PORTFOLIO MANAGEMENT
CLASS 12
CLASS WORK COVERAGE

To streamline our learning process, I've categorized the questions we'll tackle in class into four distinct groups:

1. ***Classic:*** *These questions are exactly as presented in your book, providing a familiar foundation.*
2. ***Transformed:*** *Here, we've converted book questions into multiple-choice format to enhance your analytical skills.*
3. ***Adapted:*** *These are similar to book questions but with altered numbers or names, presented as multiple-choice questions for varied practice.*
4. ***Original:*** *These are entirely new questions not found in your book, designed to challenge and expand your understanding.*

This structure will help us navigate through a range of problems, ensuring a comprehensive grasp of the material. Looking forward to our next session!

Q. No.	Type	Book	Page No.
58	***Classic***	CW Q BOOK	68
59	***Classic***	CW Q BOOK	68
60	***Classic***	CW Q BOOK	69
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PART VII: AMBIGUOUS

Question 58:

K Ltd. has invested in a portfolio of short-term equity investments. You are required to calculate the risk of K Ltd.'s short-term investment portfolio relative to that of the market from the information given below:

Investment	**A**	**B**	**C**	**D**
No. of shares	1,20,000	1,60,000	2,00,000	2,50,000
Market price per share (₹)	8.58	5.84	4.34	6.28
Beta	2.32	4.56	1.80	3.00
Expected Dividend Yield	9.50%	14.00%	7.50%	16.00%

The current market return is 20% and the risk free return is 10%.

Advise whether K Ltd. should change the composition of its portfolio. If yes, then how.

Note: Make calculations upto 4 decimal points.

(*Source: ICAI*)

ANSWER:

i. To determine whether K Ltd. should change composition of its portfolio first we should determine the Beta of the Portfolio and compare it with implicit Beta as justified by the Return on Portfolio.

Calculation of Beta of Portfolio

Investment	No. of shares	Market Price (₹)	Market Value	Dividend Yield	Dividend	Composition	β	Weighted β
A	1,20,000	8.58	10,29,600	9.50%	97,812	0.2339	2.32	0.5426
B	1,60,000	5.84	9,34,400	14.00%	1,30,816	0.2123	4.56	0.9681
C	2,00,000	4.34	8,68,000	7.50%	65,100	0.1972	1.80	0.3550
D	2,50,000	6.28	15,70,000	16.00%	2,51,200	0.3566	3.00	1.0698
			44,02,000		5,44,928	1.0000		2.9355

Return of the Portfolio = 5,44,928/44,02,000= 0.1238

Beta of Port Folio 2.9355

Market Risk implicit

$0.1238 = 0.10 + \beta \times (0.20 - 0.10)$

Or, $0.10\,\beta + 0.10 = 0.1238$

$\beta = (0.1238 - 0.10)/0.10 = 0.238$

Market β implicit is 0.238 while the portfolio β is 2.93. Thus, the portfolio is marginally risky compared to the market.

ii. To decide whether K Ltd. should change the composition of its portfolio the dividend yield (given) should be compared with the Expected Return as per CAPM as follows:

Expected return as per CAPM is $R_f + (R_M - R_f)\,\beta$

Accordingly,

Expected Return for investment A = 0.10 + (0.20 - 0.10) 2.32 = 33.20%

Expected Return for investment B = 0.10 + (0.20 - 0.10) 4.56 = 55.60%

Expected Return for investment C = 0.10 + (0.20 - 0.10) 1.80 = 28%

For investment D, Rs = 0.10 + (0.20 - 0.10) 3 = 40%

Comparing dividend yields with the expected returns of investment as per CAPM it can be observed that all investments are over-priced and they should be sold by the K Ltd. and acquire new securities.

Question 59:

Mr. Abhishek is interested in investing ₹ 2,00,000 for which he is considering following three alternatives:

i. Invest ₹ 2,00,000 in Mutual Fund X (MFX)

ii. Invest ₹ 2,00,000 in Mutual Fund Y (MFY)

iii. Invest ₹ 1,20,000 in Mutual Fund X (MFX) and ₹ 80,000 in Mutual Fund Y (MFY)

Average annual return earned by MFX and MFY is 15% and 14% respectively. Risk free rate of return is 10% and market rate of return is 12%.

Covariance of returns of MFX, MFY and market portfolio Mix are as follow:

	MFX	MFY	Mix
MFX	4.800	4.300	3.370
MFY	4.300	4.250	2.800
Mix	3.370	2.800	3.100

You are required to calculate:

i. variance of return from MFX, MFY and market return,

ii. portfolio return, beta, portfolio variance and portfolio standard deviation,

iii. expected return, systematic risk and unsystematic risk; and

iv. Sharpe ratio, Treynor ratio and Alpha of MFX, MFY and Portfolio Mix

(*Source: ICAI*)

ANSWER:

i. Variance of Returns

$$Cor_{i,j} = \frac{Cov(i,j)}{\sigma_i \sigma_j}$$

Accordingly, for MFX

$$1 = \frac{Cov(X,X)}{\sigma_X \sigma_X}$$

$$\sigma_x^2 = 4.800$$

Accordingly, for MFY

$$1 = \frac{Cov(Y,Y)}{\sigma_Y \sigma_Y}$$

$$\sigma_Y^2 = 4.250$$

Accordingly, for Market Return

$$1 = \frac{Cov(M,M)}{\sigma_M \sigma_M}$$

$$\sigma_M^2 = 3.100$$

ii. Portfolio return, beta, variance and standard deviation

$$\text{Weight of MFX in portfolio } = \frac{1,20,000}{2,00,000} = 0.60$$

$$\text{Weight of MFY in portfolio } = \frac{80,000}{2,00,000} = 0.40$$

Accordingly Portfolio Return

0.60 × 15% + 0.40 × 14% = 14.60%

$$\text{Beta of each Fund } \beta = \frac{Cov(\text{Fund,Market})}{\text{Variance of Market}}$$

$$\beta_X = \frac{3.370}{3.100} = 1.087$$

$$\beta_Y = \frac{2.800}{3.100} = 0.903$$

Portfolio Beta

0.60 x 1.087 + 0.40 x 0.903 = 1.013

Portfolio Variance

$$\sigma^2_{XY} = W^2_X\sigma^2_X + W^2_Y\sigma^2_Y + 2W_XW_YCov_{X,Y}$$

= $(0.60)^2$ (4.800) + $(0.40)^2$ (4.250) + 2(0.60) (0.40) (4.300)

= 4.472

Or Portfolio Standard Deviation

$$\sigma_{XY} = \sqrt{4.472} = 2.115$$

iii. Expected Return, Systematic and Unsystematic Risk of Portfolio

Portfolio Return = 10% + 1.0134(12% - 10%) = 12.03%

MF X Return = 10% + 1.087(12% - 10%) = 12.17%

MF Y Return = 10% + 0.903(12% - 10%) = 28.06%

Systematic Risk = $\beta^2\ \sigma^2$

Accordingly,

Systematic Risk of MFX = $(1.087)^2$ x 3.10 = 3.663

Systematic Risk of MFY = $(0.903)^2$ x 3.10 = 2.528

Systematic Risk of Portfolio = $(1.013)^2$ x 3.10 = 3.181

Unsystematic Risk = Total Risk – Systematic Risk

Accordingly,

Unsystematic Risk of MFX = 4.80 – 3.663 = 1.137

UnSystematic Risk of MFY = 4.250 – 2.528 = 1.722

UnSystematic Risk of Portfolio = 4.472 – 3.181 = 1.291

iv. Sharpe and Treynor Ratios and Alpha

Sharpe Ratio

$$MFX = \frac{15\% - 10\%}{\sqrt{4.800}} = 2.282$$

$$MFY = \frac{14\% - 10\%}{\sqrt{4.250}} = 1.94$$

$$Portfolio = \frac{14.6\% - 10\%}{2.115} = 2.175$$

Treynor Ratio

$$MFX = \frac{15\% - 10\%}{1.087} = 4.60$$

$$MFY = \frac{14\% - 10\%}{0.903} = 4.43$$

$$Portfolio = \frac{14.6\% - 10\%}{1.0134} = 4.54$$

Alpha

MFX = 15% - 12.17% = 2.83%

MFY = 14% - 11.81% = 2.19%

Portfolio = 14.6% - 12.03% = 2.57%

Question 60:

A company has a choice of investments between several different equity oriented mutual funds. T he company has an amount of ₹1 crore to invest. T he details of the mutual funds are as follows:

Mutual Fund	Beta
A	1.6
B	1.0
C	0.9
D	2.0
E	0.6

Required:

i. If the company invests 20% of its investment in each of the first two mutual funds and an equal amount in the mutual funds C, D and E, what is the beta of the portfolio?
ii. If the company invests 15% of its investment in C, 15% in A, 10% in E and the balance in equal amount in the other two mutual funds, what is the beta of the portfolio?
iii. If the expected return of market portfolio is 12% at a beta factor of 1.0, what will be the portfolios expected return in both the situations given above?

(*Source: ICAI)*

ANSWER:

With 20% investment in each MF Portfolio Beta is the weighted average of the Betas of various securities calculated as below:

i.

Investment	Beta (β)	Investment (₹ Lacs)	Weighted Investment
A	1.6	20	32
B	1.0	20	20
C	0.9	20	18
D	2.0	20	40
E	0.6	20	12
		100	**122**
Weighted Beta (β) = 1.22			

ii. With varied percentages of investments portfolio beta is calculated as follows:

Investment	Beta (β)	Investment (₹ Lacs)	Weighted Investment
A	1.6	15	24
B	1.0	30	30
C	0.9	15	13.5
D	2.0	30	60
E	0.6	10	6
		100	**133.5**
Weighted Beta (β) = 1.335			

iii. Expected return of the portfolio with pattern of investment as in case (i)

= 12% × 1.22 i.e. 14.64%

Expected Return with pattern of investment as in case (ii) = 12% × 1.335 i.e., 16.02%.

Question 62:

Suppose one of your HNI clients is holding the following portfolio as per his risk appetite:

Particulars	Securities
Equity Shares:	
G Ltd.	1000
S Ltd.	1000
B Ltd.	500
PSU Bonds	20,000

The other data related to each of these securities is as follows:

Cost(₹)	Dividends/ Interest(₹)	Market price(₹)	Beta
10,000	1,725	9,800	0.6
15,000	1,000	16,200	0.8
28,000	1400	28,300	0.6
1,800	180	1,725	0.10

Your client is interested in investing some more funds in Bonds issued by GOI.

1. Estimate the minimum rate of return that your client would expect from these Bonds keeping in view his risk appetite and assuming Market Return as 12.70%.
2. Analyze whether this portfolio has out-performed the market or not assuming Risk Free Rate of Return as 7%.

(*Source: ICAI)*

ANSWER:

1. **Working Notes:**

Calculation of Return on each single security

	Cost ₹ (1)	No. of Securities (2)	Total Cost (3) = (1) x (2)	Dividend/ Interest	Capital gain	Total (4)	Total Income (5) = (2) x (4)	Beta (6)	(6) x (3)
G Ltd.	10,000	1000	1,00,00,000	1,725	–200	1,525	15,25,000	0.6	60,00,000
S Ltd.	15,000	1000	1,50,00,000	1,000	1,200	2,200	22,00,000	0.8	1,20,00,000
B Ltd.	28,000	500	1,40,00,000	1,400	300	1,700	8,50,000	0.6	84,00,000
PSU Bonds	1,800	20,000	3,60,00,000	180	–75	105	21,00,000	0.10	36,00,000
Total			7,50,00,000				66,75,000		3,00,00,000

Rate of Return on earned on the Portfolio

$$\frac{\text{Dividend Earned} + \text{Capital appreciation}}{\text{Initial investment}} \times 100$$

$$= \frac{₹\ 66,75,000}{₹\ 7,50,00,000} \times 100 = 8.90\%$$

Weighted Average Beta of the Portfolio

$$\frac{3,00,00,000}{7,50,00,000} = 0.40$$

Expected Risk Free Rate of Return using CAPM

$8.90\% = R_f + 0.40[12.7\% - R_f]$

$8.90\% = R_f + 5.08 – 0.40\ R_f$

$3.82\% = 0.60\ R_f$

$R_f = 6.37\%$

Thus keeping in view the present risk appetite, the client would expect at least a return of 6.37% on Bonds.

2. **The expected return on the Portfolio using CAPM:**

= 7% + 0.40[12.7 – 7%] = 9.28%

Since the actual return is 8.90% which is quite lower than expected return considering the systematic risk borne by the investor and hence portfolio has not outperformed the market rather has underperformed.

Question 63:

XYZ Ltd. has substantial cash flow and until the surplus funds are utilised to meet the future capital expenditure, likely to happen after several months, are invested in a portfolio of short -term equity investments, details for which are given below:

Investment	No. of shares	Beta	Market price per share Rs.	Expected dividend yield
I	60,000	1.16	4.29	19.50%
II	80,000	2.28	2.92	24.00%
III	1,00,000	0.90	2.17	17.50%
IV	1,25,000	1.50	3.14	26.00%

The current market return is 19% and the risk free rate is 11%.

i. Calculate the risk of XYZ's short-term investment portfolio relative to that of the market;
ii. Reconcile whether XYZ should change the composition of its portfolio.

(*Source: ICAI)*

ANSWER:

i. Computation of Beta of Portfolio

Investment	No. of shares	Market Price	Market Value	Dividend Yield	Dividend	Composition	β	Weighted β
I	60,000	4.29	2,57,400	19.50%	50,193	0.2339	1.16	0.27
II	80,000	2.92	2,33,600	24.00%	56,064	0.2123	2.28	0.48
III	1,00,000	2.17	2,17,000	17.50%	37,975	0.1972	0.90	0.18
IV	1,25,000	3.14	3,92,500	26.00%	1,02,050	0.3566	1.50	0.53
			11,00,500		**2,46,282**	**1.0000**		**1.46**

Return of the Portfolio $\frac{2,46,282}{11,00,500} = 0.2238$

Beta of Port Folio = 1.46

Market Risk implicit

0.2238 = 0.11 + β × (0.19 – 0.11)

Or, 0.08 β + 0.11 = 0.2238

$$\beta = \frac{0.2238 - 0.11}{0.08} = 1.42$$

Market β implicit is 1.42 while the port folio β is 1.46. Thus the portfolio is marginally risky compared to the market.

ii. The decision regarding change of composition may be taken by comparing the dividend yield (given) and the expected return as per CAPM as follows:

Expected return	R_s as per CAPM is
R_s	$= I_{RF} + (R_M - I_{RF})\ \beta$
For investment I R_s	$= I_{RF} + (R_M - I_{RF})\ \beta$
	= .11 + (.19 - .11) 1.16
	= 20.28%
For investment II, R_s	= .11 + (.19 - .11) 2.28 = 29.24%
For investment III, R_s	= .11 + (.19 - .11) .90
	= 18.20%
For investment IV, R_s	= .11 + (.19 - .11) 1.50
	= 23%

Comparison of dividend yield with the expected return R_s shows that the dividend yields of investment I, II and III are less than the corresponding R_s,. So, these investments are over- priced and should be sold by the investor. However, in case of investment IV, the dividend yield is more than the corresponding R_s, so, XYZ Ltd. should increase its proportion.

Question 64:

The risk free rate of return is 5%. The expected rate of return on the market portfolio is 11%. The expected rate of growth in dividend of X Ltd. is 8%. The last dividend paid was ₹ 2.00 per share. The beta of X Ltd. equity stock is 1.5.

i. What is the present price of the equity stock of X Ltd.?
ii. How would the price change when:
   - The inflation premium increases by 3%
   - The expected growth rate decreases by 3% and
   - The beta decreases to 1.3.

(***Source: ICAI)***

ANSWER:

i. Equilibrium price of Equity using CAPM

= 5% + 1.5(11% - 5%)

= 5% + 9%= 14%

$$P = \frac{D_1}{k_e - g} = \frac{2.00(1.08)}{0.14 - 0.08} = \frac{2.16}{0.06} = ₹\ 36$$

ii. New Equilibrium price of Equity using CAPM (assuming 3% on 5% is inflation increase)

= 5.15% + 1.3(11% - 5.15%)

= 5.15% + 7.61% = 12.76%

$$P = \frac{D_1}{k_e - g} = \frac{2.00(1.05)}{0.1276 - 0.05} = ₹\ 27.06$$

Alternatively, it can also be computed as follows, assuming it is 3% in addition to 5%

= 8% + 1.3(11% - 8%)

= 8% + 3.9%= 11.9%

$$P = \frac{D_1}{k_e - g} = \frac{2.00(1.05)}{0.119 - 0.05} = ₹\ 30.43$$

Alternatively, if all the factors are taken separately then solution of this part will be as follows:

i. Inflation Premium increase by 3%.

This raises R_X to 17%. Hence, new equilibrium price will be:

$$\frac{2.00(1.08)}{0.17 - 0.08} = ₹\ 24$$

ii. Expected Growth rate decrease by 3%.

Hence, revised growth rate stand at 5%

$$= \frac{2.00(1.05)}{0.14 - 0.05} = ₹\ 23.33$$

iii. Beta decreases to 1.3.

Hence, revised cost of equity shall be:

= 5% + 1.3(11% - 5%)

= 5% + 7.8%= 12.8%

As a result New Equilibrium price shall be:

$$P = \frac{D_1}{k_e - g} = \frac{2.00(1.08)}{0.128 - 0.08} = ₹\ 45$$

Question 65:

Your client is holding the following securities:

Particulars of Securities	Cost ₹	Dividends/Interest₹	Market price₹	Beta
Equity Shares:				
Gold Ltd.	10,000	1,725	9,800	0.6
Silver Ltd.	15,000	1,000	16,200	0.8
Bronze Ltd.	14,000	700	20,000	0.6
GOI Bonds	36,000	3,600	34,500	0.01

Average return of the portfolio is 15.7%, calculate:

i. Expected rate of return in each, using the Capital Asset Pricing Model (CAPM).

ii. Risk free rate of return.

(*Source: ICAI)*

ANSWER:

Particulars of Securities	Cost (₹)	Dividend	Capital gain
Gold Ltd.	10,000	1,725	−200
Silver Ltd.	15,000	1,000	1,200
Bronze Ltd.	14,000	700	6,000
GOI Bonds	36,000	3,600	−1,500
Total	**75,000**	**7,025**	**5,500**

Expected rate of return on market portfolio

$$\frac{\text{Dividend Earned} + \text{Capital appreciation}}{\text{Initial investment}} \times 100$$

$$= \frac{₹\ 7,025 + ₹\ 5,500}{₹\ 75,000} \times 100 = 16.7\%$$

Risk free return

Average of Betas $= \dfrac{0.6 + 0.8 + 0.6 + 0.01}{4} = \text{Average of Betas}^* = 0.50$

Average return = Risk free return + Average Betas (Expected return – Risk free return)

15.7 = Risk free return + 0.50 (16.7 – Risk free return)

Risk free return = 14.7%

* Alternatively, it can also be calculated through Weighted Average Beta.

Expected Rate of Return for each security is

Rate of Return = $R_f + B\ (R_m - R_f)$

Gold Ltd. = 14.7 + 0.6 (16.7 – 14.7) = 15.90%

Silver Ltd. = 14.7 + 0.8 (16.7 – 14.7) = 16.30%

Bronze Ltd. = 14.7 + 0.6 (16.7 – 14.7) = 15.90%

GOI Bonds = 14.7 + 0.01 (16.7 – 14.7) = 14.72%

* Alternatively, it can also be computed by using Weighted Average Method.

Question 66:

An investor holds two stocks A and B. An analyst prepared ex-ante probability distribution for the possible economic scenarios and the conditional returns for two stocks and the market index as shown below:

Economic scenario	Probability	Conditional Returns %		
		A	B	Market
Growth	0.40	25	20	18
Stagnation	0.30	10	15	13
Recession	0.30	-5	-8	-3

The risk free rate during the next year is expected to be around 11%. Determine whether the investor should liquidate his holdings in stocks A and B or on the contrary make fresh investments in them. CAPM assumptions are holding true.

(*Source: ICAI)*

ANSWER:

Expected Return on stock A = E (A) $= \sum_{i=G,S,R} P_i A_i$

(G,S & R, denotes Growth, Stagnation and Recession)

(0.40)(25) + 0.30(10)+ 0.30(-5) = 11.5%

Expected Return on 'B'

(0.40×20) + (0.30×15) +0.30× (-8)=10.1%

Expected Return on Market index

(0.40 × 18) + (0.30 × 13) + 0.30 × (-3) =10.2%

Variance of Market index

$(18 - 10.2)^2 (0.40) + (13 - 10.2)^2 (0.30) + (-3 - 10.2)^2 (0.30)$

= 24.34 + 2.35 + 52.27 = 78.96%

Covariance of stock A and Market Index M

$$\text{Cov.}(AM) = \sum_{i=G,S,R} \left(\left[A_i - E(A)\right]\left[M_i - E(M)\right]P\right.$$

(25 -11.5) (18 - 10.2)(0.40) + (10 - 11.5) (13 - 10.2) (0.30) + (-5-11.5) (-3-10.2)(0.30)

= 42.12 + (-1.26) + 65.34

=106.20

Covariance of stock B and Market index M

(20-10.1) (18-10.2)(0.40)+(15-10.1)(13-10.2)(0.30) + (-8-10.1)(-3-10.2)(0.30)

= 30.89 + 4.12 + 71.67

=106.68

Beta for stock A $= \frac{\text{CoV}(AM)}{\text{VAR}(M)} = \frac{106.20}{78.96} = 1.345$

Beta for Stock B $= \frac{\text{CoV}(BM)}{\text{VarM}} = \frac{106.68}{78.96} = 1.351$

Required Return for A

R (A) = $R_f + \beta (M - R_f)$

11% + 1.345(10.2 - 11) % = 9.924%

Required Return for B

11% + 1.351 (10.2 – 11) % = 9.92%

Alpha for Stock A

E (A) – R (A) i.e. 11.5 % – 9.924% = 1.576%

Alpha for Stock B

E (B) – R (B) i.e. 10.1% - 9.92% = 0.18%

Since stock A and B both have positive Alpha, therefore, they are UNDERPRICED. The investor should make fresh investment in them.

Question 68:

Mr. Ram is holding the following securities:

Particulars of Securities	Cost (₹)	Dividends	Market Price	Beta
Equity Shares:				
Gold Ltd.	11,000	1,800	12,000	0.6
Silver Ltd.	16,000	1,000	17,200	0.8
Bronze Ltd.	12,000	800	18,000	0.6
GOI Bonds	40,000	4,000	37,500	1.0

Calculate:

i. Expected rate of return in each case, using the Capital Asset Pricing Model (CAPM).

ii. Average rate of return, if risk free rate of return is 14%.

(*Source: ICAI)*

ANSWER:

i. Expected rate of return

	Total Investments	Dividends	Capital Gains
Gold Ltd.	11,000	1,800	1,000
Silver Ltd.	16,000	1,000	1,200
Bronze Ltd.	12,000	800	6,000
GOI Bonds	40,000	4,000	(2,500)
	79,000	**7,600**	**5,700**

Expected Return on market portfolio = $\frac{7,600 + 5,700}{79,000}$ = 16.84%

CAPM = $E(Rp) = R_F + \beta\ [E(R_M) - R_F]$

Gold Ltd.	14 + 0.6 [16.84 - 14]	14 + 1.70	15.70%
Silver Ltd.	14 + 0.8 [16.84 - 14]	14 + 2.27	16.27%
Bronze Ltd.	14 + 0.6 [16.84 - 14]	14 + 1.70	15.70%
GOI Bonds	14 + 1 [16.84 - 14]	14 + 2.84	16.84%

ii. Average Return of Portfolio

$$\frac{15.70 + 16.27 + 15.70 + 16.84}{4} = \frac{64.51}{4} = 16.13\ \%$$

Alternatively

$$\frac{0.6 + 0.8 + 0.6 + 1}{4} = \frac{3}{4} = 0.75$$

14% + 0.75(16.84% – 14%) = 14% + 2.13% = 16.13%

Question 72:

Mr. Tempest has the following portfolio of four shares:

Name	Beta	Investment Rs. Lac.
Oxy Rin Ltd.	0.45	0.80
Boxed Ltd.	0.35	1.50
Square Ltd.	1.15	2.25
Ellipse Ltd.	1.85	4.50

The risk-free rate of return is 7% and the market rate of return is 14%.

Calculate

i. Portfolio return.
ii. Calculate the portfolio Beta

(*Source: ICAI*)

ANSWER:

Market Risk Premium (A) = 14% – 7% = 7%

Share	Beta	Risk Premium (Beta x A) %	Risk Free Return %	Return %	Return (₹)
Oxy Rin Ltd.	0.45	3.15	7	10.15	8,120
Boxed Ltd.	0.35	2.45	7	9.45	14,175
Square Ltd.	1.15	8.05	7	15.05	33,863
Ellipse Ltd.	1.85	12.95	7	19.95	89,775
Total Return					**1,45,933**

Total Investment ₹ 9,05,000

i. **Portfolio Return** $= \frac{₹1,45,933}{₹9,05,000} \times 100 = 16.13\%$

ii. **Portfolio Beta**

Portfolio Return = Risk Free Rate + Risk Premium x β = 16.13%
7% + 7β = 16.13%
β = 1.30

Alternative Approach

First we shall compute Portfolio Beta using the weighted average method as follows:

$$\text{Beta}_P = 0.45 \times \frac{0.80}{9.05} + 0.35 \times \frac{1.50}{9.05} + 1.15 \times \frac{2.25}{9.05} + 1.85 \times \frac{4.50}{9.05}$$

= 0.45 x 0.0884+ 0.35 X 0.1657+ 1.15 X 0.2486 + 1.85 X 0.4972

= 0.0398 + 0.058 + 0.2859 + 0.9198 = 1.3035

Accordingly,

i. **Portfolio Return using CAPM formula will be as follows:**

$R_P = R_F + \text{Beta}_P(R_M – R_F)$
= 7% + 1.3035(14% - 7%)
= 7% + 1.3035(7%)

= 7% + 9.1245% = 16.1245%

ii. **Portfolio Beta**

As calculated above 1.3035