AFM

LAST DAY REVISION NOTES

INDEX - MAY 2024

- Exam Tips
- Important Qn list (Study material, past year paper, RTP & MTP covered)
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AFM - EXAM TIPS

Exam Pro Tips

- In AFM, generally paper is short, if you are well prepared then you can complete the paper in 2=2.5 hrs. If you attempt all 6 Qns in exam, then you will get marks based on best 5.
- MCQ paper will not be provided in reading time so, read the descriptive qns first and plan to attempt your best 3 descriptive answers (in first 1.5 hour) which you are confident then move to MCQs (attempt all MCQ, no negative marking) and in the end write the remaining 2 descriptive answers.
- Theory is the most scoring in AFM (14 Marks) and theory qns always repeats in exam from study material or past year papers. It takes less time to answer theory qns and you will get full marks if you write the correct head points.
- No marks for simple formulas.
- In reading time identify the Qn which you want to leave, decide yourself (Try to leave new, ambiguous qns or confusing qns of forex)
- Don't read Qn 1 in reading time, start reading the Qn in reverse order (From Qn 6 to Qn 2)
- First attempt the small Qns as they are most scoring and attempt the big Qns in end.
- Give proper space in your answer sheet so that later you can make any changes you want.
- Write answer as per ICAI format.
- Circle the important calculation/ answers (see my certified copy).
- Don't cut any answer until you have solved it again correctly (a simple cross is sufficient to cut any Qn).
- Start new answer from new page.
- No marks for writing style
- Don't make any lines, table etc. and use single pen to increase your speed.

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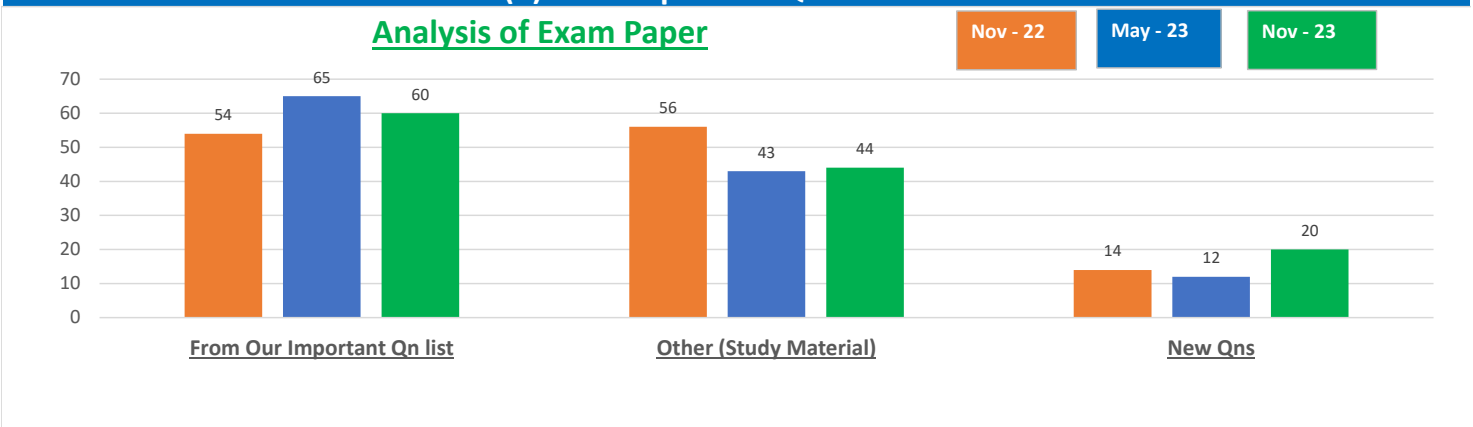
SFM Last Day Revision Notes

(1) SFM Important Question List



Qns are categorised in 3 category as follow:

- Most Important
- Very Important
- Important

Study leave plan:

One in-depth reading (10-15 days)
First revision (5-7 days)
Second revision (4-6 days)
Third revision (3-5 days)
*two revision are sufficient to clear the exam but if you are planning for rank than third revision is must.

Instruction to use:

- I have refered all Qns of module in first in-depth reading of FR and mark the Qns that I have to refer in next reading/ revision.
- In first revision I have refered only marked Qns (**all 3 category**).
- In next revision I have referred only Qns marked as **Very important & Most important**
- In final revision & one day before exam I have reffered **Most important Qns,** concept notes & mistake register.

(For those chapters that have no most important Qns, I have reffered Very important Qns too in last day revision)

Study material Qns + last 4 past year paper, RTP & MTPs Qns are sufficient to clear the exam with good marks

ABC Analysis	Chapter	Importance	Test your knowledge	Illustration
C	Chapter 1: Financial Policy and Corporate Strategy	Most Important	1,2	
C	Chapter 2: Risk Management	Very Important	1	
A	Chapter 3: Advanced Capital Budgeting Decisions	Important	3	
		Very Important	5, 14(ii), 23	12
		Most Important	7,9,21,22,25	2,11,13
B	Chapter 4: Security Analysis	Most Important	1,2	
A	Chapter 5: Security Valuation	Important	5,16	
		Very Important	24	
		Most Important	7,10,12,14,25,27,29,31	
A	Chapter 6: Portfolio Management	Important	24(c),38,40	5
		Very Important	2,15(iii),26,32,39	
		Most Important	8,14(ii),22,31,34,35	
A	Chapter 7: Securitization	Important	Refer all Qns from Bhavik Choksi sir or Ajay Agarwal theory question compiler	
B	Chapter 8: Mutual Funds	Important	1,2	
		Very Important	3	
		Most Important	13,17,20,21,22	

SFM Last Day Revision Notes

A	Chapter 9: Derivatives Analysis and Valuation	Important	3,11,12	2
		Very Important	5	
		Most Important	4,8,14,22	3
A	Chapter 10: Foreign Exchange Exposure and Risk Management	Important	10,24	
		Very Important	16,37,38,50	9
		Most Important	25,33,36,39,42,43,47,48,49	
B	Chapter 11: International Financial Management	Very Important	3	
		Most Important	1,4	1,2,3
B	Chapter 12: Interest Rate Risk Management	Important	4,7	
		Very Important	5,6	
		Most Important	3	
B	Chapter 13: Business Valuation	Important	9,11	1,2,4
		Very Important	16	3,5
		Most Important	3,7	
A	Chapter 14: Mergers, Acquisitions and Corporate Restructuring	Important	28(iii)	
		Very Important	20	1
		Most Important	14,15,22,29,30	4
A	Chapter 15: Startup Finance	Most Important	Refer all Qns from Bhavik Choksi sir or Ajay Agarwal theory question compiler	

Pro tip: Theory is always most scoring in SFM exam so, do cover theory qns from any good material (eg. Bhavik Sir Theory Compiler)

Access all past year paper, RTPs and MTPs on this link > https://drive.google.com/drive/folders/1yCkMpaMfRBtHnduBvuxtdRIiASBTuj3H?usp=sharing

Particular	Attempt	Question
Past year paper (Sugg. ans.)	Nov-18	1(a), 5(a)
	May-19	2(a), 6(b)
	Nov-19	1(b)
	Nov-20	1(c),2(a),4(a),6(a),6(b)
	Jan-21	1(a),1(b),2(b),6(a)
	May-22	1(c), 6(c)
	Nov-22	5(A), 6(A) (ii) & (iii)
	May-23	5(A), 5(C), 6(A)
	Nov-23	2(A), 2(C), 3(B)
RTPs	May-19	7,10,11,14(c),15(c)
	Nov-19	1,2
	May-20	5
	Nov-20	6,10,12
	May-21	5,14,15
	Dec-21	2,10,11
	May-22	1,14
	Nov-22	All Qns were repeated
	May-23	All Qns were repeated
	Nov-23	All Qns were repeated
	May-24	4, 12, 13
MTPs	Oct-18	2 (c)
	Aug-18	1(c), 4(d)
	May-20	3(a)
	Oct-20	1(c),2(c),4(c),5(a),6(a),6(b)
	Apr-21	1(a),1(c),2(b),3(c),6(a)
	Nov-21	3(a)
	Apr 23 - II	2(a)

(2) SFM ABC & Trend Analysis

ABC	Topic	May 2018	Nov 2018	May 2019	Nov 2019	Nov 2020	Jan 2021	Jul 2021	Dec 2021	May 2022	Nov 2022	May 2023	Nov 2023	Total	Avg.
C	Chapter 1: Financial Policy and Corporate Strategy	4			4		4	4		4	8	4	4	**36**	**3**
C	Chapter 2: Risk Management	4	4	4	4	4	4	4	4	4	4	8	4	**52**	**4**
A	Chapter 3: Advanced Capital Budgeting Decisions	New chapter added in May 2024												**0**	**0**
B	Chapter 4: Security Analysis	8			8	4	8		4	8			4	**40**	**3**
A	Chapter 5: Security Valuation	10	28	16		23	4	24	8	8	16	17	8	**162**	**14**
A	Chapter 6: Portfolio Management	14	8	8	16	8	10	16	20	16	24	16	16	**172**	**14**
A	Chapter 7: Securitization	4	4	4	8	4	8	4	4	4	4	4	4	**56**	**5**
B	Chapter 8: Mutual Funds	10	8	8	10	14	8	12	8	16	8	8	8	**118**	**10**
A	Chapter 9: Derivatives Analysis and Valuation	9	8	16	14	8	12	8	16	8	8	14	20	**141**	**12**
B	Chapter 10: Foreign Exchange Exposure and Risk Management	8	4		8	8		12	4	8	12	6	16	**86**	**7**
B	Chapter 11: International Financial Management	8	24	16	8	20	16	8	16	12	8	7	0	**143**	**12**
B	Chapter 12: Interest Rate Risk Management	8		8	12	8	22	8	16	12	8	12	14	**128**	**11**
B	Chapter 13: Corporate Valuation	13	12	8	8	4	8	8	8	8	8		8	**85**	**7**
A	Chapter 14: Mergers, Acquisitions and Corporate Restructuring	8	12	16	16	12	12	8	8	8	8	18	10	**136**	**11**
A	Chapter 15: Startup Finance	4	4	4	8	7	8	8	8	4	8	8	8	**71**	**6**

(3) SFM Important Formula List

Chapter 2: Risk Management

Value of Risk

VAR is a measure of risk. It tries to measure that in a normal market condition, how much is the maximum amount that an investment might lose. The components of VAR are:

(a) Loss amount (Standard Deviation in ₹)

(b) Confidence Interval (Generally 99%)

(c) Time Period (if nothing is given, then 1 day)

VAR = Daily Standard Deviation × Confidence Interval Value × √Number of days where,

Daily Standard Deviation = Portfolio Value (₹) × Portfolio Standard Deviation (%)

Confidence Interval (Z) Value

- 2.33 for a 99% confidence,
- 1.65 for a 95% confidence,
- 1.29 for a 90% confidence.

Chapter 3: Security Analysis

Run Test Analysis:

1. Total Number of Runs (r)
2. Number of positive price changes (n1)
3. Number of negative price changes (n2)
4. Mean (μ) $= \frac{2n1\ n2}{n1+n2} + 1$
5. Standard Deviation (σ)$= \sqrt{\frac{2n1n2(2n1n2-n2-n2)}{(n1+n2)^2\ (n1+n2-1)}}$
6. Lower limit: [μ - t (σ)]
7. Upper limit: [μ + t (σ)]

Where, t = value from t table at the confidence level (5%) for given degrees of freedom (between 5.76596)

(b) Exponential Moving Average: Unlike the AMA, which assigns equal weight of 1/*n* to each of the n prices used for computing the average, the Exponential Moving Average (EMA) assigns decreasing weights, with the highest weight being assigned to the latest price. The weights decrease exponentially, according to a scheme specified by the exponential smoothing constant, also known as the exponent, a.

$EMA_t = aP_t + (1-a)(EMA_{t-1})$

Where, a (exponent) $= \frac{2}{n+1}$

P_t = Price of today

EMA_{t-1} = Previous day's EMA

Or

EMA_t = (Closing Price of the day – EMA of Previous Day) x Exponent + Previous day EMA

Chapter 4: Security Valuation

Calculating the Equity Risk Premium

The Equity Risk Premium can be derived from Capital Asset Pricing Model (CAPM), which is as follows:

$R_x = R_f + \beta_X (R_m - R_f)$

Where:

R_X = Expected return on equity share of company X

R_f = Risk-Free Rate of Return

β_x = Beta of Company X i.e. Systematic Market Risk of the Company

R_m = Expected Return of Market or Market Portfolio or Return from Market Index

The equity risk premium is basically excess of a Security's Return over Risk-Free Rate Return and accordingly the CAPM can be remodeled as follows:

Equity Risk Premium = $R_x - R_f = \beta_x (R_m - R_f)$

The $(R_m - R_f)$ portion is called Market Risk Premium.

Valuation of Equity Shares

- Dividend Based Models
- Earnings Based Models
- Cash Flows Based Model

Earning Based Models

Gordon's Model: Valuation as per this model shall be

$$\frac{EPS_1 (1-b)}{Ke - br}$$

Where, r = Return on Retained Earnings

b = Retention Ratio

Walter's Approach: As per this model, the value of equity share shall be:

$$\frac{D+(E-D)\frac{r}{K_e}}{Ke}$$

Price Earning Ratio or Multiplier Approach: As per this approach the share price or value can simply be determined as follows:

Value = EPS X PE Ratio

This ratio can be estimated for a similar type of company or of industry after making suitable adjustment in light of specific features pertaining to the company under consideration.

Dividend Based Models

Valuation Based holding period of One Year: If an investor holds the share for one year then the value of equity share is computed as follows:

$$P_0 = \frac{D_1}{(1 + Ke)^1} + \frac{P_1}{(1 + Ke)^1}$$

Valuation Based on Multi Holding Period: In this type of holding following three types of dividend pattern can be analyzed.

(i) Zero Growth: Also, called as No Growth Model, as dividend amount remains same over the years infinitely. The value of equity can be found as follows:

$$P_0 = \frac{D}{(Ke)}$$

ii) Constant Growth: Although assumption is quite unrealistic assumption but the value of equity shared can be found by using following formula:

$$P_0 = \frac{D_1}{Ke - g} \text{ or } \frac{D_0(1+g)}{(Ke - g)}$$

(iii) Variable Growth in Dividend: Just like the constant growth assumption this assumption also appears to be unrealistic but valuation can also be done on the same. Valuation on the basis of this assumption can further be classified in Two-Stage Dividend Discount Model and Three Stage Dividend Discount Model.

g = Growth = Return on equity * retention ratio

$\boldsymbol{D_1} = D_0 \times (1 + g)$

Cash Flow Models

Free Cash Flow to Firm Model (FCFF) – In FCFF model, the value of equity is determined by first computing the value of firm, using FCFF and Cost of Capital i.e. WACC (Ko) and then deducting Debt from the same.

Free Cash Flow to Firm Model (FCFE) – In FCFE model, the value of equity is determined by using FCFE and Cost of Equity (Ke).

Calculation of Free Cash Flow to Firm (FCFF)

(a) Based on its Net Income:
FCFF= Net Income + Interest expense *(1-tax) + Depreciation -/+ Capital Expenditure –/+ Change in Non-Cash Working Capital

(b) Based on Operating Income or Earnings Before Interest and Tax (EBIT):
FCFF= EBIT *(1 - tax rate) + Depreciation -/+ Capital Expenditure –/+ Change in Non-Cash Working Capital

(c) Based on Earnings before Interest, Tax , Depreciation and Amortisation (EBITDA):
FCFF = EBITDA* (1-Tax) +Depreciation* (Tax Rate) -/+ Capital Expenditure – /+Change in Non-Cash Working Capital

(d) Based on Free Cash Flow to Equity (FCFE):
FCFF = FCFE + Interest* (1-t) + Principal Prepaid - New Debt Issued + Preferred Dividend

(e) Based on Cash Flows:
FCFF = Cash Flow from Operations (CFO) + Interest (1-t) -/+ Capital Expenditure

Calculation of Free Cash Flow to Equity (FCFE): Free Cash flow to equity is used for measuring the intrinsic value of the stock for equity shareholders. The cash that is available for equity shareholders after meeting all operating expenses, interest, net debt obligations and re-investment requirements such as working capital and capital expenditure. It is computed as:
Free Cash Flow to Equity (FCFE) = Net Income - Capital Expenditures +Depreciation - Change in Non-cash Working Capital + New Debt Issued - Debt Repayments
or
FCFE = Net Profit + depreciation - ΔNWC - CAPEX + New Debt - Debt Repayment.
ΔNWC = changes in Net Working Capital.
CAPEX = Addition in fixed assets to sustain the basis.
FCFE can also be used to value share as per multistage growth model approach.

Valuation of Rights

Immediately after the right issue, the price of share is called Ex Right Price or Theoretical Ex-Right Price (TERP) which is computed as follows:

$$\frac{nP_o + S}{n+1}$$

n = No. of existing equity shares
P0 = Price of Share Pre-Right Issue
S = Subscription amount raised from Right Issue

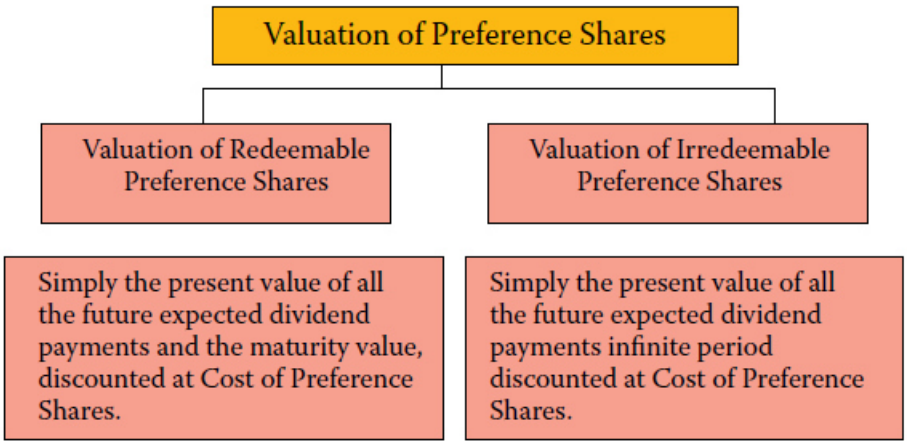
However, theoretical value of right can be calculated as follows:

$$\frac{P_o - S}{n + n_1}$$

N_1 = No. of new shares offered

Valuation of Preference Shares

Preference shares, like debentures, are usually subject to fixed rate of dividend. In case of non-redeemable preference shares, their valuation is similar to perpetual bonds.



Formula for Valuation of Redeemable Preference Share

$$= \frac{\text{Dividend}_1}{(1+r)^1} + \frac{\text{Dividend}_2}{(1+r)^2} + \ldots\ldots\ldots + \frac{(\text{Dividend}_n + \text{Maturity value})}{(1+r)^n}$$

Formula for Valuation of Irredeemable Preference Share

$$\text{Irredeemable Preference share value} = \frac{\text{Dividend}}{\text{Required return on Preference share}}$$

Bond Duration

Duration is nothing but the average time taken by an investor to collect his/her investment. If an investor receives a part of his/her investment over the time on specific intervals before maturity, the investment will offer him the duration which would be lesser than the maturity of the instrument. Higher the coupon rate, lesser would be the duration.

(a) Macaulay Duration

$$\text{Macaulay Duration} = \frac{\sum_{t=1}^{n} \frac{t * C}{(1+i)^t} + \frac{n * M}{(1+i)^n}}{P}$$

Where

n = Number of cash flows
t = Time to maturity
C = Cash flows
i = Required yield (YTM)
M = Maturity (par) value
P = Bond price

(b) Modified Duration

This is a modified version of Macaulay duration which takes into account the interest rate changes because the changes in interest rates affect duration as the yield gets affected each time the interest rate varies.

The formula for modified duration is as follows:

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration}}{\left(1 + \frac{\text{YTM}}{n}\right)} \right]$$

Where
n = Number of compounding periods per year
YTM= Yield to Maturity

Change in Bond Price = % Change in Interest × (-) Modified Duration

Enterprise Value
EV = Market Value of Equity + Market Value of Preferred Equity + Market Value of Debt + Minority Interest - Cash and Investments.

Convexity Adjustment

Although, the duration is a good approximation of the percentage of price change for a small change in interest rate but the change cannot be estimated so accurately due to convexity effect. This estimation can be improved by adjustment on account of 'convexity'. The formula for convexity is as follows:

$C^* \times (\Delta y)^2 \times 100$

Δy = Change in Yield

$$C^* = \frac{V_+ + V_- - 2V_0}{2V_0(\Delta^2)}$$

V_0 = Initial Price

V_+ = price of Bond if yield increases by Δy

V_- = price of Bond if yield decreases by Δy

Other Formulas

Current Yield = $\frac{Interest}{Price} \times 100$

Realised Yield = $\sqrt[n]{\frac{\sum(interest + residual\ value)}{Price}} - 1$

Yield to Maturity (YTM)

(Approximate) YTM = $\frac{Interest + \frac{(Residual\ value - Price)}{n}}{\frac{(Residual\ value + Price)}{2}}$

(Accurate Method) YTM: Trial & Error Method (IRR Technique)

Forward Rates

$(1 + YTM)^2 = (1 + r1)\ (1 + r2)$

$(1 + YTM)^3 = (1 + r1)\ (1 + r2)\ (1 + r3)$

Economic Value Added (EVA)

EVA = NOPAT - Capital Employed × WACC

NOPAT = EBIT (1 - t) = PAT + Interest (1 - t)

Capital Employed = D + E + P (Book values)

Convertible Bonds

Conversion Ratio:
The number of shares each convertible bond converts into. It may be expressed per bond.

Conversion Value
CV = Market price per common share x Conversion ratio

Conversion Premium:
The amount by which the price of a convertible security exceeds the current market value of the common stock into which it may be converted.
CP = Market price of Convertible Bond−Conversion Value
CP = MP – CV

Conversion Premium Ratio:
Ratio which shows at what premium the convertible bond is trading in the market. Conversion Premium Ratio= $\frac{Market\ Value}{Conversion\ Value}$ - 1

Straight Value of the Bond:
It is the price where the bond would trade if it were not convertible to stock. Its then is equivalent to non-convertible bond.

Minimum Value of the Convertible Bond:
A convertible bond should at the lowest trade at the higher of either the conversion value or straight value.

Downside Risk:
Downside risk is the % premium over the straight value of the bond.
DR (%) = $(\frac{Market\ Price}{Straight\ Value} - 1) \times 100$

Conversion Parity Price or Market Conversion Price:
Price at which the investor will neither gain nor lose on buying the bond and exercising it.
CPP = $\frac{Market\ price}{No.of\ share} \times 100$

Favourable Income Differential Per Share
It represents extra income earned in Bond over dividend income in shares.
FID = $\frac{Interest\ from\ Bond—(Dividend\ from\ Equity\ x\ CR)}{\text{Conversion Ratio}}$

Premium Payback Period:
It represents the time in which we recover premium paid (to purchase the Convertible Bond) using extra income of interest. PPP= $\frac{\text{Conversion Premium}}{\text{Favourable Income Differential}}$

Chapter 5: Portfolio Management

Portfolio Evaluation

Sharpe Ratio - Measures the Risk Premium per unit of Total Risk for a security or a portfolio of securities.

Formula

$$\frac{R_i - R_f}{\sigma_i}$$

Where
R_i = Expected return on stock i
R_f = Return on a risk less asset
σ_i = Standard Deviation of the rates of return for the i Security or Portfolio

Treynor Ratio - Measures the Risk Premium per unit of Systematic Risk (β) for a security or a portfolio of securities.

Formula

$$\frac{R_i \quad R_f}{\hat{a}}$$

Where
R_i = Expected return on stock i
R_f = Return on a risk less asset
β_i = Expected change in the rate of return on stock i associated with one unit change in the market return (Beta)

Jensen Alpha - This is the difference between a portfolio's actual return and those that could be expected in line with systematic risk of a security or portfolio using CAPM. Hence, purely a reward for bearing market risk.

Calculation of Expected Return

The expected return of the investment is the probability weighted average of all the possible returns. If the possible returns are denoted by X_i and the related probabilities are $p(X_i)$ the expected return may be represented as X and can be calculated as:

$$\overline{X} = \sum_{i=1}^{n} x_i \, p(X_i)$$

It is the sum of the products of possible returns with their respective probabilities.

Measurement of Risk

Risk aspect should also be considered along with the expected return. The most popular measure of risk is the variance or standard deviation of the probability distribution of possible returns.

Variance of each security is generally denoted by σ^2 and is calculated by using the following formula:

$$\sum_{i=1}^{n} [(X_i - \overline{X})^2 \, p(X_i)]$$

Risk for single security = $\sigma = \sqrt{\frac{\sum(X-\overline{x})}{N}}$

Measurement of Systematic Risk

The systematic risk of a security is measured by a statistical measure which is called Beta (β). There are two statistical methods i.e. correlation method and the regression method, which can be used for the calculation of Beta.

Correlation Method: Using this method beta (β) can be calculated from the historical data of returns by the following formula:

$$\beta_i = \frac{r_{im}\sigma_i\sigma_m}{\sigma_m^2}$$

Where

r_{im} = Correlation coefficient between the returns of the stock i and the returns of the market index.

σ_i = Standard deviation of returns of stock i

σ_m = Standard deviation of returns of the market index.

σ^2_m = Variance of the market returns

Regression Method: The regression model is based on the postulation that there exists a linear relationship between a dependent variable and an independent variable. The model helps to calculate the values of two constants, namely Alfa (α) and Beta (β). The formula of the regression equation is as follows:

$Y = \alpha + \beta X$

where

Y = Dependent variable
X = Independent variable
α and β are constants.

$\alpha = Y - \beta X$

The formula used for the calculation of α and β are given below.

$$\beta = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 \quad (\sum X)^2}$$

where

n = Number of items.

Y = Dependent variable scores.

X = Independent variable scores.

Portfolio Risk

Two important terms associated with the computation of Risk of Portfolio are as follows:

(i) **Covariance:** A statistical measure between two securities or two portfolios or a security and a portfolio indicates how the rates of return for the two concerned entities behave relative to each other.

The covariance between two securities A and B can be calculated using the following formula:

$$COV_{AB} = \frac{\sum [R_A - \overline{R_A}][R_B - \overline{R_B}]}{N}$$

At the beginning please add the summation sign in the numerator where

COV_{AB} = Covariance between x and y.

R_A = Return of security x.

R_B = Return of security y.

$\overline{R_A}$ = Expected or mean return of security x.

$\overline{R_B}$ = Expected or mean return of security y.

N = Number of observations.

(ii) **Coefficient of Correlation:** A statistical measure between two securities or two portfolios or a security and a portfolio indicate degree of relationship with each other.

The coefficient of correlation between two securities A and B can be calculated using the following formula:

$$r_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B}$$

where

r_{AB} = Coefficient of correlation between x and y.

Cov_{AB} = Covariance between A and B.

σ_A= Standard deviation of A.

σ_B = Standard deviation of B.

From above formula the covariance can be expressed as the product of correlation between the securities and the standard deviation of each of the securities as shown below:

$Cov_{AB} = \sigma_A \sigma_B r_{AB}$

The variance of a portfolio with only two securities in it can be calculated with the following formula.

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\,\sigma_1\sigma_2)$$

Corelation = $r_{xy} = \frac{Covariance_{xy}}{\sigma_x\sigma_y}$

Covariance = $\sum\frac{(x-\bar{x})(y-\bar{y})}{N} = r_{xy}\sigma_x\sigma_y = \beta_x\beta_y{\sigma_M}^2$

Beta = $\beta = r_{xm} \times \frac{\sigma_x}{\sigma_m} = \frac{Covariance_{xm}}{\sigma_M^2}$

Systematic risk = $r^2 \times \sigma_x^2 = \beta^2 \times \sigma_m^2$

Unsystematic risk = $\sigma_x^2 - Systematic\ risk$

Characteristic line: X = $\alpha + \beta_m$

Security Market line: CAPM $K_e = R_f + (R_m - R_f) \times \beta$

Capital Market line: $K_e = R_f + (R_m - R_f) \times \frac{\sigma_x}{\sigma_m}$

Minimum Variance portfolio: Wx = $\frac{\sigma_y^2 - Covariance_{xy}}{\sigma_x^2 + \sigma_y^2 - 2\,Covariance_{xy}}$

Sharpe's Optimal Portfolio

1. Calculate $\frac{(R_x - R_f)}{\beta_x}$

2. Rank Securities in **Descending Order** of the above ratio

3. Cut-Off Point = $\frac{\sigma_m^2 \times cumulative\ \{\frac{(R_x - R_f)}{E_x^2} \times \beta\}}{1 + \sigma_m^2 \times cumulative\ \frac{\beta^2}{E_x^2}}$

4. Select Securities up to the Highest Cut-Off

5. Optimal Portfolio

Wx = $\frac{Z_x}{Z_x + Z_y + Z_z \ldots..}$ [For Selected Securities]

Where: Zx = $\frac{\beta^2}{E_x^2} \times [\frac{(R_x - R_f)}{\beta_x}$ - Final Cut-Off Point]

Constant Proportion Portfolio Insurance Policy

Equity Value = Multiplier x [Portfolio Value - Floor Value]

Capital Asset Pricing Model (CAPM)

CAPM model describes the linear relationship risk-return trade-off for securities/portfolios. The CAPM method also is solely concerned with non-diversifiable risk.

The non-diversifiable risks are assessed in terms of beta coefficient, β, through fitting regression equation between return of a security/portfolio and the return on a market portfolio.

$$Rj = Rf + \beta (Rm - Rf)$$

Where,

R_f = Risk free rate

R_m= Market Rate

β= Beta of Portfolio

Arbitrage Pricing Theory Model (APT)

Unlike the CAPM which is a single factor model, the APT is a multi-factor model having a whole set of Beta Values – one for each factor. Arbitrage Pricing Theory states that the expected return on an investment is dependent upon how that investment reacts to a set of individual macro-economic factors (degree of reaction measured by the Betas) and the risk premium associated with each of those macro – economic factors.

According to CAPM, $E(R_i) = R_f + \lambda\beta_i$

Where, λ is the average risk premium $[E(R_m) - R_f]$

In APT, $E(R_i) = R_f + \lambda_1\beta_{i_1} + \lambda_2\beta_{i_2} + \lambda_3\beta_{i_3} + \lambda_4\beta_{i_4}$

Where, $\lambda_1, \lambda_2, \lambda_3, \lambda_4$ are average risk premium for each of the four factors in the model and $\beta_{i_1}, \beta_{i_2}, \beta_{i_3}, \beta_{i_4}$ are measures of sensitivity of the particular security i to each of the four factors.

Chapter 7: Mutual Funds

Front end load = $\frac{IPO\ Price - NAV}{NAV}$

Back-end load = $\frac{Redemption\ Price - NAV}{NAV}$

Return required = $\frac{Income}{(1 - Initial\ expense)} + Recurring\ expense$

Chapter 8: Derivatives

Black Scholes Model

The original formula for calculating the theoretical option price (OP) is as follows:

$$OP = SN(d_1) - Xe^{-rt}N(d_2)$$

Where:

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{v^2}{2}\right)t}{v\sqrt{t}}$$

$$d_2 = d_1 - v\sqrt{t}$$

The variables are:

S	= *current stock price*
X	= *strike price of the option*
t	= time remaining until expiration, expressed as a percent of a year
r	= current continuously compounded risk-free interest rate
v	= annual volatility of stock price (the standard deviation of the short-term returns over one year).
ln	= natural logarithm
N(x)	= standard normal cumulative distribution function
e	= the exponential function

Theoretical Futures Price [Cost of Carry]

Annual compounding: F = S + Cost of Carry – PV Of Dividend

Continuous Compounding: F = S × $e^{(r-d)}$

Commodity Derivatives: F = S + Cost of Carry + PV of Storage Cost – PV of Convenience Yield

Index Futures Hedging (Nifty Futures)

Number of Contracts = $\frac{Underlying\ portfolio \times \beta}{Contract\ size}$

Binomial Model

$$\text{Option Value} = \frac{C_u x\ p + C_d x\ (1-p)}{(1+r)}$$

Where,

P is the probability of price moving upwards

r is the risk free rate of interest

t is the time interval

C_u is the options value at upper level

C_d is the options value at lower level

Also, P can be calculated using this formula

$$p = \frac{(1+r)-d}{u-d}$$

Where,

$$u = \frac{\text{stock price at upper level}}{\text{spot price}},$$

$$d = \frac{\text{stock price at lower level}}{\text{spot price}}$$

or,

u= volatility of price moving upwards,

d= volatility of price moving downwards.

Risk Neutral Method

$$\text{Spot Price} = \frac{\text{Stock Price at upper level x p+Stock Price at lower level x(1-p)}}{1+r}$$

$$\text{Spot Price} = \frac{Su\ x\ p + Sd\ x(1-p)}{1+r}$$

Where,

S_u is the Stock Price at upper level

S_d is the Stock Price at lower level

Chapter 9: Foreign Exchange Exposure and Risk Management

Interest Rate Parity (IRP)

This theory which states that "the size of the forward premium (or discount) should be equal to the interest rate differential between the two countries of concern". When interest rate parity exists, covered interest arbitrage (means foreign exchange risk is covered) is not feasible, because any interest rate advantage in the foreign country will be offset by the discount on the forward rate.

As per Interest Rate Parity the forward rate can be found as follows:

$$F = \frac{S(1+r_D)}{(1+r_F)}$$

Where,

F = Expected forward rate

S = Spot Rate

r_D = Interest Rate of Domestic Country

r_F = Interest Rate of Foreign Country

Purchasing Power Parity (PPP)

As per Purchasing Power Parity the forward rate can be found as follows:

$$F = \frac{S(1+i_D)}{(1+i_F)}$$

Where,

F = Expected forward rate

S = Spot Rate

i_D = Anticipated Inflation Rate of Domestic Country

r_F = Anticipated Inflation Rate of Foreign Country

International Fisher Effect (IFE)

According to this theory, 'nominal risk-free interest rates contain a real rate of return and anticipated inflation.' This means if investors of all countries require the same real return, interest rate differentials between countries may be the result of differential in expected inflation.

Accordingly, the Nominal Risk- Free Rate of Interest can be computed as follows:

(1 + Nominal Rate) = (1 + Real Rate) (1 + Anticipated Inflation Rate)

Chapter 12: Corporate Valuation

Valuation of a Private Company

1) Find the equity beta (levered beta) for a comparable listed company.

2) Find unlevered beta for the comparable company.
Unlevered Beta = β_{Asset}
Levered Beta = β_{Equity}

$$(\beta_{Asset}) = \beta_{debt} \times \left(\frac{Debt\ (1-tax)}{Debt\ (1-tax)+Equity}\right) + \beta_{Equity} \times \left(\frac{Equity}{Debt\ (1-tax)+Equity}\right)$$

In absence of information, β_{debt} would be taken as NIL.

3) The comparable company (listed) and our private company operate in the same business and hence they should have the same business risk. Therefore, the unlevered beta can be assumed to remain the same.

Valuation Using Yield Method

Value per equity share can be calculated as:

$$\frac{Actual\ Yield}{Expected\ Yield} \times \text{Paid-up value per share}$$

$$\text{Actual Yield} = \frac{Yield\ (Profit) on\ equity\ shares}{Paid-up\ Equity\ Share\ Capital} \times 100$$

Other Methods

1. Economic Value Added

EVA = NOPAT – (Invested Capital * WACC)
Or
EVA = NOPAT – Capital Charge

2. Market Value Added

MVA = Market Value – Book Value

3. Shareholders Value Analysis

Steps involved in SVA computation:

1. Arrive at the Future Cash Flows (FCFs) by using mix of the 'value drivers'
2. Discount these FCF using WACC
3. Add the terminal value to the present values computed in step (b)