

$$ER_P = (0.65 \times 8.5) + (0.35 \times 7) = 7.98\%$$

(3) A & C (65:35)

$$ER_P = (0.65 \times 7) + (0.35 \times 9.5) = 7.88\%$$

(4) C & A (65:35)

$$= (0.65 \times 9.5) + (0.35 \times 7) = 8.63\%$$

(5) B & C (65:35)

$$= (0.65 \times 8.5) + (0.35 \times 9.5) = 8.85\%$$

(6) C & B (65:35)

$$= (0.65 \times 9.5) + (0.35 \times 8.5) = 9.15\%$$

Since maximum return is under comb ratio (6) i.e. 65% investment in C Ltd. & 35% investment in B Ltd. Hence it should be opted.

(II) Portfolio Return & Beta.

$$ER_P = \frac{(65,000 \times 7) + (20,000 \times 8.5) + (15,000 \times 9.5)}{1,00,000}$$

$$= 7.68\%$$

$$\beta_p = (0.65 \times 0.45) + (0.2 \times 1.15) + (0.15 \times 1.8)$$

$$= 0.793$$

Question – 23

Your client is holding the following securities:

Particulars of Securities	Cost ₹	Dividends ₹	Market Price ₹	BETA
Equity shares:				
Co. X	8,000	800	8,200	0.8
Co. Y	10,000	800	10,500	0.7
Co. Z	16,000	800	22,000	0.5
PSU Bonds	34,000	3,400	32,300	0.2

Assuming a Risk-free rate of 15%, calculate:

- Expected rate of return in each, using the Capital Asset Pricing Model (CAPM).
- Simple Average return of the portfolio.

(SM TYK – 28)

Solution:

$$ER_P = \frac{(73,000 - 68,000) + 5,800}{68,000} \times 100$$

$$= 15.88\%$$

$$B_P = \frac{(8,000 \times 0.8) + (10,000 \times 0.7) + (16,000 \times 0.5) + (34,000 \times 0.2)}{68,000}$$

$$= 0.415$$

$$ER_P = R_f + (R_m - R_f) B_P$$

$$15.88 = 15 + (R_m - 15) 0.415$$

$$15.88 = 15 + 0.415 R_m - 6.225$$

$$= \frac{7.12}{0.415} = 17.12\%$$

(I) Expected return of each security

$$ER = (R_f + R_m) B$$

$$X = 15 + (17.12 - 15) 0.8 = 16.70\%$$

$$Y = 15 + (17.12 - 15) 0.7 = 16.48\%$$

$$Z = 15 + (17.12 - 15) 0.5 = 16.06\%$$

$$\text{Bond} = 15 + (17.12 - 15) 0.2 = 15.42\%$$

(II) Simple average return

$$= \frac{16.7 + 16.48 + 16.06 + 15.42}{4}$$

$$= 16.17\%$$

Alternative (ICAI)

Calculation of expected return on market portfolio (R_m)

Investment	Cost (₹)	Dividends (₹)	Capital Gains (₹)
shares X	8,000	800	200
shares Y	10,000	800	500
shares Z	16,000	800	6,000
PUS Bonds	34,000	3,400	-1700
	<u>68,000</u>	<u>5,800</u>	<u>5,000</u>

$$R_m = \frac{5,800 + 5,000}{68,000} \times 100 = 15.88\%$$

Calculation of expected rate of return on individual security: Security

$$\text{Shares X} \quad 15 + 0.8 (15.88 - 15.0) = 15.70\%$$

$$\text{Shares Y} \quad 15 + 0.7 (15.88 - 15.0) = 15.62\%$$

$$\text{Shares Z} \quad 15 + 0.5 (15.88 - 15.0) = 15.44\%$$

$$\text{PSU Bonds} \quad 15 + 0.2 (15.88 - 15.0) = 15.18\%$$

Calculation of the Average Return of the Portfolio:

$$= \frac{15.70 + 15.62 + 15.44 + 15.18}{4} = 15.49\%.$$

Question – 24

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

(SM TYK – 26)

Solution:

(I) Risk Free Rate

$$R_f = \frac{(34,500 - 36,000) + 3,600}{36,000} \times 100 = 5.833 \%$$

(II) Beta

$$= \frac{(0.6 \times 10,000) + (0.8 \times 15,000) + (0.6 \times 14,000) + (0.01 \times 36,000)}{75,000}$$

$$= 0.357$$

(III) Market Rate of Return

$$ER_P = R_f + (R_m - R_f) B_p$$

$$15.7 = 5.833 + (R_m - 5.833) 0.357$$

$$R_m = 33.472\%$$

Expected return of each security

$$G = 5.833 + (33.472 - 5.833) 0.6 = 22.416\%$$

$$S = 5.833 + (33.472 - 5.833) 0.8 = 27.944\%$$

$$B = 5.833 + (33.472 - 5.833) 0.6 = 22.416\%$$

$$GOI = 5.833 + (33.472 - 5.833) 0.01 = 6.109\%$$

Alternative (ICAI)

Expected rate of return on market portfolio

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

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

Risk Free Return

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

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

$$15.7 = \text{Risk free return} + 0.50 (16.7 - \text{Risk free return})$$

$$\text{Risk free return} = 14.7\%$$

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

Expected Rate of Return for each security is

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

$$\text{Gold Ltd.} = 14.7 + 0.6 (16.7 - 14.7) = 15.90\%$$

$$\text{Silver Ltd.} = 14.7 + 0.8 (16.7 - 14.7) = 16.30\%$$

$$\text{Bronze Ltd.} = 14.7 + 0.6 (16.7 - 14.7) = 15.90\%$$

$$\text{GOI Bonds} = 14.7 + 0.01 (16.7 - 14.7) = 14.72\%$$

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

Solution updated in May-2025 SM:

*Alternatively, it can also be computed as follows:

Particulars of Securities (1)	Cost ₹ (2)	Market Price ₹ (3)	Dividend ₹ (4)	Capital Gain ₹ (5)	Beta (6)	(3) × (6)
Gold Ltd.	10,000	9,800	1,725	-200	0.6	5,880
Silver Ltd.	15,000	16,200	1,000	1,200	0.8	12,960
Bronz Ltd.	14,000	20,000	700	6,000	0.6	12,000
GOI Bonds	36,000	34,500	3,600	-1,500	0.01	345
Total	75,000	80,500	7,025	5,500		31,185

$$\beta \text{ of the portfolio} = \frac{31,185}{80,500} = 0.387$$

Using GOI Bond we can compute Risk Free Rate of Return as follows:

$$R_f = \frac{(34,500 - 36,000) + 3,600}{36,000} = 0.0583 \text{ i.e. } 5.83\%$$

Now we can calculate Market Return (R_m) using average return of the portfolio as follows:

$$R_p = R_f + \beta (R_m - R_f)$$

$$15.7\% = 5.83\% + 0.387(R_m - 5.83\%)$$

Question – 25

A holds the following portfolio:

Share/Bond	Beta	Initial Price ₹	Dividends ₹	Market Price at end of Year ₹
Epsilon Ltd.	0.8	25	2	50
Sigma Ltd.	0.7	35	2	60
Omega Ltd.	0.5	45	2	135
GOI Bonds	0.01	1,000	140	1,005

Calculate:

- The expected rate of return of each security using Capital Asset Pricing Method (CAPM)
- The average return of his portfolio.

Risk-free return is 14%.

(SM TYK – 27)

Solution:

(i) Expected Rate of Return

	Total Investments	Dividends	Capital Gains
Epsilon Ltd.	25	2	25
Sigma Ltd.	35	2	25
Omega Ltd.	45	2	90
GOI Bonds	<u>1,000</u>	<u>140</u>	<u>5</u>
	<u>1,105</u>	<u>146</u>	<u>145</u>

$$\text{Expected Return on market portfolio} = \frac{146 + 145}{1105} = 26.33\%$$

$$\text{CAPM} \quad E(R_p) = R_F + \beta [E(R_M) - R_F]$$

Epsilon Ltd.	$14 + 0.8[26.33 - 14] =$	$14 + 9.86$	$= 23.86\%$
Sigma Ltd.	$14 + 0.7[26.33 - 14] =$	$14 + 8.63$	$= 22.63\%$
Omega Ltd.	$14 + 0.5[26.33 - 14] =$	$14 + 6.17$	$= 20.17\%$
GOI Bonds	$14 + 0.01[26.33 - 14] =$	$14 + 0.12$	$= 14.12\%$

(ii) Average Return of Portfolio

$$\frac{23.86 + 22.63 + 20.17 + 14.12}{4} = \frac{80.78}{4} = 20.20\%$$

$$\text{Alternatively, } = \frac{0.8 + 0.7 + 0.5 + 0.01}{4} = \frac{2.01}{4} = 0.5025$$

$$14 + 0.5025 (26.33 - 14) = 14 + 6.20 = 20.20\%$$

Question – 26

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

Particulars	Securities
Equity Shares:	
G Ltd.	1,000
S Ltd.	1,000
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	1,400	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%.

(MTP Nov – 2021)**Solution:****(i) Weighted Average Beta**

Stocks	Cost	Dividend	Market Value
G Ltd	1,00,00,000	17,25,000	98,00,000
S Ltd	1,50,00,000	10,00,000	1,62,00,000
B Ltd	1,40,00,000	7,00,000	1,41,50,000
PSU Bonds	3,60,00,000	36,00,000	3,45,00,000
	7,50,00,000	70,25,000	7,46,50,000

$$ER_p = \frac{(7,46,50,000 - 7,50,00,000) + 70,25,000}{7,50,00,000} \times 100 = 8.9\%$$

$$B_p = \frac{(100 \times 0.6) + (150 \times 0.8) + (140 \times 0.6) + (360 \times 0.10)}{750}$$

$$= 0.4$$

 R_f Rate

$$ER_p = R_f + (R_m - R_f) B_p$$

$$8.90 = R_f + (12.7 - R_f) 0.4$$

$$8.90 = R_f + 5.08 - 0.4 R_f$$

$$R_f = \frac{8.90 - 5.08}{0.6} = 6.36\% \text{ (Implicit } R_f)$$

(ii) Required Rate of Return (Risk)

Portfolio Estimation = 8.9 %

$$CAPM = R_f + (R_m - R_f) B_p$$

$$= 7 + (12.7\% - 7) 0.4$$

$$= 9.28\%$$

जितना Risk है उस हिसाब से 9.28% Return मिलना चाहिए ।

Portfolio Performance is not good Because Required Rate of Return (9.28%) is more than Expected Rate Of Return (8.9%).

Question – 27

Your client is holding the following securities:

Particulars of Securities	Cost	Dividends/ Interest	Market price at the end of holding period	Beta
	₹	₹	₹	
Equity Shares:				
G Ltd.	20,000	1,450	19,600	0.6
S Ltd.	30,000	1,000	30,400	0.8
B Ltd.	28,000	1,400	32,000	0.6
GOI Bonds	72,000	5,060	71,980	0.01

Evaluate:

- Risk free rate of return.
- Expected rate of return of each security (except GOI Bond), using the Capital Asset Pricing Model (CAPM).

Note: (1) Use weighted average Beta in calculations.

(2) Round off calculations upto 3 decimal points.

(Study Material TYK, MTP April – 2024)

Solution:

(i) R_f Rate

$$R_f = \frac{(P_1 - P_0) + \text{Income}}{P_0} \times 100$$

$$R_f = \frac{(71,980 - 72,000) + 5,060}{72,000} \times 100$$

$$= 7\%$$

(ii) Expected Return of Each Security

Particulars	Cost	Dividend	MP
G Ltd.	20,000	1,450	19,600
S Ltd.	30,000	1,000	30,400
B Ltd.	28,000	1,400	32,000
GOI Bond	72,000	5,060	71,980
	1,50,000	8,910	1,53,980

$$ER_p = \frac{(1,53,980 - 1,50,000) + 8,910}{1,50,000} \times 100$$

$$= 8.593\%$$

$$\text{Beta} = \frac{(20,000 \times 0.6) + (30,000 \times 0.8) + (28,000 \times 0.6) + (72,000 \times 0.6)}{1,50,000}$$

$$= 0.357$$

Market Return (R_m)

$$ERP = R_f + (R_m - R_f) B_p$$

$$8.593 = 7 + (R_m - 7) 0.357$$

$$8.593 = 7 + 0.357 R_m - 2.499$$

$$R_m = 11.462\%$$

$$G \text{ Ltd.} = 7 + (11.462 - 7) 0.6 = 9.677$$

$$S \text{ Ltd.} = 7 + (11.462 - 7) 0.8 = 10.57\%$$

$$B \text{ Ltd.} = 7 + (11.462 - 7) 0.6 = 9.677\%$$

ICAI Solution:

Particulars of Securities	Cost ₹	Market Price	Capital gain	Dividend/ Interest
G Ltd.	20,000	19,600	-400	1,450
S Ltd.	30,000	30,400	400	1,000
B Ltd.	28,000	32,000	4,000	1,400