economic conditions. Both the shares are presently quoted at Rs. 100 per share.

Economic Conditions	Probability	Returns of VCC Ltd.	Returns of LCC Ltd.
High Growth	0.3	100	150
Low Growth	0.4	110	130
Stagnation	0.2	120	90
Recession	0.1	140	60

(1) Which of the two companies are risky investments?

(2) Mr. Suresh has three options for investing Rs. 1000.

(i) Only in shares of VCC Ltd.

(ii) Only in shares of LCC Ltd.

Which of the above options is the best? Why?

Mr. Ned Stark purchased the following 5 scrips.

Co's Name	No. of Shares	Purchase price	Dividend	Face Value	Bonus Share	Selling Price
H Ltd.	150	250	10%	10	1:02	275
C Ltd.	200	180	25%	5		240
S Ltd.	100	80	100%	10	1:05	108
F Ltd.	400	240	25%	10		200
M Ltd.	500	260	400%	2		295

Purchase Brokerage paid Rs. 1,500.

Selling Brokerage: 1,900.

Calculate the Holding Period Return.

Investor's assessment of return on a share of X Ltd. under three different situations is as follows:

Situation	Chance (P)	Return (%)
1	0.25	36
2	0.50	26
3	0.25	12

Calculate the expected rate of return.

Mr. Ashok purchased 10 shares of ACC Ltd. four years ago at Rs. 50 each. The company paid the following dividends.

	Year 1	Year 2	Year 3	Year 4
Dividend per Share (Rs.)	2	2	2.5	3
Dividend Amount (Rs.)	20	20	25	30

The current price of the share is Rs. 60. What rate of return has he earned on his investment if he sells the shares now?

Dr. Sukhi purchased 400 shares of Sundar Ltd. @ Rs. 61 each on 15th October, 2008. He paid brokerage of Rs. 600. The company paid the following dividends:

June, 2008	Rs. 800
June, 2009	Rs. 1000
June, 2010	Rs. 1,200

He sold all his holding for Rs. 34,500 (net) on 15th October, 2011 (1) What is the holding period Return? (2) What is the annualized Return? (3) Is Mr. Sukhi a good investor?

Mr. Jio purchased 100 shares of Reliance Ltd. at Rs. 50 each on 1.7.2014. He paid brokerage of Rs. 1,500. The company paid the following dividends.

Year	1	2	3
Dividend per share (Rs.)	2	2	3
Dividend amount (Rs.)	200	200	300

After holding them for three years he sold all shares at Rs. 90 each. He paid brokerage of Rs. 2,000. Calculate holding period and Annualised rate of return.

Calculate the expected rate of return from the following information relating to B Ltd.

State of the Economy	Probability of occurrence	Rate of Return
Boom	0.30	40%
Normal	0.50	30%
Recession	0.20	20%

The probability distribution of annual returns on a security are given below:

Return on Security	Probability
– 0.35	0.04
– 0.25	0.08
– 0.15	0.14
– 0.05	0.17
0.05	0.26
0.15	0.18
0.25	0.09
0.35	0.04

Compute the expected return on the security.

Mr. Abraham has a portfolio of five stocks. The expected return and amount invested in each stock is given below:

Stocks	Expected return	Amount invested
A	0.14	10,000
B	0.08	20,000
C	0.15	30,000
D	0.09	15,000
E	0.12	25,000
Portfolio value		1,00,000

Compute the expected return on Mr. Abraham's portfolio.

The rate of return on stocks of X and Y under different states of the economy are presented below along with the probability of the occurrence of each state of the economy.

Particulars	Boom	Normal	Recession
Probability of occurrence	0.3	0.5	0.2
Rate of Return on stock X (%)	25	35	45
Rate of Return on stock Y (%)	45	35	25

(i) Calculate the expected rate of return and standard deviation of return on stocks X and Y.

(ii) If you could invest in either stock X or stock Y, but not in both, which stock would you prefer?

The rate of return of stocks of A and B under different states of economy are presented below along with the probability of the occurrence of each state of the economy.

	Boom	Normal	Recession
Probability of Occurrence	0.3	0.4	0.3
Rate of Return on stock A (%)	20.0	30.0	50.0
Rate of Return on stock B (%)	50.0	30.0	20.0

(a) Calculate the expected rate of return and standard deviation of return for stocks A and for stocks B.

(b) If you could invest in either stocks A or stocks B, but not in both, which stock would you prefer and why?

(c) If the rate of return on stocks A was revised as shown below, would your preference in question (b) above change? Why?

	Boom	Normal	Recession
Rate of Return on stock A (%)	50.0	40.0	30.0

The rates of return on stocks X and Y under different states of economy are presented below along with the probability of the occurrence of each state of the economy:

	Boom	Normal	Recession
Probability of occurrence	4	3	3
Rate of Return on stock X	40	30	20
Rate of Return on stock Y	30	25	15

(i) Calculate the expected rate of return and standard deviation of return of Stocks X and Y.

(ii) If you could invest in either stocks X or Y, but not in both, which stock would you prefer?

Mr. A has invested equal amount in Security X and Security Y. The expected returns during the boom and depression with equal probability of occurrence are as under:

Economic Conditions	Expected Returns of	
	Security X	Security Y
Boom	6	12
Depression	15	5

Calculate expected return and standard deviation of each security.

The rate of return on Stocks X and Y under different states of the economy are given below:

	Boom	Normal	Recession
Probability of occurrence	0.35	0.50	0.15
Rate of Return on stock X (%)	20	30	40
Rate of Return on stock Y (%)	40	30	20

(i) Calculate the expected return and standard deviation of return on both the stocks.

(ii) If you could invest in either stocks X or stock Y, but not in both, which stock would you prefer?

(iii) What would be your decision if the probability changes to 30: 40: 30?

(c) Calculation of Standard Deviation of Y:

State of Economy	Return on Y (%)	$(Y - \bar{Y})$	$(Y - \bar{Y})^2$	P	$P(Y - \bar{Y})^2$
Boom	40	10	100	0.30	30.00
Normal	30	0	0	0.40	0.00
Recession	20	– 10	100	0.30	30.00
					60.00

$\therefore$ Standard Deviation $= \sqrt{60.00} = 7.75$

If the probability changes to 30:40:30 then both the stocks have sa return as well as risk. Hence, investment can be made in any stock.

Illustration 3.24:

The rate of return on stock M and stock N under different stat economy are given below:

State of Economy	Probability	Stock A (%)	Stock B (%
Boom	0.3	30	50
Normal	0.4	20	20
Recession	0.3	50	30

Calculate the expected return and standard deviation of retur stock M and stock N. If u could invest in either stock M or stock N not in both, which stock would you prefer and why?

Illustration 3.2 :

Following is information about shares of ABC Ltd. And XYZ Ltd, under different economic conditions. At present both shares are traded at Rs. 100.

Economic Condition	Probability	Expected price of Share ABC Ltd.	Expected price of Share XYZ Ltd.
High Growth	0.3	140/-	150/-
Low Growth	0.4	110/-	100/-
Stagnation	0.2	120/-	120/-
Recession	0.1	100/-	80/-

(i) Which company has more risk to invest?

(ii) Mr. Ram wants to invest Rs. 10000

(1) Only in ABC Ltd. (2) Only in XYZ Ltd.

Which is better option? Justify.

(iii) Will your decision change if probabilities are 0.4, 0.4, 0.1, 0.1 respectively?

Illustration 3.29:

The rate of return on stock of X and Y under different state of the economy are presented below along with the probability of the occurrence.

State of Economy	Probability	Stock X (%)	Stock Y (%)
Boom	0.5	30	35
Normal	0.3	35	40
Recession	0.2	25	30

(1) Calculate the expected rate of return and standard deviation of return on stock X and Y.

(2) Which stock is better investment option?

Returns of two assets X and Y under four possible situations are given.

Possibilities	Probability	Returns on Asset – X	Returns on Asset – Y
1	0.15	5%	6%
2	0.25	12%	9%
3	0.50	15%	18%
4	0.10	20%	24%

Find out:

(1) Standard deviations for both Assets – X and Assets – Y.

(2) Covariance between Assets – X and Asset – Y.

The returns of two assets, under four possible states of nature, are given below:

State of Nature	Probability	Returns on Asset 1	Returns on Asset 2
1	0.20	8%	2%
2	0.25	10%	8%
3	0.35	12%	12%
4	0.20	14%	14%

Calculate:

(1) Standard Deviation for asset 1 and asset 2

(2) Co-variance between return of asset 1 and 2

Returns for X and Y under four possible situations are given:

Situations	Probabilities	Return on X	Return on Y
1	0.25	12%	10%
2	0.25	15%	15%
3	0.25	20%	5%
4	0.25	10%	25%

Find out: Portfolio risk and return if the portfolio contains stock X and Y in equal proportion.

Illustration

Returns for X and Y under four possible situations are given:

Situations	Probabilities	Return on X	Return on Y
1	0.25	12%	10%
2	0.25	15%	15%
3	0.25	20%	5%
4	0.25	10%	25%

Find out: Portfolio risk and return if the portfolio contains stock X and Y in equal proportion.

Mr. Nitin has two investment options i.e. security M and Security N worth price Rs. 200 and Rs. 250 respectively.

Security M		Security N	
Probabilities	**Expected Price**	**Probabilities**	**Expected Price**
0.3	220	0.5	280
0.5	250	0.4	290
0.2	260	0.1	260

Calculate expected returns and deviations. Out of these two which is better investment option.

The rate of return of stock A and B under different states of economy are given below:

	Boom	Normal	Recession
Probability of Occurrence	0.30	0.50	0.20
Rate of return of stock A	30%	50%	70%
Rate of return of stock B	70%	50%	30%

(i) Calculate the expected return and standard deviation of return on both the stock.

(ii) If you could invest in either stock A and B, but not in both, which stock would you prefer?

Solution

The rate of return on stock A and stock B under different state of economy are given below:

State of Economy	Probability	Stock A (%)	Stock B (%)
Prosperity	0.6	40	50
Depression	0.4	30	20

- Calculate the expected return and standard deviation of return on stock A and stock B.
- What would be your decision if the probability changes to 0.50 : 0.50?

The rate of return on stock P and stock Q under different state of economy are given below:

State of Economy	Probability	Stock P (%)	Stock Q (%)
Boom	0.5	15	10
Normal	0.3	20	20
Recession	0.2	25	35

Calculate the expected return and standard deviation of return on stock P and stock Q.

Which stock is a better investment option? and why?

Solution

The rate of return on stock M and stock N under different state of economy are given below:

State of Economy	Probability	Stock A (%)	Stock B (%)
Boom	0.3	30	50
Normal	0.4	20	20
Recession	0.3	50	30

Calculate the expected return and standard deviation of return on stock M and stock N. If u could invest in either stock M or stock N, but not in both, which stock would you prefer and why?

Solution:

From the following information calculate Beta of a security:

Year	Return on Security %	Return on Market Portfolio %
1	10	12
2	12	11
3	15	14
4	10	12
5	08	11

Calculate beta β in case of share of Nelco Ltd., whose returns and market portfolio returns are given below:

Year	Nelco Ltd.	Market Portfolio Returns
1	20	14
2	24	18
3	10	9
4	15	14
5	(–) 10	(–) 8
6	12	10
7	18	16
8	28	30
9	33	35
10	40	42

From the following data calculate Beta of security.

Year	Return on security (%)	Return on Market Portfolio (%)
1	12	14
2	13	16
3	15	21
4	12	23
5	13	16

Calculate Beta in case of share of Nelco Ltd. whose returns and market portfolio returns are given below:

Year	Nelco Ltd.	Market Portfolio Returns
1	20	14
2	24	19
3	10	9
4	15	14
5	(-) 10	(-) 8
6	12	10
7	18	16
8	28	30
9	33	35
10	40	42

Illustration

From the following details calculate Beta of a security.

Year	Return on Security (%)	Return on Market Portfolio (%)
1	10	12
2	12	10
3	13	10
4	10	12
5	8	15
6	11	14
7	16	20
8	12	15
9	18	20
10	20	22

Solution:

Compute the beta factors and expected returns for Keshav Ltd. and Madhav Ltd. Return on government securities is 9%. Returns in earlier years are:

Year	Keshav Ltd.	Madhav Ltd.	Market
1	20%	16%	14%
2	22%	18%	16%
3	20%	20%	18%
4	18%	18%	12%

Solution:

Mr. Krishna has invested equal amount on security X and security Y.

Expected Return	Security X	Security Y
In Prosperity	5	13
In Depression	14	6

The probability of prosperity and depression is 0.5 each. You are required to calculate expected return and standard deviation of individual securities as well as the portfolio.

A stock costing Rs. 120 pays no dividends. The possible prices that the stock might sell for at the end of the year with respective probabilities are:

Price	Probability
115	0.1
120	0.1
125	0.2
130	0.3
135	0.2
140	0.1

(1) Calculate the expected return.

(2) Calculated the standard deviation of returns.

You are required to calculate beta factors and expected returns for Dine/R Ltd. and Dime/S Ltd. (using CAPM) and offer your comments. Risk free rate of return is 7%.

Year	Dine/R Ltd. (%)	Dime/S Ltd. (%)	Market (%)
1	13	13	15
2	14	14	16
3	13	10	15
4	12	11	14

You are required to calculate beta factor and expected rate of returns for P Ltd. and Q. Ltd. (Using CAPM), Risk free rate of return is 8%.

Year	P Ltd. %	Q Ltd. %	Market %
1	20	20	14
2	20	18	18
3	24	18	15
4	16	16	13

The returns of 2 Assets, under four possible states of nature, are given below:

State of Nature	Probability	Returns on Asset 01	Returns on Asset 02
1	0.10	5%	0%
2	0.30	10%	8%
3	0.50	15%	18%
4	0.10	20%	26%

Find out:

(i) Standard Deviation for Asset 01 and Asset 02

(ii) Co-variance between Returns of Asset 01 and 02.

Given below are the likely returns in case of shares of Ram Ltd and Shyam Ltd in the various economic conditions. Both to shares are presently quoted at Rs. 250 per shares.

Economic conditions	Probability	Returns of Ram Ltd. (%)	Returns of Shyam Ltd. (%)
High Growth	0.25	110	180
Low Growth	0.25	130	150
Stagnation	0.30	160	100
Recession	0.20	190	70

(1) Which of the companies is risky investment?

(2) Which is better option for investment?

Given below are likely returns in case of shares of Ram Ltd. and Shyam Ltd. in various economic conditions. Both the shares are presently quoted at Rs. 250 per shares.

Economic conditions	Probability	Expected Price on Ram Ltd.	Expected Price on Shyam Ltd.
High Growth	0:25	210	280
Low Growth	0.25	260	230
Stagnation	0.30	290	270
Recession	0.20	280	260

(1) Which of the companies is risky investment?

(2) Which is better option for investment?

Illustration 3.56:

The returns of two assets, under three possible states of nature, are given below:

State of nature	Probability	Return on Asset 1	Returns on Asset 2
1	0.25	18	8
2	0.25	12	15
3	0.50	13	12

Calculate co-variance between return of assets 1 and asset 2.

Solution:

Returns of two assets X and Y under four possible situation are given.

Possibilities	Probability	Return on asset X	Returns on asset Y
1	0.15	5%	6%
2	0.25	12%	9%
3	0.50	15%	18%
4	0.10	20%	24%

Find out covariance between Asset - X and Asset - Y

(11) The following information is available about two securities A and B.

Particulars	A	B
Expected return	10 %	12 %
Standard deviation of expected return	15 %	10 %
Correlation coefficient with the market	0.6	0.4
Beta	0.7	0.8

Which of the two securities is more risky? Why?

(Ans.: Security A is more risky because its standard deviation is higher than B. Correlation coefficient of security A with the market is also higher than security B. Beta for security A is lower than security B, however it is less than 1).

(12) (a) The risk free return is 8 percent and the return on market portfolio is 12 percent. If required return on a stock is 15 percent, What is its beta?

(b) The risk-free return is 9 percent. The required return on a stock whose beta is 1.5 is 15 percent. What is the return on the market portfolio?

(Ans.: (a – 1.75), (b – 13%)).

(13) Mr. Sharma's portfolio return are given below:

Year	Securities	Return
1	X	12
1	Y	10
2	X	18
2	Y	16

Standard deviation of both the securities is 3.

Calculate:

(a) Expected rate of return on his portfolio if it is made up of 50% of X and 50% of Y,

(b) Co variance of X and Y, and

(c) Portfolio risk made up of 50% of X ad 50% of Y.

*(**Ans.:** (a) 14%, (b) 8, (c) 0.88).*

(14) Mr. Vipul has a portfolio of three securities. From the following details compute the portfolio returns and rate of return on individual securities.

Security	Price as on 31.12.94	Price as on 31.12.95	Yearly Dividend
A	20	30	2
B	30	40	3
C	50	60	5

*(**Ans.:** PR – 40%, A – 60%, B – 43%, C – 30%).*

(15) **(a)** What will be the expected return on a portfolio composed of the following securities?

Security	Expected Return %	Proportion %
A	10	25
B	15	25
C	20	50

(b) What will be the expected return if the proportion of each security in the portfolio is 20, 30 and 50 respectively?

*(**Ans.:** (a) 16.25%, (b) 16.50%).*

(16) From the following information calculate the Beta of a security.

Year	Return on Security %	Return on Market Portfolio %
1	10	12
2	12	11
3	15	14
4	10	12
5	08	11

*(**Ans.:** Beta = 1.67).*

(17) Mr. Anand has a portfolio of two securities with 50% investment in X and 50% investment in Y. The characteristics of returns under three different scenarios with different probabilities for the two securities and the portfolio are given below:

Scenario	Probability	Return on 'X' %	Return on 'Y' %	Return on Portfolio (%)
Boom	0.25	40	20	30
Normal	0.50	30	30	30
Recession	0.25	20	20	20

Calculate the expected return and standard deviation of security X, Y and portfolio.

(Ans.: X – 30%, Y – 25%, P – 27.5%, 7%, 5%, 4.33%).

(18) (a) What will be the expected return on a portfolio composed of the following securities?

Security	Expected Return %	Proportion %
A	10	25
B	15	25
C	20	50

(b) What will be the expected return if the proportion of each security in the portfolio is 20, 30 and 50 respectively?

Ans.: (a) 16.25%, (b) 16.50%.

(19) You have been asked by your client for advice in selecting a portfolio of assets based on the following data:

Year	Return (%)		
	X	Y	Z
1998	15	14	20
1999	16	16	18
2000	18	18	16

You are requested to create portfolios by investing equal proportions in each of the two different securities. Calculate:

(a) Expected return on each of these securities.

(b) Standard deviation on each of security's return.

(c) Expected return on each portfolio.

(d) Standard deviation of each portfolio.

(e) Which portfolio would you recommend?

(20) Mr. Shekhar has supplied you the following information regarding his investments.

HL Ltd.		LT Ltd.	
Return (%)	Probability	Return (%)	Probability
25	0.30	15	0.20
20	0.50	13	0.30
10	0.20	12	0.40
		06	0.10

He wants to invest Rs. 50,000 in any one of the securities. Which security should be selected for his investment?