

STRATEGIC FINANCIAL MANAGEMENT
CONCEPTS & FORMULAE BOOKLET



GLOBAL CMA

INDEX

S.No.	TOPIC	Page No.
1.	MERGERS & ACQUISITION	3
2.	DIVIDEND POLICY	8
3.	BOND VALUATION	14
4.	MUTUAL FUNDS	21
5.	PORTFOLIO MANAGEMENT	22
6.	DERIVATIVES - FUTURES	33
7.	DERIVATIVES - OPTIONS	36
8.	VALUATION OF BUSINESS	46
9.	LEASING	49
10.	CAPITAL BUDGETING	52
11.	FOREIGN EXCHANGE	59
12.	MISCELLANEOUS	69

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MERGER AND ACQUISITION

➔ For our analysis we will assume Acquiring Company as A Ltd and Target Company as B Ltd .

SHARE EXCHANGE RATIO :

➔ Share Exchange Ratio is the number of shares that the acquiring firm is willing to issue for each share of the target firm .

➔ **Example:** Exchange Ratio of .50 means that the acquiring firm is willing to give .50 share for every share of target firm.

➔ There are different method for calculation of Share Exchange Ratio :

$$(a) \text{ Based on EPS : } \quad \text{Share Exchange Ratio} = \frac{\text{EPS of target firm}}{\text{EPS of acquiring firm}}$$

$$(b) \text{ Based on MPS : } \quad \text{Share Exchange Ratio} = \frac{\text{MPS of target firm}}{\text{MPS of acquiring firm}}$$

$$(c) \text{ Based on Book Value : } \quad \text{Share Exchange Ratio} = \frac{\text{Book Value Per Share of Target Firm}}{\text{Book Value Per Share of Acquiring Firm}}$$

Note: If question is silent, always take either EPS or MPS as base depending upon the requirement or framing of question.

MINIMUM AND MAXIMUM EXCHANGE RATIO :

Firm A will calculate Maximum Exchange Ratio. Firm B will calculate Minimum Exchange Ratio

If Decision is based on EPS :

For A Ltd : Maximum Exchange Ratio (i.e the Exchange Ratio at which EPS of Firm 's A shareholder before and after merger will be same)

$$\text{EPS Before Merger} = \text{EPS after Merger} \Rightarrow \text{EPS}_A = \frac{E_A + E_B + \text{Synergy}}{N_A + N_B \times \text{ER}}$$

Now by solving the above equation keeping Exchange Ratio constant we can find maximum exchange ratio.

For B Ltd : Minimum Exchange Ratio (i.e the Exchange ratio at which EPS of Firm 's B shareholder before & after merger will be same)

$$\text{EPS Before Merger} = \text{Equivalent EPS after Merger} \Rightarrow \text{EPS}_B = \frac{E_A + E_B + \text{Synergy}}{N_A + N_B \times \text{ER}} \times \text{ER}$$

Now by solving the above equation keeping Exchange Ratio constant we can find minimum exchange ratio.

If Decision is based on MPS [if P/E Ratio after Merger for A Ltd is given or any hint in the question is given regarding this] :

For A Ltd : Maximum Exchange Ratio (i.e the Exchange Ratio at which MPS of Firm 's A shareholder before and after merger will be same)

Every minute you spend in planning saves 10 minutes in execution; this gives you a 1,000 percent Return on Energy! Obstacles are those frightful things you see when you take your eyes off the goal.

Market Value Of Preference Shares issued to various party	xxx
Payment of Current Liability	xxx
Payment of Unrecorded/ Contingent Liabilities	xxx
Any other expenses paid	xxx
Less : Sale proceeds from sale of assets not required in business	(xxx)
Less : Cash in hand and bank received	(xxx)
Cost Of Acquisition	xxx

Note : Current Liability must be paid even if question is silent

Note : Sale of Asset is to be taken only if question requires and the asset is not required in business .

Note : Cash is to be deducted even if question is silent .

COST AND BENEFIT OF MERGER

When compensation is paid in Cash :

For A Ltd :

Cost or Apparent Cost = Cash Paid - Value Of B received

Benefit or Synergy = Combined Value of A & B After Merger - [Value Of A Before Merger + Value of B Before Merger]

Net Benefit or NPV = Benefit - Cost

For B Ltd :

Net Benefit or NPV = Cash Received - Value of B Sacrificed

When compensation is paid in Shares :

For A Ltd :

Cost or True Cost = Value of shares given – Value Of B Received = $\alpha \times$ Combined Value Of A & B – Value Of B received

Where α represents the % share of B Ltd. in merged firm .

Benefit or Synergy = Combined Value of A & B After Merger - [Value Of A Before Merger + Value of B Before Merger]

Net Benefit or NPV = Benefit - Cost

For B Ltd :

Net Benefit or NPV = Value of shares received – Value Of B sacrificed = $\alpha \times$ Combined Value Of A & B – Value Of B sacrificed.

Note : It can be seen from the above that the Benefit of merger from the point of view of B Ltd is Cost from the point of view of A Ltd.

Note : For B Ltd. we generally calculate Net Benefit and not cost and benefit separately .

Note : If question is silent we always calculate Cost & Benefit for A Ltd.

DEFERRED PAYMENT PLAN

Under this plan the firm do not issue entire equity share at the time of acquisition. Additional number of equity shares are issued by the firm depending upon the firm future earnings in excess of base period earnings.

Additional number of Equity Shares should be calculated by using the following relation :

Success is 20% skills and 80% strategy. You might know how to read, but more importantly, what's your plan to read? "Taking a new step. . . is what people fear most."

$$\frac{\text{Excess Earning Of Target Firm after Merger over Base Period Earning} \times \text{P/E Ratio Of Acquiring Firm}}{\text{Market Price Per Share of Acquiring Firm}}$$

PURCHASE PRICE PREMIUM

$$\text{Purchase Price Premium} = \frac{\text{Offer Price to B Ltd.} - \text{MPS Of BLtd Before Merger}}{\text{MPS Of BLtd Before Merger}}$$

COMPONENTS OF MARKET PRICE PER SHARE :

$$\text{Market Price Per Share(MPS)} = \text{Earning Per Share (EPS)} \times \text{Price Earning Ratio (PE Ratio)}$$

$$= \frac{\text{Earning After Tax}}{\text{No. of Equity Share}} \times \frac{\text{Market Price Per Share}}{\text{Earnings Per Share}}$$

$$\text{Return on Equity(ROE)} \times \text{Book Value / Intrinsic Value Per Share}$$

$$= \frac{\text{Earning After Tax}}{\text{Equity Shareholder's Fund}} \times \frac{\text{Equity Share holder's Fund}}{\text{No. of Equity Shares}}$$

Where Equity Shareholder's Fund = Equity Share Capital + Reserves - P/L account (Dr.)

SYNERGY GAIN

If Combined Value of companies after merger is greater than sum of the individual company .The extra value is known as Synergy Gain .

Merger Gain or Synergy Based On Earnings = Total Combined Earning Of Merged Firm - [Earning Of A + Earning Of B]

Merger Gain or Synergy Based On Market Value

= Total Combined Market Value Of Merged Firm - [Market Value Of A + Market Value Of B]

EPS A+B WHEN SYNERGY IS EXPRESSED IN %

$$\text{EPS}_{A+B} = \left[\frac{(\text{Earning}_A + \text{Earning}_B) (1 + \text{Synergy Gain})}{N_A + N_B \times \text{ER}} \right]$$

EPS A+B WHEN SYNERGY IS EXPRESSED IN AMOUNT

$$\text{EPS}_{A+B} = \left[\frac{(\text{Earning}_A + \text{Earning}_B + \text{Synergy Gain})}{N_A + N_B \times \text{ER}} \right]$$

EPS A+B WHEN CASH IS PAID OUT OF BORROWED MONEY

"Do not wait;the time will never be 'just right.' Start where u stand, & work with whatever tools u may have at ur command,& better tools will be found as u go along."

$$EPS_{A+B} = \frac{(\text{Earning}_A + \text{Earning}_B - \text{Borrowed Amount} \times \text{Interest Rate} \times (1 - \text{Tax Rate}))}{N_A}$$

EPS A+B WHEN CASH IS PAID OUT OF BUSINESS MONEY

$$EPS_{A+B} = \frac{(\text{Earning}_A + \text{Earning}_B - \text{Cash Paid} \times \text{Opportunity Cost Of Interest} \times (1 - \text{Tax}))}{N_A}$$

EPS A+B AFTER ONE YEAR WHEN GROWTH RATE IS USED

$$EPS_{A+B} = \frac{(E_A + E_B)(1 + g_{A+B})}{N_A + N_B \times ER} \quad \text{Where, } g_{A+B} = g_A \times \frac{E_A}{E_A + E_B} + g_B \times \frac{E_B}{E_A + E_B}$$

MPS A+B IN CASE OF CASH TAKEOVER

$$MPS \text{ After Merger} = \frac{\text{Market Value of A} + \text{Market Value of B} + \text{Synergic Benefit} - \text{Cash Payment}}{\text{No. of shares of A}}$$

EFFICIENT MARKET HYPOTHESIS/DIFFERENT FORMS OF MARKET

Every investor would strive to make use of market information to improve his earnings or minimize his loss potential. This notion is at the heart of the Efficient Market Hypothesis

Based on different information sets, there are three forms of Market Efficiency or three forms of Market :

Weak Form Efficiency/Market : Market Price is reflected only by historical / past information .

Semi Strong Form Efficiency/Market : Market Price is reflected by both Past and Public information

Strong Form Efficiency/Market : Market Price is reflected by Past, Public as well as Private Information .

TWO-TIER TENDER OFFER

A two-tier tender offer is an offer to purchase a sufficient number of stockholders' shares so as to gain effective control of a firm at a certain price per share, followed by a lower offer at a later date for the remaining shares. For example, an investor may offer \$50 per share for up to 51% of a firm's outstanding stock and then, having gained control, offer \$40 for each of the remaining shares.

DEMERGER

A corporate strategy to sell off subsidiaries or divisions of a company. The act of splitting off a part of an existing company to become a new company, which operates completely separate from the original company.

LEVERAGED BUYOUTS

→ **Meaning** : A **Leveraged buy-out (LBO)** is an acquisition of a company in which the acquisition is substantially financed through debt. Typically in the LBO 90% or more of the purchase price is financed with debt.

Now is the only time there is. Make your now wow, your minutes miracles, & your days pay. Your life will have been magnificently lived & invested, & when you die you will have made a difference

DIVIDEND

EXPRESSION OF DIVIDEND :

Dividend may be expressed in the following manner :

- (i) Dividend Rate = $\frac{\text{Dividend Per Share}}{\text{Face Value}} \times 100$
- (ii) Dividend Yield (Return) = $\frac{\text{Dividend Per Share}}{\text{Market Price Per Share}} \times 100$
- (iii) Dividend Payout Ratio = $\frac{\text{Dividend Per Share}}{\text{Earning Per Share}} \times 100$

Note: Dividend must be paid to preference share holders before any declaration of dividend to equity shareholders.

Note: Dividend is always paid on face value of share and not market price .

WALTER'S MODEL

➔ **Symbolically :** $P_0 = \frac{\text{DPS}}{K_e} + \frac{\frac{r}{K_e} (\text{EPS} - \text{DPS})}{K_e}$ Where,

P_0 = Current Market Price Per Share Ex-Dividends; DPS = Dividend Per Share;

K_e = Cost of Equity ;

r = Rate of Return / Internal Rate of Return (IRR) / Return on Equity (ROE) / Return on Investment

$\text{EPS} - \text{DPS}$ = Retained Earning Per Share

OPTIMUM DIVIDEND AS PER WALTER'S MODEL (ALL OR NOTHING APPROACH) :

➔ Walter suggested that optimum dividend payout or optimum retention ratio depends on the relationship of K_e & r

<u>Nature of Firm</u>	<u>Relationship</u>	<u>Optimum Dividend Payout</u>	<u>Optimum Retention Ratio</u>
Growth Company	$K_e < r$	0%	100%
Declining Company	$K_e > r$	100%	0 %
Normal Company	$K_e = r$	Indifferent	Indifferent

GORDON GROWTH'S MODEL/DIVIDEND DISCOUNT MODEL

➔ **Symbolically :** $P_0 = \frac{\text{DPS}_1}{K_e - g}$ or $P_0 = \frac{\text{DPS}_0 (1 + g)}{K_e - g}$ or $P_0 = \frac{\text{EPS}_1 (1 - b)}{K_e - g}$

DPS_1 = DPS next year / Dividend to be paid / Expected Dividend

DPS_0 = DPS of current year / Dividend just paid / DPS as on today / Last Year Dividend / Dividend Recently Paid

EPS_1 = Earning Per Share of next year or at the end of the year

MPS_1 = MPS at the end of the year ; K_e = Cost of Equity for shareholders

Start living now. Stop saving the good thing for that special occasion. Stop withholding your love until that special event materializes. Every day you are alive is a special occasion. Every minute, every breath, is a gift from God.

Po	=	Current Market Price Per Share Ex-Dividends, g = Growth rate of dividend = b × r
b	=	Retention Ratio (%)
r	=	Rate of Return / Internal Rate of Return (IRR) / Return on Equity (ROE) / Return on Investment
(1-b)	=	Dividend Payout Ratio.

OPTIMUM DIVIDEND AS PER GROWTH MODEL (ALL OR NOTHING APPROACH)

<u>Nature of Firm</u>	<u>Relationship</u>	<u>Optimum Dividend Payout</u>	<u>Optimum Retention Ratio</u>
Growth Company	Ke < r	0%	100%
Declining Company	Ke > r	100%	0 %
Normal Company	Ke = r	Indifferent	Indifferent

GRAHAM & DODD MODEL

$$P_0 = m \times \left(D + \frac{E}{3} \right)$$

Where, P₀ = Current Market Price Per Share Ex-Dividend, m = multiplier, D = Dividend Per Share, E = Earning Per Share

LINTER'S MODEL (CORPORATE DIVIDEND BEHAVIOUR MODEL)

➔ **Symbolically :-** $D_1 = D_0 + [(EPS_1 \times \text{Target Dividend Payout Ratio}) - D_0] \times AF$

Where D₁ = Dividend to be declared in current year ; D₀ = Dividend in previous year or Dividend paid ; AF = Adjustment Factor / Speed of Adjustment / % increase in Dividend which can be maintained in future

IRRELEVANCE THEORY : MODIGLIANI-MILLER (MM) MODEL

➔ **Symbolically :** Current Value of the firm taking investment budget and earning into consideration is given by :

$$n P_0 = \frac{(n + m) P_1 + E_1 - I_1}{1 + K_e} \quad \text{Where,}$$

P₀ = Current or Prevailing Market Price Ex-Dividend ; P₁ = Year end Market Price Ex- Dividend ;

I₁ = Total Investment made at year end ; E₁ = Total Earning at the end of the year ;

K_e = Cost of Equity ; n = Present / Existing Number of Equity Shares ;

m = Additional or New Number of Equity Shares issued at year end at year end market price

nP₀ = Market Value of all existing shares in beginning of year/ Market Value of the firm as on today

➔ **Other useful relation in respect of MM Approach are :**

(a) Current Market Price of the share in the absence of Investment & Earning is given by :

$$P_0 = \frac{D_1 + P_1}{(1 + K_e)^1} \quad \text{This formula is normally used in calculating } P_1 \text{ i.e MPS at the end of the year 1}$$

(b) Number of new equity shares to be issued by the company for Investment purpose is given by :

$$m = \frac{\text{Investment}_1 - [\text{Earning}_1 - n \times \text{DPS}_1]}{\text{Market price at the end } (P_1)}$$

I met money and said why everyone runs behind you, you are just a piece of paper. Money smiled and said of course I am just a piece of paper, but I haven't seen a dustbin yet in my whole life.

(c) Market Value of the firm at the end is given by :

Market Price Per Share at the end \times Total Number Of Equity Share at the end = $P_1 \times (n + m)$

PRESENT VALUE OF GROWTH OPPORTUNITY (PVGO)

Present Value of Growth Opportunity = Price of the Share with Growth – Price of the Share without Growth

$$\Rightarrow \text{Present Value of Growth Opportunity} = \frac{D_0 (1 + g)}{K_e - g} - \frac{\text{EPS}}{K_e}$$

OVERVALUED & UNDERVALUED SHARES:-

When Current Market Price and Theoretical Market Price i.e price which we calculate by applying present value concept are not same we will undertake following decision :

<u>Case</u>	<u>Valuation</u>	<u>Decision</u>
If Currenty Market Price > Present Value Market Price	Overvalued	Sell
If Currenty Market Price < Present Value Market Price	Undervalued	Buy
If Currenty Market Price = Present Value Market Price	Correctly Valued	Hold

APPLICATION OF PRICE/EARNING (P/E) RATIO

$$\text{Price Earning Ratio} = \frac{\text{MPS}}{\text{EPS}} ; K_e = \frac{1}{\text{P/E Ratio}}$$

VALUE OF DECLINING FIRM OR WHEN GROWTH RATE IS NEGATIVE

Market Price Per Share of a firm whose dividend is declining at a constant rate p.a forever is given by

$$P_0 = \frac{D_0(1 - g)}{K_e + g}$$

CALCULATION OF HOLDING PERIOD RETURN (HPR)

$$\text{Holding Period Return or Total Yield} = \frac{D_1 + (P_1 - P_0)}{P_0} = \frac{D_1}{P_0} + \frac{P_1 - P_0}{P_0} = \text{Dividend Yield} + \text{Capital Gain Yield}$$

PRICE AT THE END OF VARIOUS PERIOD

$$P_0 = \frac{D_1 + P_1}{(1 + K_e)^1} ; \quad P_1 = \frac{D_2 + P_2}{(1 + K_e)^1} ; \quad P_2 = \frac{D_3 + P_3}{(1 + K_e)^1} ; \quad P_3 = \frac{D_4 + P_4}{(1 + K_e)^1}$$

.....accordingly price at the end year each year can be computed .

UNEQUAL GROWTH RATE

Dividend Growth Model cannot be applied directly in case dividend is not growing at a constant rate from year 1 onwards

Death is more universal than life; everyone dies but not everyone lives.

You have to put in many, many tiny efforts that nobody sees or appreciates before you achieve anything worthwhile

In such case we will modify Dividend Growth Model and calculate Current Market Price in the following manner :
 P_0 [Assuming Dividend is growing constantly from year 4 onwards]

$$= \frac{D_1}{1 + Ke} + \frac{D_2}{(1 + Ke)^2} + \frac{D_3}{(1 + Ke)^3} + \frac{D_4}{(1 + Ke)^4} + \frac{D_4(1 + g)}{Ke - g} \times \frac{1}{(1 + Ke)^4}$$

DETERMINATION OF GROWTH RATE

Assuming growth rate to be constant , we can find the growth rate by using any of the following two relation :

(a) $g = b \times r$

(b) $D_n = D_0(1 + g)^{n-1}$ Where D_0 = Base Year Dividend ; D_n = Latest Year Dividend ; n = number of year. Putting the values of D_n , D_0 and n in the above equation we may find growth rate .

BOOK VALUE PER SHARE (BVPS)

$$\text{Book Value Per Share (BVPS)} = \frac{\text{Total Equity Shareholder's Fund}}{\text{Total Number Of Equity Share}}$$

RETURN ON EQUITY (ROE)

$$\text{Return On Equity (ROE) (r)} = \frac{\text{Total Earnings of the Firm For Equity Shareholder}}{\text{Total Equity Shareholder's Fund}} \times 100$$

Note : $\text{EPS} = \text{Book Value Per Share} \times \text{Return on Equity}$ or $\text{EPS} = \text{BVPS} \times \text{ROE}$

EARNING YIELD

$$\text{Earning Yield} = \left[\frac{\text{Earnings Per Share}}{\text{Market Price Per Share}} \right] \times 100$$

EARNING PER SHARE (EPS)

$$\text{Earning Per Share (EPS)} = \frac{\text{Total Earning Available To Equity Shareholder}}{\text{Total Number of Equity Share}}$$

DIVIDEND PER SHARE (DPS)

$$\text{Dividend Per Share (DPS)} = \frac{\text{Total Dividend Paid To Equity Shareholder}}{\text{Total Number of Equity Share}}$$

MARKET PRICE PER SHARE (MPS)

To lose patience is to lose the battle. Every sunset gives us one day less to live! But every sunrise give us, one day more to hope! So, hope for the best. Good Day & Good Luck! The journey is the reward.

$$\text{Market Price Per Share (MPS)} = \frac{\text{Total Market Value / Market Capitalization / Market Cap}}{\text{Total Number of Equity Share}}$$

RETENTION RATIO

$$\text{Retention Ratio} = \left[\frac{\text{EPS} - \text{DPS}}{\text{EPS}} \right] \times 100 = \left[\frac{\text{Retained Earnings Per Share}}{\text{EPS}} \right] \times 100$$

DETERMINATION OF PE RATIO WHICH WILL NOT EFFECT MARKET VALUE ?

Example : What should be P/E ratio at which dividend pay-out ratio will have no effect on the value of the share if $r = 8\%$?

If $r = K_e$, then the Dividend Payout Ratio (D/P Ratio) does not affect the price or value of the share. Here we have $r = 8\%$. Hence K_e should also be 8% .

$$\text{Now we know that, } K_e = \frac{1}{\text{P/E Ratio}} \Rightarrow .08 = \frac{1}{\text{P/E Ratio}} \Rightarrow \text{P/E Ratio} = 12.5 \text{ times}$$

DATES WITH DIVIDEND :

Dates relating to dividend in sequence of events are as follows :

1. Declaration Date :
2. Last cum-Dividend Date :
3. Ex- Dividend Date :
4. Record Date :
5. Payment Date :

CONCEPT OF MAXIMUM DIVIDEND

Maximum Dividend is the amount of Retained Earning or Cash Available which ever is lower.

CONSTANT DIVIDEND AMOUNT APPROACH :

➔ Under this model, a fixed amount of dividend is paid each year irrespective of the earnings.

➔ There would be no reduction in dividend even during the period of losses.

➔ **Example :** Assume Contant Dividend Amount = Rs. 4

Year	1	2	3	4	5
EPS	10	25	45	2	-7
DPS	4	4	4	4	4

➔ **Symbolically :** $P_0 = \frac{\text{DPS}}{K_e}$

CONSTANT DIVIDEND PAYOUT APPROACH :-

“Tell me, what is it you plan to do with your one wild and precious life?” It is hard to fail, but it is worse never to have tried to succeed. Everything is always okay in the end. If it is not okay, then it is not the end

➔ Under this approach, Dividend Payout Ratio is kept constant.

➔ There could be zero dividends during the period of losses.

➔ Example : Assume Constant Dividend Payout = 50 %

Year	1	2	3	4	5
EPS	10	25	45	2	-7
DPS	5	12.5	22.5	1	-

RESIDUAL DIVIDEND APPROACH :

➔ Under this Approach Earnings or Retained Earnings should first be used for beneficial investments and then if any amount is left should be used for paying dividend.

➔ **Example 1:** Earnings Available : Rs.1,00,000 ; Investment Required : Rs. 20,000. Determine the amount of Dividend to be paid and external financing required under Residual Approach ?

Dividend to be paid = Rs.80,000 ; Amount Of External Financing Required = Nil

➔ **Example 2:** Earnings Available : Rs.1,00,000 ; Investment Required : Rs. 1,30,000. Determine the amount of Dividend to be paid and external financing required under Residual Approach ?

Dividend to be paid = Nil ; Amount Of External Financing Required = Rs. 30,000

APPLICATION OF FLOTATION COST

➔ Flotation cost are the cost which are associated with issue of new share. For Example commission , brokerage , underwriting expenses etc .

➔ In case flotation cost is given in question we should take Current Market Price net of flotation cost in the following manner:

If flotation Cost is expressed in Percentage :

$$P_0 [1 - f] = \frac{DPS_1}{K_e - g}$$

If flotation Cost is expressed in Absolute Amount :

$$P_0 - f = \frac{DPS_1}{K_e - g}$$

Note: It may be noted that Flotation cost is applicable only for new equity share and hence Flotation Cost for Existing Equity Share and Retained Earning is generally Nil.

INCREASE OR DECREASE IN MPS DUE TO INVESTMENT

Example : If Present MPS of the Company as per its existing policy is Rs. 10 and it has 1,00,000 shares outstanding . Now Company is undertaking an investment which is giving a positive NPV of Rs. 2,00,000. Therefore increase in MPS due to investment will be Rs. 2. And Revised MPS after the investment will be Rs. 10+Rs.2 = Rs. 12

RADICAL APPROACH (APPLICATION OF TAX)

Dividend Payment is not an expense for the company. It is an appropriation of profit. Hence It should not be taken after tax. Now as per current regulation Dividend is not taxable in the hands of Shareholders. Company is required to pay Dividend Distribution Tax (or CDT) on behalf of Equity Shareholder. Hence if CDT is given in question we should take $DPS(1+CDT)$

The greater danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it. "You can be young without money but you cannot be old without it"

BOND VALUATION

VALUE OF STRAIGHT COUPON BOND OR EQUAL INTEREST BOND

➔ **Meaning :** Straight Coupon Bonds or Equal Interest Bonds are those bonds which pay equal amount of interest upto maturity and also repay principal amount at the end of maturity period .

➔ **Symbolically**

$$\text{Value of Bond (B}_0\text{)} = \frac{\text{Interest}}{(1 + \text{Yield})^1} + \frac{\text{Interest}}{(1 + \text{Yield})^2} + \dots + \frac{\text{Interest}}{(1 + \text{Yield})^n} + \frac{\text{Face Value or Maturity Value}}{(1 + \text{Yield})^n}$$

= Interest x PVAF (Yield % , n years) + Maturity Value x PVF (Yield % , n years)

Where n = Number of Years to Maturity

VALUE OF ZERO COUPON BOND OR DEEP DISCOUNT BOND

➔ **Meaning :** Zero Coupon Bonds are those bonds on which investors are not paid any interest but are entitled only to repayment of principal sum on the maturity period .

➔ **Symbolically :** Value of Bond (B₀) =
$$\frac{\text{Face Value or Maturity Value}}{(1 + \text{Yield})^n}$$

VALUE OF PERPETUAL BOND OR IRREDEEMABLE BOND

➔ **Meaning :** These are bonds where interest payment is paid forever i.e upto infinity.

➔ **Symbolically :** Value Of Bond (B₀) =
$$\frac{\text{Interest}}{\text{Yield}}$$

VALUE OF SEMI ANNUAL INTEREST BOND

➔ **Meaning :** Semi Annual Interest Bonds are those bonds which pay interest semiannually .Most of the bonds pay interest semi annually .

➔ To value such bonds we have to make three changes :

1. $\frac{\text{Annual Interest Amount}}{2}$ 2. Years To Maturity $\times 2$ 3. $\frac{\text{Yield or Discount Rate}}{2}$

➔ If coupon interest are paid quarterly or monthly then in such case we should use '4' & '12' in place of '2' in the above changes.

SELF AMORTIZING BONDS

Bonds which pay a principal amount over a period of time rather than on maturity are called Self Amortizing Bonds

INFLATION BONDS

Inflation Bonds are the bonds where interest rate is adjusted for inflation. Thus the investor gets an interest which is free from the effects of inflation. For example : If the interest rate is 10 % and the inflation is 2 % the investor will earn 12.20 % [i.e (1+Interest Rate) \times (1 + Inflation Rate) - 1]

OVERPRICED AND UNDERPRICED BONDS

When Current Market Price and Theoretical Market Price i.e price which we calculate by applying present value concept are not same we will undertake following decision :

Let others lead small lives, but not you. Let others argue over small things, but not you. Let others cry over small hurts, but not you. Let others leave their future in someone else's hands, but not you.

<u>Case</u>	<u>Valuation</u>	<u>Decision</u>
If Currenty Market Price > Present Value Market Price	Overvalued	Sell
If Currenty Market Price < Present Value Market Price	Undervalued	Buy
If Currenty Market Price = Present Value Market Price	Correctly Valued	Hold

BOND WITH CHANGING YIELD RATES OR FORWARD RATE-EQUAL COUPON BOND

➔ If Yield Rates are $Y_1, Y_2, Y_3, Y_4, \dots, YTM_n$ for year 1, 2, 3, 4, ..., n then Value of Bond will be equal to :

$$\frac{\text{Interest}}{(1 + Y_1)} + \frac{\text{Interest}}{(1 + Y_1)(1 + Y_2)} + \frac{\text{Interest}}{(1 + Y_1)(1 + Y_2)(1 + Y_3)} + \frac{\text{Interest}}{(1 + Y_1)(1 + Y_2)(1 + Y_3)(1 + Y_4)} + \dots$$

$$\dots + \frac{\text{Interest}}{(1 + Y_1)(1 + Y_2)(1 + Y_3)(1 + Y_4) \dots (1 + Y_n)} + \frac{\text{Maturity Value}}{(1 + Y_1)(1 + Y_2)(1 + Y_3)(1 + Y_4) \dots (1 + Y_n)}$$

BOND WITH CHANGING YIELD RATES OR FORWARD RATE-ZERO COUPON BOND

Bond Value Of One Year Zero Coupon Bond (B_0) = $\frac{\text{Maturity Value}}{(1 + YTM_1)}$

Bond Value Of Two Year Zero Coupon Bond (B_0) = $\frac{\text{Maturity Value}}{(1 + YTM_1)(1 + YTM_2)}$

Likewise Value of Bond can be calculated according to maturity life.

CURRENT YIELD / FLAT YIELD / CURRENT INTEREST YIELD / BASIC YIELD :

➔ Current Yield = $\frac{\text{Current Annual Interest Amount}}{\text{Current Value of Bond}}$ or $\frac{\text{Interest}}{B_0}$

➔ **Note :** Current Yield is always calculated on per annum basis .

Note : If Current Market Price and Intrinsic/Fair Value are different we will take Current Market Price and not Intrinsic Value for all the calculation of yield .

YEILD (K_d) OR YIELD TO MATURITY (YTM) OR COST OF DEBT / REDEMPTION YIELD / INTERNAL RATE OF RETURN / MARKET RATE OF INTEREST / MARKET RATE OF RETURN / PROMISED YTM / OPPORTUNITY COST OF DEBT

Yield to Maturity is the overall return on the bond if it is held till maturity .

➔ Symbolically : It can be calculated by using two method :

Trail n Error Method / IRR Technique

$$\text{Value of Bond } (B_0) = \frac{\text{Interest}}{(1 + \text{Yield})^1} + \frac{\text{Interest}}{(1 + \text{Yield})^2} + \dots + \frac{\text{Interest}}{(1 + \text{Yield})^n} + \frac{\text{Face Value or Maturity Value}}{(1 + \text{Yield})^n}$$

Now for finding Yield we should use IRR Technique :

$$K_d = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates}$$

U can complain b'coz roses have thorns, or u can rejoice because thorns have roses. In the middle of difficulty lies opportunity. For true success ask yourself these 4 questions: Why? Why not? Why not me? Why not now?

Approximation Method:
$$K_d = \frac{\text{Interest} + \left(\frac{\text{Maturity Value} - \text{Issue Value}}{n} \right)}{\frac{\text{Maturity Value} + \text{Issue Value}}{2}}$$

Note : If Current Market Price and Intrinsic/Fair Value are different we will take Current Market Price and not Intrinsic Value for all the calculation of yield .

YIELD TO CALL (YTC) :

$$YTC = \frac{\text{Interest} + \left(\frac{\text{Call Value} - \text{Issue Value}}{\text{Call Years}} \right)}{\frac{\text{Call Value} + \text{Issue Value}}{2}}$$

YIELD TO PUT (YTP) :

$$YTP = \frac{\text{Interest} + \left(\frac{\text{Put Value} - \text{Issue Value}}{\text{Put Years}} \right)}{\frac{\text{Put Value} + \text{Issue Value}}{2}}$$

YIELD TO WORST (YTW) :

The yield to worst is the lowest yield of yield to maturity, yield to call, yield to put, and others.

Example : Given the following data calculate Yield To Worst: YTM = 10%, YTC = 7%, YTP=9%

Solution: YTW = 7 %

HOLDING PERIOD RETURN(HPR) :

➔ Holding Period Return (R) or Total Return

$$= \frac{\text{Interest} + (B_1 - B_0)}{B_0} \text{ or } \frac{\text{Interest}}{B_0} + \frac{(B_1 - B_0)}{B_0} \text{ or Current Interest Yield} + \text{Capital Gain Yield}$$

Where B_0 is the Price of bond as on today , and B_1 is the price of the bond at the end of the holding period or Sale Price of Bond at the end of holding period .

➔ **Note :** The holding period is generally assumed to be of one year period unless otherwise stated .

Kd OF PERPETUAL BOND

$$\text{Yield or } K_d = \frac{\text{Annual Interest}}{B_0}$$

Duration Of Normal Bond or Fredric Macaulay 's Duration

➔ **Symbolically :** Duration Of Bond =
$$\frac{1}{B_0} \left[1 \times \frac{\text{Interest}}{(1 + K_d)^1} + 2 \times \frac{\text{Interest}}{(1 + K_d)^2} + \dots \dots \dots n \times \frac{\text{Interest}}{(1 + K_d)^n} + n \times \frac{\text{Maturity Value}}{(1 + K_d)^n} \right]$$

“Hope is always available to us. When we feel defeated, we need only take a deep breath and say, “Yes,” and hope will reappear.” Success is the ability to go from failure to failure without losing your enthusiasm.

OR
$$\text{Duration} = \frac{1 + \text{YTM}}{\text{YTM}} - \frac{(1 + \text{YTM}) + n(\text{Coupon Rate} - \text{YTM})}{\text{Coupon Rate} [(1 + \text{YTM})^n - 1] + \text{YTM}}$$

DURATION OF A ZERO COUPON BOND :

For a zero coupon bond , the duration is simply equal to the maturity of the bond while the duration of a normal coupon bond is less than the maturity.

DURATION OF PERPETUAL BOND

$$\text{Duration Of Perpetual Bond} = \frac{1 + \text{YTM}}{\text{YTM}}$$

VOLATILITY /SENSITIVITY/MODIFIED DURATION :

➔ **Symbolically** : Volatility or Modified Duration or Sensitivity [%] = $\frac{\text{Macaulay Duration}}{\text{Yield To Maturity}}$

➔ **Note** : % Change in Bond Price = - Modified Duration × Change In Yield To Maturity

➔ The Modified Duration will always be lower than the Macaulay Duration .

CONVEXITY

➔ Convexity is calculated as follows :

$$\text{Convexity} = \frac{1}{B_0 \times (1 + \text{YTM})^2} \left[\frac{\text{Interest}}{(1 + \text{YTM})^1} (1^2 + 1) + \frac{\text{Interest}}{(1 + \text{YTM})^2} (2^2 + 2) + \dots + \frac{\text{Interest} + \text{Maturity Value}}{(1 + \text{YTM})^n} (n^2 + n) \right]$$

➔ The percentage change in a bond's price =

$$-\text{Modified Duration} \times \text{Change in YTM} + \left[\frac{1}{2} \times \text{Convexity} \times (\text{Change In YTM})^2 \right]$$

RELATIONSHIP BETWEEN YTM AND COUPON RATE

<u>Case</u>	<u>Nature Of Bond</u>
Coupon Rate = YTM	Par Value Bond i.e $B_0 = \text{Par Value}$
Coupon Rate > YTM	Premium Bond i.e $B_0 > \text{Par Value}$
Coupon Rate < YTM	Discount Bond i.e $B_0 < \text{Par Value}$

Note : For the above relationship to be true the maturity value of the bond must be equal to face value .

APPLICATION OF FLOTATION COST

➔ Flotation costs are the cost which are associated with issue of new debentures like underwriting , brokerage etc .

➔ If Flotation cost is given we simply take Bond Value Net of Flotation Cost .

Equation :
$$K_d = \frac{\text{Interest} + \left(\frac{\text{Maturity Value} - B_0 [1 - f]}{n} \right)}{\frac{\text{Maturity Value} + B_0 [1 - f]}{2}}$$

Where "f" is the flotation cost expressed in percentage . Flotation Cost may also be expressed in absolute amount in such case we will simply deduct flotation cost by bond value i.e $B_0 - f$

*Do one thing every day that scares you.”“Life is either a daring adventure, or nothing.”
Impossible is a word to be found only in the dictionary of fools.*

TAXATION EFFECT

➔ If income tax rate is given in question then Interest should be taken after tax . If Capital Gain Tax Rate is given then Maturity Value should be taken after tax i.e after adjusting it for Capital Gain Tax .

➔ **Equation:**

$$K_d = \frac{\text{Interest}(1 - \text{Tax}) + \left(\frac{\text{Maturity Value Net Of Capital Gain Tax} - \text{Issue Value}}{n} \right)}{\frac{\text{Maturity Value Net Of Capital Gain Tax} + \text{Issue Value}}{2}}$$

Where : Maturity Value Net Of Capital Gain Tax = Maturity Value - Capital Gain Tax = Maturity Value - Tax Rate [Maturity Value - Issue Price]

➔ **Note :** If Capital Gain Tax is not given in question it is assumed to be Nil .

BOND IMMUNIZATION

➔ **How we can achieve Immunization :** This can be attained by selecting the bonds whose duration is equal to the investor's investment horizon .

VALUE OF IRREDEEMABLE PREFERENCE SHARES

$$\text{Value Of Irredeemable Preference Shares} = \frac{\text{Annual Dividend}}{K_p}$$

COST OF REDEEMABLE PREFERENCE SHARES

➔ Redeemable Preference Shares are those shares which can be redeemed after a specific period of time.

➔ How to Calculate K_p of Redeemable Preference Share:
$$K_p = \frac{\text{Dividend} + \left(\frac{\text{Maturity Value} - P_0}{n} \right)}{\frac{\text{Maturity Value} + P_0}{2}}$$

Where P_0 - In Case of Existing Shares: Current Market Price of PSC and In case of New Shares P_0 will be Net Proceeds which is equal to Face Value + Premium - Discount - Flotation Cost

➔ Sometimes when relevant information is not given for calculation of K_p then we simply use : **K_p** = Rate Of Preference Dividend

BOND VALUATION AND TIME TO MATURITY

The value of the bond approaches its par value as the time to maturity approaches its maturity date other things remaining the same.

As the maturity approaches a Premium Bond will decrease in value

As the maturity approaches a Discount Bond will increase in value

As the maturity approaches a Par Value Bond will remain same in value

Note : For the above relationship to be true the maturity value of the bond must be equal to face value .

FAIR VALUE OF CONVERTIBLE BOND

Fair Conversion Value

= Number Of Equity Shares Received on Conversion \times Market Price Per Share prevailing at the time of conversion

Fortune favours the brave. Men are born to succeed, not fail.

The fear of death follows from the fear of life. A man who lives fully is prepared to die at any time.

PERCENTAGE OF DOWNSIDE RISK/PREMIUM OVER INVESTMENT VALUE

$$\frac{\text{Market Price Of Convertible Bond} - \text{Market Price Of Non - Convertible Bond}}{\text{Market Price Of Non - Convertible Bond}} \times 100$$

CONVERSION PREMIUM OVER CONVERTIBLE VALUE

$$\frac{\text{Market Price Of Convertible Bond} - \text{Fair Value Of Convertible Bond}}{\text{Fair Value Of Convertible Bond}} \times 100$$

CONVERSION PARITY PRICE

$$\text{Conversion Parity Price} = \frac{\text{Market Price Of Convertible Bond}}{\text{No. of Equity Shares on Conversion}}$$

BREAKEVEN PERIOD FOR CONVERTIBLE PERIOD

$$\text{Breakeven Period} = \frac{\text{Excess Value On Conversion}}{\text{Annual Excess Receipt}}$$

BOND STRIPS

Bond Strips = Interest Strips + Principle Strips

Value of a Bond is the sum of present value of two distinct cash flows streams viz Present Value Of Interest called the Interest Strips and Present Value of Principal repaid on maturity called the Principal Strip .

An issuer may split the bond in two strips and sell them to different investors having different investment objectives .

Example : Nominal Value of 12% bonds issued by a company is Rs.100. The bonds are redeemable at Rs. 125 at the end of year 5. Coupons are paid annually. Determine value of interest strip & principal strip. Annual Yield rate is 10%.

Solution: Interest Strip = $12 \times \text{PVAF} (10\%, 5 \text{ Years}) = 12 \times 3.791 = 45.49$

Principal Strip = $125 \times \text{PVF} (10\%, 5 \text{ Years}) = 12 \times .621 = 77.63$

OVERLAPPING INTEREST

Example: Amount Of Bond:300,00,000; Existing Coupon rate:14%; New Coupon Rate:12%; Tax Rate:40%; Overlapping Period:2 Months. calculate the amount of Overlapping Interest?

Solution: The effect on overlapping Interest will only be applicable in case of Old Bond:

Interest: $300,00,000 \times 14\% \times 2/12 = 7,00,000$

Tax Saving : Benefit @ 40 % 2,80,000

Overlapping Interest 4,20,000

CONFUSION REGARDING COUPON RATE & YTM

Coupon Rate is the rate .at which company pays interest.

YTM or Yield is the rate of return required by the investor of a bond.

No matter how hard the past, you can always begin again. It is not because things are difficult that we do not dare, it is because we do not dare that they are difficult.

Note: It may be noted that any change in interest rate will only change yield and not coupon rate. In other words Coupon rate always remain constant unless otherwise specifically stated.

RELATIONSHIP BETWEEN BOND VALUE AND YTM

➔ YTM and the Bond Value has inverse relationship :

- If YTM increases the price or bond value will decrease & - If YTM decreases the price or bond value will increase
.....Other things remaining constant

CALLABLE BONDS AND PUTTABLE BONDS

➔ A **Callable Bond** is one when the issuer/borrower has an option to retire or redeem the bonds prior to the date of maturity

➔ A **Puttable Bond** is one where the holder (investor) has an option to get the bond redeemed prior to the date of maturity

CALCULATION OF YTM OF HALF YEARLY INTEREST PAYMENT BOND

$$\text{Kd Of 6month} = \frac{\text{Interest per 6 months} + \left(\frac{\text{Maturity Value} - \text{Issue Value}}{n \times 2} \right)}{\frac{\text{Maturity Value} + \text{Issue Value}}{2}}$$

Now Kd p.a = Kd for 6 month x 2

Example : Bond face Value: 1000; Issue Value = 900; Interest paid half yearly; Coupon Rate = 10%; Life = 5 years. Calculate YTM?

$$\text{Solution: Kd Of 6 month} = \frac{\text{Interest per 6 months} + \left(\frac{\text{Maturity Value} - \text{Issue Value}}{n \times 2} \right)}{\frac{\text{Maturity Value} + \text{Issue Value}}{2}} = \frac{50 + \left(\frac{1000 - 900}{5 \times 2} \right)}{\frac{1000 + 900}{2}}$$

= 6.32 % for 6 month or 12.63 p.a

EX-INTEREST & CUM INTEREST

When Bond Value include the amount of Interest ,it is known as Cum-Interest, otherwise not.

In all the Bond Equation Formula, Bond Value should be taken Ex-Interest. If Bond Value is given Cum-Interest then first we have to make it Ex-Interest then we should proceed with our calculation

Note:

(1) 1 % = 100 basic points

(2) If the question is silent about the maturity period of any investment say preference shares , bonds , debentures etc then we will assume such investmet as irredeemable or perpetual .

(3) Interest is paid on face value.

(4) If silent bond are always assumed to be redeemed at face value .

Everything that is happening at this moment is a result of the choices you've made in the past. Failure is simply the opportunity to begin again, this time more intelligently.

MUTUAL FUND

NET ASSET VALUE (NAV)

$$\text{Symbolically : NAV} = \frac{\text{Net Asset Of The Scheme}}{\text{Number Of Units Outstanding}} = \frac{\text{Total Asset - Total External Liability}}{\text{Number Of Units Outstanding}}$$

Total Asset = Market Value of Investments + Receivables + Accrued Income + Other Assets

Total External Liability = Accrued Expenses + Payables + Other Liabilities

Note : In Mutual Fund , shares are termed as units and shareholders are termed as unitholders .

VALUATION RULES

In Mutual Fund NAV is calculated on a “mark to market” basis. In other words market value should be used for Mutual Fund valuation. If Market Value of any security is not given then in such case book value can be taken unless otherwise specifically stated.

HOLDING PERIOD RETURN (HPR)

$$\text{Holding Period Return} = \frac{[\text{NPV at the end} - \text{NPV at the beginning}] + \text{Dividend Received} + \text{Capital Gain Received}}{\text{NPV at the beginning}}$$

EXPENSE RATIO

$$\text{Expense Ratio} = \frac{\text{Expenses Incurred Per Unit}}{\text{Average NAV}} \quad \text{Where Average NAV} = \frac{\text{Opening NAV} + \text{Closing NAV}}{2}$$

RELATIONSHIP BETWEEN RETURN OF MUTUAL FUND, RECURRING EXPENSES , INITIAL EXPENSES AND RETURN DESIRED BY INVESTORS

Relationship Between Return Of Mutual Fund, Recurring Expenses , Initial Expenses and Return Desired By Investors can be given by using following relation :

$$\text{Return Required By Investors} = (\text{Return Of Mutual Fund} - \text{Recurring Expenses}) (1 - \text{Issue Expenses})$$

ENTRY LOAD & EXIT LOAD

Entry Load or Front End Load : When an investor purchase a unit of a Mutual Fund he has to pay a load in addition to the NAV of the units. Such load is known as Entry Lod.

Total amount paid by the investor i.e purchase price or Sale Price Per Unit charged by Mutual Fund Company = NAV (1+ Entry Load)

Exit Load or Back End Load :

When an investor sale his unit to a Mutual Fund he has to pay a load . Such load is known as Exit Lod.

Total amount received by the investor on sale of unit or Repurchase/Buyback price of Mutual Fund=NAV(1- Exit Load)

CALCULATION OF DISCOUNT AND PREMIUM

The premium or discount for close ended mutual fund is calculated by using following relation = $\frac{\text{Market Price} - \text{NAV}}{\text{NAV}}$

FALL IN NAV AFTER DIVIDEND OR ANY DISTRIBUTION

NAV of Mutual Fund Scheme will fall to the extent of any distribution made by the company.

For example:If Existing NAV is Rs. 16 and dividend of Rs. 4 is to be distributed per unit,then in such case NAV after dividend distrubution will be Rs. 12

You can have anything you want, if you want it badly enough. You can be anything you want to be, do anything you set out to accomplish if you hold to that desire with singleness of purpose.

PORTFOLIO MANAGEMENT

RETURN OF A SECURITY OR ASSET :

$$\text{Holding Period Return} = \frac{(\text{Price At The End} - \text{Price At The Beginning}) + \text{Income Distribution}}{\text{Price At The Beginning}}$$

Return may be of two types :

1. AVERAGE RETURN BASED ON PAST DATA :

Example :	Year	2000	2001	2002	2003	2004
	Return (%)	10	20	15	30	25

Calculate Average Return ?

$$\text{Solution : Average Return} = \frac{10 + 20 + 15 + 30 + 25}{5} = 20$$

2. EXPECTED RETURN BASED ON PROBABILITY :

Example :	Return (%)	20	21	22	23	24
	Probability	.15	.10	.60	.10	.05

Calculate Expected Return ?

$$\text{Solution : } 20 \times .15 + 21 \times .10 + 22 \times .60 + 23 \times .10 + 24 \times .05 = 21.80$$

RISK OF A SECURITY OR ASSET

STANDARD DEVIATION (σ) :

Standard Deviation is the deviation from arithmetic mean and is a measure of Total Risk .It is Pronounced as Sigma.

Based On Past Data :

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(\text{Given Return} - \text{Average Return})^2}{n}}$$

Note: Sometimes in place of 'n' we can use 'n-1'. However students must give a note for this treatment.

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(\text{Given Return} - \text{Average Return})^2}{n - 1}}$$

$$\text{Based On Probability : Standard Deviation } (\sigma) = \sqrt{\sum \text{probability} \times (\text{Given Return} - \text{Expected Return})^2}$$

Variance

$$\text{Based On Past Data as well as Based on Probability : Variance} = (\text{Standard Deviation})^2 = \sigma^2$$

RANGE AS A MEASURE OF RISK :

A simple way to measure the risk is to find out the range of possible returns. The range is the difference between the " highest

There are those who dream and wish and there are those who dream and work.No man is a failure who is enjoying life.Ninety-nine percent of failures come from people who have the habit of making excuses.

and lowest expected return"

For example : The possible returns of a security are 20 % , 21 % , 22% , 23 % and 24 % .What is the range of risk ?

Solution : Range Of Risk = 24 % - 20 % = 4 %

COEFFICIENT OF VARIATION (CV):

Coefficient Of Variation measures Risk Per Unit Of Return.It is a relative measure of Risk

Based On Past Data : $CV = \frac{\text{Standard Deviation}}{\text{Average Return}}$ **Based On Probability :** $CV = \frac{\text{Standard Deviation}}{\text{Expected Return}}$

Decision : Lower the Standard Deviation , Coefficient Of Variation , Variance or Range ,Lower will be the Risk Of Security .

RULE OF DOMINANCE BASED ON SECURITY RETURN & RISK

Rule 1: If Return of two security are different but Their Standard Deviation are Same .

Decision : Security with higher Return is preferred.

Rule 2: If Return of two security are same but Their Standard Deviation are Different .

Decision : Security with Lower Standard Deviation is preferred.

Rule 3: If Return and Standard Deviation of two security are different

Decision : In such case we should use Coefficient Of Variation.Securities with lower Coefficient Of Variation should be preferred.

PORTFOLIO

Portfolio means combination of security . Assuming our portfolio consists of Security A and Security B with Weight w_A and Weight w_B we can calculate various measures relating to Portfolio Risk and Portfolio Return .

RETURN OF PORTFOLIO

The Return of the portfolio is the weighted average return of individual security .

On the Basis Of Past Data : Return Of Portfolio = A's Average Return \times Weight w_A + B's Average Return \times Weight w_B

On the Basis Of Probability : Return Of Portfolio = A's Expected Return \times Weight w_A + B's Expected Return \times Weight w_B

Note : Weights used in Portfolio for different security will always be equal to 1 .

RISK OF PORTFOLIO

STANDARD DEVIATION OF THE PORTFOLIO CONSISTING OF TWO SECURITY :

$$\text{Standard Deviation}([\sigma_{1+2}]) = \sqrt{\sigma_1^2 w_1^2 + \sigma_2^2 w_2^2 + 2 \sigma_1 w_1 \sigma_2 w_2 r_{1,2}}$$

Where , σ_{1+2} = Standard Deviation of Portfolio consisting of Security 1 & 2 ;

σ_1 = Standard Deviation Of Security 1 ; σ_2 = Standard Deviation Of Security 2 ;

w_1 = Weight Of Security 1 ; w_2 = Weight Of Security 2 ; $r_{1,2}$ = Coefficient Of Correlation Between Security 1 and Security 2

COEFFICIENT OF CORRELATION (R) :

Correlation answer the following question : Does there exist an association between the two variables ? If yes then to what extent .It shows the relationship or association between two variable.It expresses the degree of closeness between two variables .The value of r ranges between -1 and +1 .

"If you deliberately plan on being less than you are capable of being, then I warn you that you'll be unhappy for the rest of your life.The only thing that will stop you from fulfilling your dreams is you."

Based On Past Data as well as Probability :

$$\text{Coefficient of Correlation between A \& B : } (r_{A,B}) = \frac{\text{Covariance (A, B)}}{\sigma_A \times \sigma_B}$$

COVARIANCE

Covariance also indicate link between the return of two securities just like Coefficient Of Correlation. But the value of covariance may range from $-\alpha$ to $+\alpha$ i.e it can take any value .

Based On Past Data :

$$\text{Covariance (A, B)} = \frac{\sum(\text{Given Return}_A - \text{Average Return}_A) \times (\text{Given Return}_B - \text{Average Return}_B)}{n} = \frac{\sum(d_A \times d_B)}{n}$$

Note: Sometimes in place of 'n' we can use 'n-1'. However students must give a note for this treatment.

$$\text{Covariance (A, B)} = \frac{\sum(\text{Given Return}_A - \text{Average Return}_A) \times (\text{Given Return}_B - \text{Average Return}_B)}{n-1} = \frac{\sum(d_A \times d_B)}{n-1}$$

Based On Probability :

$$\text{Covariance (A, B)} = \sum(\text{Given Return}_A - \text{Expected Return}_A) \times (\text{Given Return}_B - \text{Expected Return}_B) = \sum(d_A \times d_B)$$

Note :

(i) The value Correlation Of Coefficient (r) ranges between + 1 and - 1 and Value of Covariance will range between $-\alpha$ to $+\alpha$

(ii) When r = + 1

When r = + 1 It is a Perfect Positive Correlated Portfolio

When r = + 1 Portfolio Risk will be Maximum

When r = + 1 Standard Deviation Of Portfolio will become $(\sigma_{A+B}) = \sigma_A \times W_A + \sigma_B \times W_B$ i.e it become weighted average risk of individual security consisting a portfolio.

(iii) When r = - 1

When r = - 1 It is a Perfect Negative Correlated Portfolio

When r = - 1 Portfolio Risk will be minimum

When r = - 1 Standard Deviation Of Portfolio will become $(\sigma_{A+B}) = \sigma_A \times W_A - \sigma_B \times W_B$

(iv) When r = 0

When r = 0 It is a No Correlated Portfolio

When r = 0 Out of two security in a portfolio one security must be a risk free security .

When r = 0 Standard Deviation Of Portfolio will become $(\sigma_{A+B}) = \sigma_A \times W_A$

(v) As r decreases risk also decreases . Lesser the correlation , lower the risk . Higher the correlation , greater would be the risk of the portfolio . When r = +1 Portfolio has its maximum risk and in such case there can be No risk reduction . When r = -1 Portfolio has Minimum or Lowest Risk and in such case there will be minimum risk reduction .

STANDARD DEVIATION OF PORTFOLIO CONSISTING OF THREE SECURITIES

*The only man who never makes mistakes is the man who never does anything.
Work as though you would live forever, and live as though you would die today.*

$$\sigma_{ABC} = \sqrt{\sigma_A^2 w_A^2 + \sigma_B^2 w_B^2 + \sigma_C^2 w_C^2 + 2w_A \sigma_A w_B \sigma_B r_{AB} + 2w_A w_C \sigma_A \sigma_C r_{AC} + 2w_B w_C \sigma_C \sigma_B r_{BC}}$$

STANDARD DEVIATION OF PORTFOLIO CONSISTING OF FOUR SECURITIES

$$\sigma_{ABC} = \sqrt{\sigma_A^2 w_A^2 + \sigma_B^2 w_B^2 + \sigma_C^2 w_C^2 + \sigma_D^2 w_D^2 + 2w_A \sigma_A w_B \sigma_B r_{AB} + 2w_A w_C \sigma_A \sigma_C r_{AC} + 2w_B w_C \sigma_C \sigma_B r_{BC} + 2w_C w_D \sigma_C \sigma_D r_{CD} + 2w_D w_A \sigma_D \sigma_A r_{DA} + 2w_B w_D \sigma_B \sigma_D r_{BD}}$$

CALCULATION OF OPTIMUM WEIGHTS TO MINIMIZE PORTFOLIO RISK

$$W_A = \frac{\sigma_B^2 - r_{A,B} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times r_{A,B} \times \sigma_A \times \sigma_B} = \frac{\sigma_B^2 - \text{Covariance (A,B)}}{\sigma_A^2 + \sigma_B^2 - 2 \times \text{Covariance (A,B)}}$$

and $W_B = 1 - W_A$ (Since $w_A + w_B = 1$)

SHORT CUT FORMULA FOR OPTIMUM WEIGHTS WHEN $r = -1$

When $r = -1$ then we can also use the following formula for finding Optimum Weights

$$W_X = \frac{\sigma_Y}{\sigma_X + \sigma_Y} ; W_Y = 1 - W_X \quad (\text{Since } w_X + w_Y = 1)$$

PORTFOLIO CONSISTING RISK FREE SECURITY & MARKET PORTFOLIO

Case 1 : Invest 100 % in Market Portfolio and 0% in Rf security

Standard Deviation (Risk) (σ) = Standard Deviation of Market or Risk of Market or σ_{Market}

Return = Return from Market or R_m

Case 2 : Invest 0 % in Market Portfolio & 100 % in Risk Free Security

Standard Deviation (Risk) (σ) = zero [As Standard Deviation Of Risk Free Security is always zero]

Return = Risk Free Rate or R_f

Case 3: Invest between 0 % and 100 % in Market Portfolio

In such case he should **invest** few portion of his wealth in risk free security and few portion of wealth in market portfolio

$$\begin{aligned} \text{Return Of Portfolio} &= \text{Market Return} \times \text{Weight Of Market Portfolio} + \text{Risk Free Return} \times \text{Weight Of Risk Free Security} \\ &= R_m \times W_m + R_f \times W_f \end{aligned}$$

$$\text{Standard Deviation / Risk Of Portfolio} = \text{Standard Deviation Of Market} \times \text{Weight Of Market Portfolio} = \sigma_m \times W_m$$

Case 4 : Invest more than 100 % in Market Portfolio(**Risk Free Borrowing**)

In such case since investment is more than 100 % in market portfolio, the excess amount required for investment should be **borrowed** at risk free rate .

Let the additional amount to be borrowed be x .

$$\text{Return Of Portfolio} = \text{Market Return} \times (1 + x) - \text{Risk Free Return Paid on Borrowing} \times x = R_m \times (1 + x) - R_f \times x$$

Know the true value of time; snatch, seize, and enjoy every moment of it. No idleness, no delay, no procrastination; never put off till tomorrow what you can do today.

Standard Deviation / Risk Of Portfolio = Standard Deviation Of Market $\times (1 + x) = \sigma_m \times (1 + x)$

**BETA OF AN ASSET OR SECURITY / MARKET SENSITIVITY INDEX / BETA COEFFICIENT
USING COVARIANCE FORMULA**

Beta is a ratio of " Covariance Of Security with the Market " and "Variance Of Market"

$$\text{Beta of an Asset or Security} = \frac{\text{Covariance between Security and Market}}{\text{Variance of the market}} = \frac{\text{Covariance (s, m)}}{\sigma_m^2} = \frac{r \times \sigma_s \times \sigma_m}{\sigma_m^2} = \frac{r \times \sigma_s}{\sigma_m}$$

BETA OF AN ASSET OR SECURITY USING REGRESSION FORMULA :

Beta can also be measured by using the regression method.

$$\text{Beta of an Asset or Security} = \frac{\sum XY - n \overline{XY}}{\sum Y^2 - n \overline{Y}^2} \quad \text{Where Y represents Market Return and X represents Security Return}$$

Note : We should always give preference to Covariance / Variance Formula and not Regression Formula for calculating Beta though the answer will always be same by both the method .

BETA OF A SECURITY BASED ON CHANGES :

➔ Beta is the degree of the responsiveness of the security's return with the market return .

➔ Hence Beta may also be defined by using following relation : $\text{Beta} = \frac{\text{Change in Security Return}}{\text{Change in Market Return}}$

BETA OF A PORTFOLIO

➔ Beta of a portfolio is the weighted average beta of individual securities .

➔ **Symbolically :**

$$\text{Beta Of Portfolio} = \text{Beta Of Security A} \times \text{Weight Of A} + \text{Beta Of Security B} \times \text{Weight Of B} = \beta_A \times W_A + \beta_B \times W_B$$

MARKET BETA

➔ The Market Beta is a benchmark against which we can compare beta for different securities and portfolio .

➔ Market Beta is always assumed to be 1 .

**BETA OF A FIRM / FIRM BETA / OVERALL BETA OF FIRM / ASSET BETA / PROJECT BETA-
IF TAX IS CONSIDERED**

Overall Beta or Firm Beta or Asset Beta or Project Beta

$$= \text{Equity Beta} \times \frac{\text{Equity}}{\text{Debt}(1 - \text{tax}) + \text{Equity}} + \text{Debt Beta} \times \frac{\text{Debt}(1 - \text{tax})}{\text{Debt}(1 - \text{tax}) + \text{Equity}}$$

**BETA OF A FIRM / FIRM BETA / OVERALL BETA OF FIRM / ASSET BETA / PROJECT BETA-
IF TAX IS NIL**

Overall Beta or Firm Beta or Asset Beta or Project Beta

$$= \text{Equity Beta} \times \frac{\text{Equity}}{\text{Debt} + \text{Equity}} + \text{Debt Beta} \times \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

*It is better to be hated for what you are than to be loved for what you are not.
"Celebrate the success of others. Bring people up, not down."*

EFFECT IN OVERALL BETA DUE TO CHANGE IN CAPITAL STRUCTURE

- A school of thought led by Modigliani and Miller's theory believe that Overall Beta of the firm is not affected by the Change in Capital Structure .It means that overall beta of a company cannot be diversified or reduced by the firm.
- Overall Beta of a company will be same as other company if the two company are similar i.e if they belong to the same industry.

EFFECT IN EQUITY & DEBT BETA DUE TO CHANGE IN CAPITAL STRUCTURE

Change in Capital Structure will only changes Equity and Debt Beta But not Overall Beta .

OVERALL COST OF CAPITAL (K_o)-IFTAX IS NIL

Alt 1 : $K_o = \text{Risk Free Rate} + \text{Beta}_{\text{Overall}} [\text{Market Return} - \text{Risk Free Return}]$

Alt 1 : $K_o = \text{Cost Of Equity} \times \text{Weight Of Equity} + \text{Cost Of Debt} \times \text{Weight Of Debt} = K_e \times W_e + K_d \times W_d$

Where , $K_e = \text{Risk Free Rate} + \text{Equity Beta} (\text{Market Return} - \text{Risk Free Rate}) = R_f + B_{\text{Equity}} (R_m - R_f)$

$K_d = R_f + B_{\text{Debt}} (R_m - R_f)$

OVERALL COST OF CAPITAL (K_o)-IFTAX IS CONSIDERED :

$K_o = \text{Cost Of Equity} \times \text{Weight Of Equity} + \text{Cost Of Debt} \times \text{Weight Of Debt} = K_e \times W_e + K_d \times W_d$

Where , $K_e = \text{Risk Free Rate} + \text{Equity Beta} (\text{Market Return} - \text{Risk Free Rate}) = R_f + B_{\text{Equity}} (R_m - R_f)$

$K_d = \text{Interest Rate}(1 - \text{Tax})$

Note:

- (i) Equity Beta will always be greater than Debt Beta as risk of Equity Shareholder are higher than Risk of Debenture holders
- (ii) If Debt Beta is not given in question, it is assumed to be zero.
- (iii) If silent Risk Free Rate and Debenture Rate of Interest are assumed to be same unless otherwise stated i.e If rate of interest on debenture is not given in question then it is assumed to be risk free rate .
- (iv) Market Value should be given preference than Book Value for calculating Weights in determination of Overall Beta .
- (v) For Unleveraged Firm / All Equity Firm : Overall Beta / Firm Beta / Project Beta = Equity Beta
- (vi) Beta of Equity will always be higher than Overall Asset Beta or Project Beta .

CAPITAL ASSET PRICING MODEL (CAPM) BASED RETURN

→ **Symbolically :** Expected Return / Required Return / Equilibrium Return / Desired Return =

$$R_f + \frac{\text{Beta}_{\text{Security}}}{\text{Beta}_{\text{Market}}} [(R_m - R_f)] = R_f + \text{Beta}_{\text{Security}} [(R_m - R_f)]$$

Where $R_f = \text{Risk Free Return}$, $R_m = \text{Market Return}$

Note :

- (i) Beta of Market is always assumed to be 1
- (ii) Risk Premium Of Market or Normal Risk Premium = Return From Market - Risk Free Return
- (iii) Risk Premium Of Security or Security Specific Risk = $\text{Beta}_{\text{Security}} [\text{Return From Market} - \text{Risk Free Return}]$

"Are you bored with life? Then throw yourself into some work you believe in with all your heart, live for it, die for it, & u will find happiness that u had thought could never be yours.

(iv) Risk Free Securities are : (a) Government Securities (b) Treasury Bill (T- Bill) (c) GOI Bonds (d) Gilt Edged Securities (e) RBI Bonds

(v) Risk Free Rate and Normal/Market Risk Premium are common to all securities

(vi) CAPM only takes into account Systematic Risk and not Total Risk .

(vii) Index (Sensex or Nifty) represents Market and hence Return of Market means Return on Nifty /Sensex.

CAPITAL ASSET PRICING MODEL (CAPM) BASED DECISION

<u>Case</u>	<u>Valuation</u>	<u>Decision</u>
If CAPM Return > Given Return	Overvalued or Overpriced	Sell
If CAPM Return < Given Return	Undervalued or Underpriced	Buy
If CAPM Return = Given Return	Correctlyvalued or Correctly priced	Hold

Note : Given Return means any return which may be given in question. At most of the times it is referred to as Expected Return of Average Return

ARBITRAGE PRICING THEORY [STEPHEN ROSS'S APT MODEL]/MULTI-FACTOR MODEL

➔ **Symbolically :** Overall Return in case of APT will be = Risk Free Return + { Beta_{Inflation} × Inflation Differential or Premium } + { Beta_{GNP} × GNP Differential or Premium } ...+ and so on

Where , Differential or Premium = [Actual Value - Expected/Estimated Value]

FAMA'S NET SELECTIVITY MODEL

$$\text{Fama's Net Selectivity} = R_P - \left[R_F + \left(\frac{\sigma_P}{\sigma_M} \right) (R_M - R_F) \right]$$

If the Fama's measure is positive ,it means the fund has outperformed the benchmark index

CAPITAL MARKET LINE (CML)

➔ Expected Return under CML is calculated by using following equation : $R_f + \left(\frac{\sigma_P}{\sigma_m} \right) \times [R_m - R_f]$

Slope Of CML

➔ Slope Of CML may be obtained as follows : $\frac{R_m - R_f}{\sigma_m}$ [This is also known as Market Price of Total Risk or Market

Total Risk Return Trade Off i.e Risk Premium per unit of Market Risk]

SECURITY MARKET LINE (SML)

➔ A Graphical representation of CAPM is known as Security Market Line .

➔ Expected Return under SML is calculated by using following equation :

$$R_f + \frac{\text{Beta}_{\text{Security}}}{\text{Beta}_{\text{Market}}} [R_m - R_f] = R_f + \text{Beta}_{\text{Security}} [R_m - R_f] \quad [\text{Remember : Beta of Market is always assumed}$$

to be equal to 1]

"May every hour of this day bring something special; a thought that makes you smile, a smile that warms the heart, and a heart that holds much happiness inside."

SLOPE OF SML

→ Slope Of SML may be obtained as follows : $\frac{R_m - R_f}{B_m} = R_m - R_f$ [This is also known as Market Price Of Systematic Risk or Market Systematic Risk Return Trade Off or Risk Premium per unit of Systematic Risk]

CHARACTERISTICS LINE (CL)

→ Equation Of Characteristics Line : $Y = a + \beta \times X$, Where

Y = Average or Expected Return for the Security ; X = Average or Expected Return of the Market Portfolio ; β = Beta of Security ; a = Intercept or alpha which can be calculated as $Y - \beta \times X$

SLOPE OF CHARACTERISTICS LINE

→ Beta is a slope of Characteristics Line .

PORTFOLIO EVALUATION TECHNIQUE

SHARPE RATIO

→ **Symbolically** : Sharpe Ratio = $\frac{\text{Return Of Portfolio} - \text{Return Of Risk Free Investment}}{\text{Standard Deviation Of Portfolio}}$

→ **Decision** : The higher a Sharpe Ratio, the better a portfolio

TREYNOR RATIO

→ **Symbolically** : Treynor Ratio = $\frac{\text{Return Of Portfolio} - \text{Return Of Risk Free Investment}}{\text{Beta Of Portfolio}}$

→ **Decision** : Higher the ratio, Better the performance

JENSEN'S ALPHA / JENSEN'S INDEX / DIFFERENTIAL RETURN

→ **Symbolically** : Jensen's Alpha = Return of Portfolio - CAPM Return

where, CAPM Return = $R_f + \text{Beta} (R_m - R_f)$

→ **Decision** : If Alpha is **positive** it shows that the portfolio has performed better and it has out performed the market. If Alpha is **negative**, it means that the portfolio has underperformed as compared to the market. If Alpha is **zero**, it indicates that the portfolio has just performed what it is expected to.

COEFFICIENT OF DETERMINATION

Coefficient Of Determination = $(\text{coefficient of correlation})^2 = (r^2)$

Use of Coefficient of Determination in calculating Systematic Risk & Unsystematic Risk

Explained by the index (Systematic Risk) = Variance of Security Return x Co-efficient of Determination of Security or Variance of Security Return x r^2

Not explained by the index (Unsystematic Risk) = Variance of Security Return x (1 - Co-efficient of Determination of Security) or Variance of Security Return x $(1 - r^2)$

DEBT EQUITY RATIO

'You have to believe in yourself, that's the secret. Even when I was in the orphanage, when I was roaming the street trying to find enough to eat, even then I thought of myself as the greatest actor in the world.' - Charlie Chaplin

$$\text{Debt Equity Ratio} = \frac{\text{Debt}}{\text{Equity}}$$

DEBT RATIO

$$\text{Debt Ratio} = \frac{\text{Debt}}{\text{Equity} + \text{Debt}}$$

NEW FORMULA OF COVARIANCE USING BETA

$$\text{Covariance between any 2 stocks} = \beta_1 \times \beta_2 \times \sigma_m^2$$

SHARPE'S OPTIMAL PORTFOLIO/APPLICATION OF CUT OFF POINT

1. Find out the “excess return to beta” ratio for each stock under consideration.
2. Rank them from the highest to the lowest.
3. Proceed to calculate Cut Off Point Of Security ‘i’(Ci) for all the stocks according to the ranked order using the following

$$\text{formula: } C_i = \frac{\sigma_m^2 \sum_{i=1}^N \frac{(R_i - R_f) \times \beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^N \frac{\beta_i^2}{\sigma_{ei}^2}}$$

Where σ_{ei}^2 = variance of a stock’s movement that is not associated with the movement of market index i.e. stock’s unsystematic risk.

The highest Ci value is taken as the cut-off point i.e. C*. It is the cut off rate. Security with C* value and the securities before this security are to be included in the portfolio and others are rejected.

4. The next step is to calculate weights. For this purpose we have to calculate Zi. $Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left[\frac{R_i - R_f}{\beta_i} - C^* \right]$

By using Zi, weights are calculated. For Understanding the proper application of Sharpe's optimal Portfolio students must have solve a practical question on this concept in their respective classes.

PERFORMANCE INDEX

Meaning: It is the ratio of Expected (Actual) Return Of Portfolio to minimum required rate of return computed with the help of CAPM.

Formula: Performance Index = Actual(Expected) Return/CAPM Return

Decision: If Performance Index ≥ 1 , the Portfolio Manager had performed better. Otherwise managers had not performed better. Higher the Performance Index, Better it is.

PORTFOLIO RISK IN CASE OF LARGE NUMBER OF SECURITIES

$$\text{The Standard Deviation of Portfolio with n stock is} = \sqrt{\frac{\sigma^2}{n} + \frac{r \times \sigma^2 \times (n-1)}{n}}$$

“Do not pray for easy lives. Pray to be stronger men! Do not pray for tasks equal to your powers. Pray for power equal to your tasks.” It's not the events of our lives that shape us, but our beliefs as to what those events mean.

Systematic Risk In This Case = $\sqrt{r \times \sigma^2}$

Capital Allocation Line (CAL) = $\frac{\text{Return Of Portfolio} - \text{Risk Free Rate}}{\text{Systematic Risk}}$

UNDERSTANDING SYSTEMATIC RISK AND UNSYSTEMATIC RISK

Total Risk = Systematic Risk + Unsystematic Risk

Systematic Risk or Non-Diversiable Risk or Market Risk

- ➔ This risk affects all companies operating in the market.
- ➔ They are beyond the control by the management of entity.
- ➔ Example : Interest Rate; Inflation ; Taxation; Political Development ; Credit Policy.

Unsystematic Risk or Diversiable Risk or Specific Risk

- ➔ This risk affects only a particular security / company .
- ➔ They can be controlled by the management of entity.
- ➔ Example : Strikes, change in management, the research & development expert of company leaves;

Kinds of Systematic and Unsystematic Risk :

Types of Systematic Risk (i) Market Risk : (ii) Interest Rate Risk : (iii) Social or Regulatory Risk : (iv) Purchasing Power Risk :

Types of Unsystematic Risk(i) Business Risk : (ii) Financial Risk :(iii) Default Risk :

SINGLE INDEX MODEL /SINGLE FACTOR MODEL/SHARPE INDEX MODEL

Risk Of a Security :

Total Security Risk = Systematic Risk (or Security Market Risk) + Unsystematic Risk (or Security Residual Risk)

$\sigma_s^2 = \sigma_m^2 \beta_s^2 + \sigma_e^2$ **Where** σ_s^2 =Variance Of the Return of the Security ; β_s = Beta of a security ; σ_m^2 =Variance of the Market Portfolio ; σ_e = Residual Risk

Risk Of a Portfolio :

The risk of the portfolio is the weighted average of the market related risk of the individual securities in the portfolio plus the portfolio residual variance .

Total Portfolio Risk = Systematic Risk (or Portfolio Market Risk) + Unsystematic Risk (or Portfolio Residual Risk)

$$\text{or } \sigma_p^2 = \sigma_m^2 \beta_p^2 + \sum_{i=1}^n \sigma_e^2 w_i^2$$

RULE OF DIVERSIFICATION

- ➔ Diversification means "Do not put all your eggs in one basket"
- ➔ Diversification refers to investing in more than one security i.e dividing the security into different stocks and not investing the money in one particular stock .
- ➔ Diversification reduces risk.Greater the diversification lower should be the risk.

"Be courageous and bold. When you look back on your life, you'll regret the things you didn't do, more than the ones you did."Imagination is more important than knowledge.

LEVERED AND UNLEVERED FIRM :

If a company finances its investments and projects completely with Equity then the company is known as an Unlevered Firm. If a company finances its investments and projects both with Equity and Debt then the company is known as a Levered Firm

EFFECT OF INCREASE AND DECREASE IN INFLATION :

In Case of Increase In Inflation : Increase Risk Free Rate and Market Rate by the rate of Inflation

In Case of Decrease In Inflation : Decrease Risk Free Rate and Market Rate by the rate of Inflation

DECISION BASED ON BETA

A Security with Beta Greater than 1 :

→ It means security has a higher volatility than the market. Fluctuation in security price will be more than fluctuation in the market index. → It is termed as Aggressive Security / High Beta Security

→ Example : A Security with a beta of 2.0 will tend to move twice as much as the market. If the market went up by 10%, the Security tends to rise by 20%. If the market fell by 10%, the Security tends to fall by 20%.

A Security with Beta Less than 1

→ It means security has a lesser volatility than the market. Fluctuation in security price will be less than fluctuation in the market index.

→ It is termed as Defensive Security / Low Beta Security

→ Example : A Security with a beta of 0.5 will move half as much as the market. If the market rises by 10%, the Security tends to rise by 5%. If the market fell by 10%, the Security tends to fall by 5%.

A Security with Beta Equal to 1

→ It means volatility in security price & market is same. Security price are expected to move in tandem with the market index

→ It is termed as Normal Security / Normal Beta Security or Stock

→ For Example : In case a security beta is 1 then If the market moved up by 10%, the Security will also tend to move up by 10%. If the market fell by 10%, the Security will also tend to fall by 10%.

A Security with Beta is less than 0 [Negative Beta] : Beta value less than zero indicates that a negative (inverse) relationship between security return and market return exists. i.e If market goes up price of the security will fall and vice-versa. In reality beta value can hardly take a negative value. Normally Gold is supposed to have negative beta.

A Security with Betas = 0 [Zero Beta] : If beta value is zero it means there is no systematic risk and the share prices have no relationship with the market. In reality beta value can hardly take a zero value. However Beta of Risk Free Security is assumed to be zero .

Note : For India Market is represented by Sensex and Nifty .

PROXY BETA

Proxy Beta is used when the firm has no market listing and thus no Beta of its own. In that case we take the help of comparable listed firms and make necessary adjustments as required relative to the financial gearing levels. It is better to take average of two or more than two companies for calculating Proxy Beta.

"Be kind to everyone you meet, for they may be facing a harder battle."

"The formula for peace of mind is simple: Don't worry about anything - pray about everything."

FUTURES

INTRODUCTION

➔ There are two type of market which exist in Stock Exchange (i) Cash Market (ii) Future Market

Cash Market : A commodities or securities market in which goods are sold for cash and delivered immediately. Contracts bought and sold on these markets are immediately effective. The cash market is also called the "spot market" or "physical market", because prices are settled in cash on the spot at current market prices.

Future Market : Future Market is the market where though contract is entered today but settlement takes place at some future date

POSITIONS UNDER STOCK MARKET :

Long Position : If a person buys or holds an asset , he is said to be in a Long Position .

Short Position : If a person sells an asset , he is said to be in a Short Position .

WHEN INTEREST IS COMPOUNDED CONTINUOUSLY

Future Value = Present Value $\times e^{rt}$

Present Value = $\frac{\text{Future Value}}{e^{rt}} = \text{Future Value} \times e^{-rt}$

Note : Value of $e = 2.71828$; **Note** : Value of $\text{Log } e = .4343$

SECURITIES PROVIDING NO INCOME :

In case Of Continuous Copounding : Fair Future Value = Spot Price $\times e^{rt}$

Where r = risk free interest rate p.a with continuous compounding ;

t = time to maturity expressed in years (Number of Days \div 365 Or Number of Months \div 12)

SECURITIES PROVIDING A KNOWN CASH INCOME IN AMOUNT (RS.) :

In case Of Continuous Copounding : Fair Future Value = (Spot Price – Present Value Of Expected Dividend) $\times e^{rt}$;

Where Present Value of Expected Dividend = Dividend $\times e^{-rt}$

SECURITIES PROVIDING INCOME IN % OR KNOWN YIELD :

In case Of Continuous Copounding : Fair Future Value = Spot Price $\times e^{(r-y)t}$

Where y = dividend yield p.a expressed in percentage

SECURITIES WITH STORAGE COST EXPRESSED IN AMOUNT (RS.) :

In case Of Continuous Copounding : Fair Future Value = [Spot Price + Present Value Storage Cost] $\times e^{rt}$

Where Present Value of Storage Cost = Storage Cost $\times e^{-rt}$

*"Learn to be happy with what you have while you pursue all that you want."
"My interest is in the future because I am going to spend the rest of my life there."*

SECURITIES WITH CONVENIENCE YIELD EXPRESSED IN %

In case Of Continuous Copounding : Fair Future Price = Spot Price $\times e^{(r-c)t}$

Where c = convenience yield p.a expressed in percentage

FAIR FUTURE PRICE OF SECURITY WITH STORAGE COST EXPRESSED IN %

In case Of Continuous Copounding : Fair Future Value = Spot Price $\times e^{(r-s)t}$ Where s = storage cost p.a expressed in %

FAIR FUTURE PRICE OF SECURITY WITH CONVENIENCE YIELD EXPRESSED IN AMOUNT (RS.)

In case Of Continuous Copounding :

Fair Futures Price = [Spot Price + Present Value Of Storage Costs - Present Value Of Convenience Yield] $\times e^{rt}$

Note: The above valuations could have also be done by using Normal Compounding.

CONCEPT OF ARBITRAGE UNDER FUTURE MARKET :

<u>Case</u>	<u>Valuation</u>	<u>Borrow/Invest</u>	<u>Cash Market</u>	<u>Future Market</u>
Actual Futue Value > Fair Future Value	Overvalued	Borrow	Buy	Sell
Actual Future Value < Fair Future Value	Undervalued	Invest	Sell*	Buy

* here we are assuming that arbitrageur holds one share .

OBTAINING COMPLETE HEDGE WITH THE HELP OF INDEX FUTURES AND BETA

How to Hedge :

First Decide on Position to be taken :

If you are Short on any Security

To Hedge You should go Long in Index [Sensex or Nifty]

If you are Long on any Security

To Hedge You should go Short in Index [Sensex or Nifty]

Decide on Value to be Hedged :

Extent Of Hedging or Total Value to be hedged or Value of Perfect Hedge = Beta Of The Stock \times Value Of Transaction or Value Of Exposure or Current Value Of Portfolio

OBTAINING PARTIAL HEDGE WITH THE HELP OF INDEX FUTURES AND BETA

Partial Hedge = Beta Of The Stock \times Value Of Transaction or Value Of Exposure or Current Value Of Portfolio \times % which is to be hedged

GAIN OR LOSS UNDER FUTURE CONTRACT :

The profit or payoff position of a futures contract depends on the differences between the contracted future price and the

"Never let yesterday's disappointments overshadow tomorrow's dreams." "Never talk defeat. Use words like hope, belief, faith, victory." Be realistic But Plan for a miracle."

actual market price prevailing on the maturity date .

<u>Position</u>	<u>Actual Price On Expiration</u>	<u>Profit/Loss</u>
Long	Increase	Profit
Long	Decrease	Loss
Short	Increase	Loss
Short	Decrease	Profit

NUMBER OF FUTURE CONTRACTS TO BE SOLD OR PURCHASED FOR INCREASING OR REDUCING BETA TO A DESIRED LEVEL USING INDEX FUTURE

The number of futures contract to be taken for increasing and reducing beta to a desired level is given by the following formula :

$$\frac{\text{Current Portfolio Value} \times [\text{Existing Beta of the Portfolio} - \text{Desired Beta of the Portfolio}]}{\text{Value Of one Futures Contract}}$$

Note : Buy or Purchase Future if Desired or Target Beta is more than the Existing Beta .[i.e If Beta is to be increased than a buying position should again be supplemented by a buying position]

Note : Sale Future if Desired or Target Beta is less than the Existing Beta [i.e If Beta is to be decreased than a buying position should be supplemented by a selling position]

BASIS

Basis = Future Price (the actual price that is quoted in the future market) - Spot Price (the price that is quoted in the cash market)

➔ In a normal market, the spot price is less than the futures price and accordingly the basis would be negative. Such a market is known as a **contango market**.

➔ Basis can become positive, i.e., the spot price can exceed the futures price .The market under such circumstances is termed as a **backwardation market** or inverted market.

➔ Basis will approach zero towards the expiry of the contract, i.e., the spot and futures prices converge as the date of expiry of the contract approaches. The process of the basis approaching zero is called **convergence**.

OPEN INTEREST / OPEN CONTRACTS OR OPEN COMMITMENTS :

Open Interest means total number of the contracts still outstanding. It is the sum of all the long positions or equivalently, it is the sum of all the short positions that has not been exercised, closed or expired.

<u>Time</u>	<u>Trading Activity</u>	<u>Open Interest</u>
Jan 1	A buys 1 option and B sells 1 option contract	1
Jan 2	C buys 5 options and D sells 5 options contracts	6
Jan 3	A sells his 1 option and D buys 1 options contract	5
Jan 4	E buys 5 options from C who sells 5 options contracts	5

Once you have mastered time, you will understand how true it is that most people overestimate what they can accomplish in a year - and underestimate what they can achieve in a decade!

OPTIONS

OPTION- AN UNDERSTANDING

<u>Call Option</u>		<u>Put Option</u>	
Call Writer / Call Seller	Call Holder/Call Buyer	Put Writer / Put Seller	Put Holder/Put Buyer
Obligation to Sell/Performance Is Must	Right To Buy But no Obligation to perform	Obligation to Buy/Performance is must	Right to Sell But no Obligation to perform

TYPES OF CALL OPTION-CALL & PUT

Call Option :A option giving the buyer of the option the right but not the obligation to buy the required shares.(Right to buy)

Put Options :A option giving the buyer of the option the right but not the obligation to sell the required shares .(Right to sell)

CLASSIFICATION OF OPTION CONTRACT ON THE BASIS OF UNDERLYING ASSET

Option may be classified with reference to the underlying asset.

Stock Option : Option on the individual shares are known as Stock Options or Equity Options.Example:Tata Ltd Stock Option,Reliance Ltd Stock Option

Index Option : An index option is the option on the index of securities . In India SEBI has allowed these options on Nifty and Sensex

Interest Rate Option : This option are taken on interest rate . Example:Interest Rate Cap.Floor & Collar.This option is not available in India

Currency Option : This option are taken on currencies. This options are also not available in India

BUYERS AND SELLERS OF OPTION CONTRACT :

➔Buyer and Seller is determined from the view point of right.

➔The person who has a right under a contract is known as Buyer. The right may be Right to Buy [Call Buyer] or Right to Sell [Put Buyer] .

➔The person who is giving or selling the right is known as Seller . He may be Call Seller or Put Seller .They have no right but obligation to perform their contract if buyer decides to exercise their right .

EXERCISE PRICE /STRIKE PRICE :

The fixed price at which buyer of the option contract can exercise his option to buy/sell a share.

Yesterday is but a dream, tomorrow is only a vision. But today, well lived, makes every yesterday a dream of happiness, and every tomorrow a vision of hope. Look well, therefore, to this day, for it is life, the very life of life

OPTION PREMIUM/OPTION PRICE/OPTION VALUE :

When the buyer buys a right (either the right to buy or the right to sell) he has to pay the writer a price .This is called Option Premium .

Option Premium is cost from the viewpoint of holders(buyers) and income from the viewpoint of writers (seller).

EXPECTATION OF VARIOUS PARTY IN OPTION MARKET :

Long Call :	Person buying a Call option	They expects Price to Increase
Long Put :	Person buying a Put option	They expects Price to Decrease
Short Call :	Person selling a Call option	They expects Price to Decrease
Short Put :	Person selling a Put option	They expects Price to Increase

EUROPEAN & AMERICAN OPTION

European Option : When an option can be exercised only on the expiry date , it is called a European option

American Option : When an option can be exercised on or before the expiry date, it is called an American Option .

↪ American –Any Time

European –Expiry Date

IN / OUT /AT THE MONEY OPTION-FOR CALL

Market Scenario

For Holder or Buyer Of Call Option

Market Price > Strike Price

In the Money

Market Price < Strike Price

Out Of The Money

Market Price = Strike Price

At The Money

Note : The above position is reversed for the Writer of the Option .

Note : For finding In /Out /At the money Option , Premium is ignored as it is considered as sunk cost.

IN / OUT /AT THE MONEY OPTION-FOR PUT

Market Scenario

Holder or Buyer Of Put Option

Market Price > Strike Price

Out Of The Money

Market Price < Strike Price

In the Money

Market Price = Strike Price

At The Money

Note : The above position is reversed for the Writer of the Option .

Note : For finding In /Out /At the money Option , Premium is ignored as it is considered as sunk cost.

PAY OFF/PROFIT & LOSS OF A CALL OPTION:

Pay off means Profit and Loss.In determining the profit and loss we take into consideration the amount of premium.

Call Option :

Profit : When Market Price > Strike Price

In such case he will exercise the Option.Profit = Actual Market Price - Strike Price - Premium

Loss : When Market Price < Strike Price

In such case he will not exercise the option .Loss = Amount Of Premium Paid

You see, in life, lots of people know what to do, but few people actually do what they know. Knowing is not enough! You must take action.As you behave towards others,expect that others will behave to you."

Note : Position of Call Seller will just be opposite of Position of Call Buyer.

PAY OFF/PROFIT & LOSS OF A PUT OPTION :

Pay off means Profit and Loss. In determining the profit and loss we take into consideration the amount of premium.

Put Option :

Profit : When Market Price < Strike Price

In such case he will exercise the option. Profit = Strike Price - Current Market Price - Premium

Loss: When Market Price > Strike Price

In such case he will not exercise the Option. Loss = Amount of Premium Paid

Note : Position of Put Seller will just be opposite of Position of Put Buyer.

MAXIMUM & MINIMUM PROFIT & LOSS

FOR CALL BUYER

Maximum Profit = Unlimited

Maximum Loss = Amount Of Premium Paid

FOR PUT BUYER

Maximum Profit = Strike Price - Premium Paid

Maximum Loss = Amount of Premium Paid

FOR CALL SELLER

Maximum Profit = Amount Of Premium Received

Maximum Loss = Unlimited

FOR PUT SELLER

Maximum Profit = Amount Of Premium Received

Maximum Loss = Strike Price - Premium Paid

BREAK EVEN PRICE OF CALL

Breakeven price is the market price at which the option parties neither makes a profit nor incur any losses.

Break-Even Market Price for Buyer and Seller of Call Option : Exercise Price + Premium

BREAK EVEN PRICE OF PUT OPTION

Breakeven price is the market price at which the option parties neither makes a profit nor incur any losses.

Break-Even Market Price for Buyer and Seller of Put Option : Exercise Price – Premium

POSITION TO BE TAKEN IN OPTION MARKET

Expectation

If Expected Market Price > Strike Price or If Market will go up

If Expected Market Price < Strike Price or If Market will go down

If Expected Market Price = Strike Price or If Market will remain same

Call

Buy Call

Sell Call

No action

Put

Sell Call

Buy Put

No Action

INTRINSIC VALUE AND TIME VALUE OF OPTION

Option Premium is the component of two parts : Intrinsic Value + Time Value of Money i.e $OP = IV + TVM$

Intrinsic Value

→ It can never be negative (always equal to or greater than zero).

→ Intrinsic Value of Call Option = Maximum of (0, Current Market Price - Exercise Price);

→ Intrinsic Value of Put Option = Maximum of (0, Exercise Price - Current Market Price).

“The price of success is hard work, dedication to the job at hand, and the determination that whether we win or lose, we have applied the best of ourselves to the task.”

Time Value of Option :

→ Time Value of Option is the amount by which the option price exceeds the Intrinsic Value. i.e $TVM = OP - IV$

→ On the expiration date, the time value of option is zero and the premium is entirely represented by the Intrinsic Value.

VALUE/PREMIUM/PRICE OF CALL OPTION AS ON EXPIRY :

Value of Call Option at expiration : Maximum of (Actual Market Price - Strike Price , 0)

VALUE/PREMIUM/PRICE OF PUT OPTION AS ON EXPIRY :

Value of Put Option at expiration : Maximum of (Strike Price - Actual Market Price , 0)

VALUE OF CALL OPTION BEFORE EXPIRY DATE : MINIMUM THEORETICAL PRICE OF CALL OPTION / LOWER LIMIT:

Theoretical Minimum Value of Call Option :

= Spot Price or CMP – Present Value of Strike Price = Spot Price or CMP – Strike Price $\times e^{-rt}$

VALUE OF PUT OPTION BEFORE EXPIRY DATE : MINIMUM THEORETICAL PRICE OF PUT OPTION / LOWER LIMIT :

Theoretical Minimum Value of Put Option :

= Present Value of Strike Price – Spot Price or CMP = Strike Price $\times e^{-rt}$ – Spot Price or CMP

BIONOMIAL MODEL FOR OPTION VALUATION-FOR CALL

Option Premium = $\Delta \times$ Current Market Price - Amount Of Borrowing

Where, **Number Of Share to be Purchased** : [Also referred as Δ / Hedge Ratio/Option Delta]

$$\frac{\text{Value Of Call Option On Expiry At High Price} - \text{Value Of Call Option On Expiry At Low Price}}{\text{High Price} - \text{Low Price}} = \frac{C_1 - C_2}{S_1 - S_2}$$

Amount Of Borrowings : $B = \frac{1}{1+r} (\Delta S_2 - C_2)$

r = rate of interest per option period . For example if annual rate of interest is 10 % and Option period is 3 months then we will take .025 in the above formula .

RISK NEUTRAL METHOD-FOR CALL

Risk Neutral Method gives the same value of Option Premium as given by Bionomial Model .

Value/Premium/Price Of Call As On Today =
$$= \frac{C_1 \times p + C_2 \times (1-p)}{(1+r)}$$

How to Calculate Probability :

Alt 1 : Expected % Risk Free Return = (% increase in price \times probability of price increase) - (% decrease in price \times

One reason so few of us achieve what we truly want is that we never direct our focus; we never concentrate our power. Most people dabble their way through life, never deciding to master anything in particular.

probability of price decrease)

⇒ Expected % Risk Free Return = [% increase in price × p] - [% decrease in price × (1 - p)]

Alt 2 : When c.c is not used : $p = \frac{\text{Spot Price} (1 + \text{Interest Rate}) - \text{Lower Price}}{\text{Higher Price} - \text{Lower Price}}$

Alt 3 : When c.c is used $p = \frac{\text{Spot Price} \times e^{rt} - \text{Lower Price}}{\text{Higher Price} - \text{Lower Price}}$

Alt 4 : $p = \left[\frac{1 + r - d}{u - d} \right]$

Where $u = 1 + \%$ change in asset price if prices go up i.e $S_1 \div S$

Where $d = 1 + \%$ change in asset price if prices go down i.e $S_2 \div S$

$r =$ rate of interest per option period . For example if annual rate of interest is 10 % and Option period is 3 months then we will take .025 in the above formula .

Where p and $(1-p)$ are the probability of price increase and price decrease respectively.

$S =$ Current Market Price; $S_1 =$ Higher Price ; $S_2 =$ Lower Price

$C_1 =$ Value of Call Option as on expiry at Higher Price i.e $\text{Max} [S_1 - \text{Exercise Price} , 0]$

$C_2 =$ Value of Call Option as on expiry at Lower Price i.e $\text{Max} [S_2 - \text{Exercise Price} , 0]$

RISK NEUTRAL METHOD-FOR PUT

Risk Neutral Method gives the same value of Option Premium as given by Binomial Model .

Value/Premium/Price Of Put As On Today $= \frac{C_1 \times p + C_2 \times (1 - p)}{(1 + r)}$

How to Calculate Probability : Same As Above

$C_1 =$ Value of Put Option as on expiry at Higher Price i.e $\text{Max} [\text{Exercise Price} - S_1 , 0]$

$C_2 =$ Value of Put Option as on expiry at Lower Price i.e $\text{Max} [\text{Exercise Price} - S_2 , 0]$

BLACK & SCHOLES MODEL-FOR CALL

↪ Value Of European Call Option $= \text{Spot Price} \times N(d_1) - \text{Exercise Price} \times e^{-rt} \times N(d_2)$

$d_1 = \frac{\ln \left[\frac{\text{Current Market Price}}{\text{Exercise Price}} \right] + [r + .50\sigma^2] \times t}{\sigma \times \sqrt{t}}$ and $d_2 = d_1 - \sigma\sqrt{t}$

$\sigma =$ Standard Deviation of Continuous Compounded Rate

$t =$ remaining life to expiration of the option in terms of year for example for a call option of 6 months $t = .5$, for a call option

of 73 days $t = \frac{73}{365}$; $r =$ continuous compounded risk free **annual** rate of return ; $\ln =$ Natural Log with base e

BLACK & SCHOLES MODEL-FOR PUT

“Before you start some work, always ask yourself three questions -Why am I doing it, What the results might be & Will I be successful. Only when you think deeply and find satisfactory answers to these questions, go ahead.”

$$\text{Value Of Put} = \text{Strike Price} \times [1 - N(d_2)] \times e^{-rt} - \text{Current Market Price} \times [1 - N(d_1)]$$

Note: We can also use PCPT Model for calculating Value Of Put, provided Value of Call is either given or it is already calculated.

VALUE OF EQUITY & DEBT BY USING BLACK & SCHOLES MODEL

$$\text{Current Value of Equity} = N(d_1) \times \text{Current Value or Present Value of Business} - N(d_2) \times \text{Value of Debt} \times e^{-rt}$$

$$d_1 = \frac{\ln\left(\frac{\text{Value of Business}}{\text{Value of Debt}}\right) + (r + .50\sigma^2) \times t}{\sigma\sqrt{t}} \quad \text{and} \quad d_2 = d_1 - \sigma\sqrt{t}$$

Note: This concept is similar to normal BSM Method. The only difference is that instead of Current Market Price we use Current Value Of Business and in case of Exercise Price we use Value of Debt here.

PUT CALL PARITY THEORY (PCPT)

➔ This is a general relationship between Value of Call and Value of Put provided it has the same exercise price and same maturity

➔ **Symbolically :** As per PCPT we have : Value of Call + Present Value of Strike Price = Value of Put + Current Market Price or Value of Call + Strike Price $\times e^{-rt}$ = Value of Put + Current Market Price

➔ If Put Call Parity theorem do not hold then arbitrage opportunity is possible .i.e If LHS \neq RHS Arbitrage Opportunity is possible.

OPTION STRATEGIES

STRADDLES

➔ Straddle is an offsetting position taken by an investor in the options market. Straddle can be of two types:

1. Long Straddle

Buying a Call and Buying a Put with the same strike price and the same expiry date.

In Long straddle the investor will have to pay premium on the call as well as on put option contract.

2. Short Straddle

Selling a Call and a Selling a Put with the same strike price and the same expiry date.

In Short straddle the investor will receive premium on the call as well as on put option contract.

➔ In case of Long & Short Straddle , an investor breaks even at two points :

(Strike Price - Total Premium) and (Strike Price + Total Premium)

➔ If question is silent always assume Long Straddle.

STRIPS

➔ A strips involves buying one call and buying two puts all with the same exercise price and same expiry date.

➔ A strip is adopted when decrease in price is more likely than an increase.

Don't argue for other people's weaknesses. Don't argue for your own. When you make a mistake, admit it, correct it, and learn from it--immediately.

STRAPS

- ➔ A **strap** involves buying two calls and buying one put all with the same exercise price and same expiry date.
- ➔ A strap is adopted when increase in price is more likely than a decrease.

STRANGLE

- ➔ There are two types of strangle strategies depending on whether you buy options or sell options.

Long Strangle: where you buy a Call and buy a Put Option on the same underlying, same expiry date but different strike price.

Short Strangle: where you sell a Call and sell a Put Option on the same underlying, same expiry date but different strike price.

There are 2 break-even points for the strangle position. The breakeven points can be calculated using the following formulae.

Upper Breakeven Point = Strike Price of Long Call + Net Premium Paid

Lower Breakeven Point = Strike Price of Long Put - Net Premium Paid

BUTTERFLY SPREAD

- ➔ It can be Long Butterfly Spread and Short Butterfly Spread

LONG BUTTERFLY SPREAD

- ➔ It involves four options at three different strike prices. One such way of creating Butterfly Spread is as follows :

Buy a call option with a lower strike price &

Buy another call with a higher strike price.

Then sells two call options with strike rates in between higher strike price and lower strike price .

all the options have same expiry date .

Breakeven Point(s)

There are 2 break-even points for the butterfly spread position. The breakeven points can be calculated using the following formulae.

· Upper Breakeven Point = Strike Price of Higher Strike Long Call - Net Premium Paid

· Lower Breakeven Point = Strike Price of Lower Strike Long Call + Net Premium Paid

SHORT BUTTERFLY SPREAD

Sell 1 Call ,Buy 2 Calls and Sell 1 Call in the same manner as Long Butterfly Spread.

- ➔ If question is silent always assume Long Butterfly Spread.

CALL RATIO SPREAD

- ➔ The strategy consists of buying 1 in the money call and selling 2 out of the money calls on the same underlying security and expiration date.

- ➔ The only thing that will be different is the strike price of the options.

- ➔ It is a limited profit, unlimited risk options trading strategy that is taken when the options trader thinks that the underlying stock will experience little volatility in the near term.

- ➔ Breakeven Point(s): There are 2 break-even points for the ratio spread position. The breakeven points can be calculated using the following formulae.

· Upper Breakeven Point = Strike Price of Short Calls + (Points of Maximum Profit / Number of Uncovered Calls)

“Put yourself in a state of mind where you say to yourself, 'Here is an opportunity for you to celebrate like never before, my own power, my own ability to get myself to do whatever is necessary.

· Lower Breakeven Point = Strike Price of Long Call + Net Premium Paid

BULLISH CALL SPREAD

➔ An options strategy that involves purchasing call options at a specific strike price while also selling the same number of calls of the same asset and expiration date but at a higher strike.

➔ A bull call spread is used when a moderate rise in the price of the underlying asset is expected.

➔ The underline price at which **break-even** is achieved for the bull call spread position can be calculated using the following formula. Breakeven Point = Strike Price of Long Call + Net Premium Paid

BULL PUT SPREAD STRATEGY

Buy Put at Lower Strike Price & Sell Put at Higher Strike Price

BEAR CALL SPREAD STRATEGY

Buy Call at Higher Strike Price & Sell Call at Lower Strike Price

BEAR PUT SPREAD STRATEGY

Buy Put at Higher Strike Price & Sell Put at Lower Strike Price

CALENDAR SPREAD

Purchase & Sell Of two Option Of the Same Type, Same Exercise Price But Different Maturity

CAPS ,FLOORAND COLLAR

This is a method of hedging by which the upper limit and lower limit of price to be paid for the underlying asset can be assured .

Caps : Caps means setting the upper limit .Usually the upper limit is set by Strike Price of a Call purchased

Floor : Floor means setting the lower limit .Usually the lower limit is set by Strike Price of Put sold .

Collar : Combination of Caps and Floor is known as Collars .

SYNTHETIC LONG AND SYNTHETIC SHORT

Synthetic Futures is a position constructed with options which have the same strike price and same expiration. It can be either long or short.

A long synthetic futures position consists of purchasing a call and selling a put.i.e Synthetic Long = Long Call + Short Put

A short synthetic futures position consists of selling call and purchasing a put.i.e Synthetic Short = Short Call +Long Put

ARBITRAGE OPPORTUNITY UNDER OPTION MARKET -BEFORE EXPIRY-ON CALL

Actual Premium < Fair Premium

Undervalued

Buy Call Option

Sell in Cash Market

Invest

You see, it's never the environment; it's never the events of our lives, but the meaning we attach to the events how we interpret them-that shapes who we are today & who we'll become tomorrow.

ARBITRAGE OPPORTUNITY UNDER OPTION MARKET -BEFORE EXPIRY-ON PUT

Actual Premium < Fair Premium	Undervalued	Buy Put Option	Buy in Cash Market	Borrow
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ARBITRAGE OPPORTUNITY UNDER OPTION MARKET -ON EXPIRY-ON CALL

Actual Premium < Fair Premium	Undervalued	Buy Call Option	Sell in Cash Market
Actual Premium > Fair Premium	Overvalued	Sell Call Option	Buy in Cash Market

ARBITRAGE OPPORTUNITY UNDER OPTION MARKET -ON EXPIRY-ON PUT

Actual Premium < Fair Premium	Undervalued	Buy Put Option	Buy in Cash Market
Actual Premium > Fair Premium	Overvalued	Sell Put Option	Sell in Cash Market

OPTION GREEK PARAMETERS

(a) Delta (Sensitivity to Change in Price of the Underlying Asset) : Delta is a measure of sensitivity of the price of an option to a unit change in the price of the underlying asset.

It is calculated as : $\Delta = \frac{\text{Change in Option Premium}}{\text{Change in Price of Underlying Asset}}$

Note : Delta of a Call Option is always positive and Delta of a Put Option is always negative

(b) Gamma (Sensitivity to Change in Delta) : It is a measure of the rate of change of the delta with respect to the price of the underlying asset .**It is calculated as :** $\Gamma = \frac{\text{Change in Delta}}{\text{Change in Price of Underlying Asset}}$

(c) Vega (Sensitivity to Change in Volatility of Asset Price) : It is a measure of rate of change in option price with respect to the percentage change in volatility of the underlying assets price .

It is calculated as : $\text{Vega} = \frac{\text{Change in Option Premium}}{\text{Change in Volatility of Price}}$

(d) Theta (Sensitivity to Change in Time to Expiry) : It is the rate of change in value of the option with respect to time to maturity.**It is calculated as** $\Theta = \frac{\text{Change in Option Premium}}{\text{Change in Time to Expiry}}$

(e) Rho (Sensitivity to Change in Interest Rate) : It is the rate of change in option price with respect to change in interest rate .**It is calculated as :** $\rho = \frac{\text{Change in Option Premium}}{\text{Change in Rate of Interest}}$

BLACK & SCHOLES MODEL-WHEN DIVIDEND AMOUNT IS GIVEN

As per BSM Model : Value of Call Option = Adjusted Current Price $\times N(d_1)$ – Exercise Price $\times e^{-rt} \times N(d_2)$

Where $d_1 = \frac{\ln \left[\frac{\text{Adjusted Current Market Price}}{\text{Exercise Price}} \right] + [r + .5\sigma^2] \times t}{\sigma \times \sqrt{t}}$; $d_2 = d_1 - \sigma\sqrt{t}$

Where Adjusted Current Market Price = Current Market Price - Present Value Of Dividend Income

Your life changes the moment you make a new, congruent, and committed decision. Without involvement, there is no commitment. Mark it down, asterisk it, circle it, underline it. No involvement, no commitment.

BLACK AND SCHOLES MODEL-IN CASE OF DIVIDEND YIELD

As per BSM Model : Value of Call Option = Spot Price $\times e^{-dy \times t} \times N(d_1) - \text{Exercise Price} \times e^{-r \times t} \times N(d_2)$

$$\text{Where } d_1 = \frac{\ln \left[\frac{\text{Current Market Price}}{\text{Exercise Price}} \right] + [r - dy + .50\sigma^2] \times t}{\sigma \times \sqrt{t}} ; d_2 = d_1 - \sigma\sqrt{t}$$

Where dy = dividend yield p.a expressed in %

PUT-CALL RATIO (PCR)

The ratio of the volume of put options traded to the volume of call options traded i.e PCR = Volume Of Put / Volume Of Call. The put-call ratio helps to determine market sentiment, with a high ratio indicating a bearish sentiment and a low ratio indicating a bullish sentiment

FACTORS AFFECTING DETERMINATION OF VALUE OF OPTION(OPTION PREMIUM)[FROM THE POINT OF VIEW OF OPTION WRITER]

Current Market Value/Spot Value :

<u>Type of Option</u>	<u>Market Price Increases</u>	<u>Market Price Decreases</u>
Call Option	Become more Valuable	Become less Valuable
Put Option	Become less Valuable	Become more Valuable

Exercise / Strike Price (EP) :

<u>Type of Option</u>	<u>Market Price Increases</u>	<u>Market Price Decreases</u>
Call Option	Become less valuable	Become more valuable
Put Option	Become more valuable	Become less valuable

Time Expiration: Both Put & Call Options become more valuable as the time to expiration increases. The risk involved for the option writer is more in case of long term contracts. Higher the risk involved, higher the option premium.

Risk Free Rate of Return / Risk Free Interest Rate :

<u>Risk Free Interest Rate</u>	<u>Call Option Premium</u>	<u>Put Option Premium</u>
Higher	Higher	Lower
Lower	Lower	Higher

Volatility : Higher the volatility/instability in the price of an underlying asset higher is the option premium. The reason for this is simply that higher volatility increases the risk of an option writer and hence the option premium.

SHORT SELL

Short Selling or "shorting" is the practice of selling securities which the seller does not own, in the hope of repurchasing them later at a lower price. Short selling is the selling of a stock that the seller doesn't own. This option is available in Cash Market.

TREATMENT OF BROKERAGE

Brokerage is paid in both the cases i.e when the shares are purchased as well as when the shares are sold .

Just as your car runs more smoothly & requires less energy to go faster & farther when the wheels are in perfect alignment, u perform better when your thoughts, feelings, emotions, goals, & values are in balance

VALUATION OF BUSINESS

DIVIDEND YIELD METHOD OR DIVIDEND CAPITALIZATION VALUATION METHOD

$$\text{Dividend Yield} = \frac{\text{Dividend Per Share (DPS)}}{\text{Market Price Per Share (MPS)}} \Rightarrow \text{Market Price Per Share} = \frac{\text{Dividend Per Share (DPS)}}{\text{Dividend Yield}}$$

EARNING YIELD METHOD OR INCOME OR EARNING CAPITALIZATION VALUATION METHOD

$$\text{Earning Yield} = \frac{\text{Earning Per Share (DPS)}}{\text{Market Price Per Share (MPS)}} \Rightarrow \text{Market Price Per Share} = \frac{\text{Earning Per Share (DPS)}}{\text{Earning Yield}}$$

ECONOMIC VALUE METHOD (EVA)

Symbolically : EVA = Net Operating Profit After Taxes - Cost Of Capital × Average Capital Employed

➔ NOPAT = EBIT (1- Tax)

➔ Cost Of Capital = $K_e \times W_e + K_d \times W_d + K_p \times W_p$

➔ Average Capital Employed = $\frac{\text{Opening Capital} + \text{Closing Capital}}{2}$

If Opening & Closing balance are not separately given, then in such case we should simply take Closing Balance without taking its average.

➔ Total Funds / Capital Employed includes : Equity Share Capital + Reserves + Debentures + Preference Share Capital + Long Term Loan - Profit and Loss Account (Dr.) - Fictitious Asset

PRICE EARNING [P/E] RATIO VALUATION METHOD

$$\text{Price Earning Ratio [P/E Ratio]} = \frac{\text{MPS}}{\text{EPS}} \Rightarrow \text{MPS} = \text{P/E Ratio} \times \text{EPS}$$

VALUE OF FIRM USING FUTURE MAINTAINABLE PROFITS (FMP)

$$\text{Value Of Business} = \frac{\text{Future Maintainable Profit}}{\text{Relevant Capitalization Rate}}$$

Calculation Of Future Maintainable Profits :

Average Past Year Profits	xxxx
Add :	
All Actual Expenses and Losses not likely to occur in future	xxxx
All Profits likely to arise in Future	xxxx
Less : All Expenses and Losses expected to arise in future	(xxxx)
Less : All Profits not likely to occur in future	(xxxx)

We love ourselves even after doing many mistakes. Then how can we hate others for their one mistake. Think before you hate someone or hate yourself.

MARKET VALUE ADDED (MVA)**➔Symbolically :**

MVA = Current Value of the securities of the Company in the Market - Total Amount of Shareholder's Funds [Balance Sheet Fig.]

Note: Current Value of the securities of the Company in the Market = MPS x No. Of Equity Shares

Note: Shareholder's Funds [Balance Sheet Fig.] includes Equity Share Capital + Retained Earning - Accumulated Loss - P/L Account (Debit Balance)

QUESTION Supreme Industries has an equity market capitalisation of Rs. 3,400 crore in current year. Further that its equity share capital is Rs. 2,000 crore and its retained earnings are Rs. 600 crore. Determine the MVA and interpret it.

Solution : Market Value Added = (Rs. 3,400 crore - Rs. 2,600 crore) = Rs. 800 crore.

FAIR PRICE OF SHARE

Fair Price of Share =
$$\frac{\text{Value as per Net Asset Value} + \text{Value as per Profit Earning Capacity Method}}{2}$$

NET ASSET VALUE (NAV)

Net Assets = [Total Assets - Total External Liability]

Net Asset Per Share =
$$\frac{\text{Net Asset}}{\text{Number Of Equity Share Outstanding}}$$

Note: Total Asset and Total External Liability may be taken on the basis of Market Value , Liquidation Value or Book Value as the case may be .If question is silent then in such case we should give preference to Market Value base.

BOOK VALUE VALUATION METHOD

Book Value Per Share =
$$\frac{\text{Total Book Value of Shareholder}}{\text{Number Of Equity Shares}} = \frac{\text{Shareholder's Fund}}{\text{Number Of Equity Shares}}$$

Where Shareholder's Fund :

From Liability Side : Equity Share Capital + Reserve & Surplus + Retained Earnings - Accumulated loss - P/L (Debit balance)

From Asset Side : Assets less External Liabilities

CHOP-SHOP APPROACH/BREAK-EVEN APPROACH TO VALUATION

➔The “chop-shop” approach suggests that the sum of the individual parts of a firm may be worth more than the current value of the whole.

➔The “chop-shop” approach to valuation was first proposed by Dean Lebaron and Lawrence Speidell of Batterymarch Financial Management.

➔The “chop-shop” approach involves three steps.

Step 1: Identify the firm’s various business segments and calculate the average capitalization ratios for firms in those

Your belief determines your action & your action determines your results, but first you have to believe. The more goals you set - the more goals you get.

industries.

Step 2: Calculate a “theoretical” market value based upon each of the average capitalization ratios.

Step 3: Average the “theoretical” market values to determine the “chop-shop” value of the firm.

QUESTION: Using the chop-shop approach (or Break-up value approach), assign a value for Cornett GMBH. whose stock is currently trading at a total market price of €4 million. For Cornett, the accounting data set forth three business segments: consumer wholesale, specialty services, and assorted centers. Data for the firm’s three segments are as follows:

BUSINESS SEGMENT	Segment Sales	Segment Assets	Segment Income
Consumer wholesale	€1,500,000	€750,000	€100,000
Specialty services	€800,000	€700,000	€150,000
Assorted centers	€2,000,000	€3,000,000	€600,000

Industry data for “pure-play” firms have been compiled and are summarized as follows:

BUSINESS SEGMENT	Capitalization/Sales	Capitalization/Assets	Capitalization/OperatingIncome
Consumer wholesale	0.75	0.60	10.00
Specialty services	1.10	0.90	7.00
Assorted centers	1.00	0.60	6.00

ANSWER:

Cornett, GMBH. – Break-up valuation

Business Segment	Capital-to- Sales	Segment Sales Theoretical Values	
Consumer wholesale	0.75	€1,500,000	€1,125,000
Specialty services	1.10	€800,000	€880,000
Assorted centers	1.00	€2,000,000	€2,000,000
Total value			€4,005,000

Business Segment	Capital-to- Assets	Segment Assets Theoretical Values	
Consumer Wholesale	0.60	€750,000	€450,000
Specialty services	0.90	€700,000	€630,000
Assorted centers	0.60	€3,000,000	€1,800,000
Total value			€2,880,000

Business Segment	Capital-to-Op.Income	Segment Income	Theoretical Values
Consumer wholesale	10.00	€100,000	€1,000,000
Specialty services	7.00	€150,000	€1,050,000
Assorted centers	6.00	€600,000	€3,600,000
Total value			€5,650,000

Average theoretical value = $4,005,000 + 2,880,000 + 5,650,000 / 3 = €4,178,000$ (approx)

FREE FLOAT MARKET CAPITALIZATION/VALUATION

Free Float Market Capitalisation means Market Capitalisation or Market Value of the Company excluding promoter’s share. As the name indicate “free float”, it means shares which are freely available or freely tradeable in the market. Shares held by promoters are not freely tradeable in the market. There shares are subject to certain restriction as placed by SEBI.

Example: No. Of Total Equity Share = 1,00,000; MPS = 10; Promoter's Holding = 60%. Calculate Total & Free Float Market Capitalization.

Solution: Total Market Value = $1,00,000 \times 10 = 10,00,000$

Free Float Market Value = $1,00,000 \times 10 \times 40\% = 4,00,000$

"If you want total security, go to prison. There you're fed, clothed, given medical care, and so on. The only thing lacking... is freedom." If you have 50 friends - It is not enough but If you have one enemy - It is too much.

LEASING

PARTIES TO LEASE AGREEMENT :

There are two parties under any lease agreement :

- (i) **Lessor** : Owner of the asset is known as Lessor .
- (ii) **Lessee** : The party who uses the asset is known as Lessee .

HOW TO EVALUATE LEASE OR BORROW & BUY DECISION : A FINANCING DECISION

Calculate Present Value Of Outflow under both the option separately by using the discount rate and choose that option that involves minimum outflow .

HOW TO EVALUATE FROM THE POINT OF VIEW OF LESSOR- AN INVESTMENT DECISION

If NPV is positive, then Lessor should give the asset on Lease otherwise he should not give.

CHOICE OF DISCOUNT RATE

This is the most confusing topic as there are lot of views regarding the use of appropriate Discount Rate. Suggested Answers issued by institute are also based on different views. However the most popular assumption and treatment is given below :

Discount Rate For Lessee : $K_d = \text{Interest Net Of Tax i.e Interest } (1 - \text{Tax})$

Discount Rate For Borrower : $K_d = \text{Interest Net Of Tax i.e Interest } (1 - \text{Tax})$

Discount Rate For Hire Purchaser : $K_d = \text{Interest Net Of Tax i.e Interest } (1 - \text{Tax})$

Note: If Cost Of Capital is given in question and also its PVF table is given in question itself, then in such case we should use Cost Of Capital.

Discount Rate For Lessor : K_o i.e Cost Of Capital

INTERNAL RATE OF RETURN OR IMPLIED INTEREST COST OF LEASE FOR LESSOR

➔ It is the discounting rate at which the net present value of any proposal is zero.

➔ This method relieves us from the task of identifying the discount rate to be used .

➔ Internal Rate Of Return is the discount rate at which Net Present Value (NPV) is zero . Under this method we discount the cash flows by two rates. One higher rate and one lower rate . By higher rate we should get negative NPV and by lower rate we should get positive NPV. Now to find exact discount rate we will use following equation

$$\text{IRR} = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in rates.}$$

"We are told never to cross a bridge till we come to it, but this world is owned by men who have 'crossed bridges' in their imagination far ahead of the crowd."

INTERNAL RATE OF RETURN OR IMPLIED INTEREST COST OF LEASE FOR LESSEE

➔ It is the discounting rate at which the net present value of any proposal is zero.

➔ Here we should compare Buying Option with Lease Option to calculate IRR.

Present Value of Benefits On Account Of Leasing = Present Value Of Costs On account Of Leasing

or Cost Of Asset = Present Value Of Lease Rent Paid Net Of Tax + Present Value of Tax saving on Depreciation + Present Value Of Salvage Value adjusted For Tax

Now use IRR Technique and take out the required rate.

BREAKEVEN LEASE RENTALS

The break even lease rental is the rental at which the lessee is indifferent to a choice between lease financing and borrowing/buying .

EQUAL ANNUAL LOAN INCLUSIVE OF INTEREST :- WHEN INSTALMENT IS PAID AS THE END OF EACH YEAR

For calculating Equal Annual Loan Inclusive Of Interest we will use following formula :

$$\frac{\text{Cost Of Asset (or Loan Taken If It Differs)}}{\text{PVAF (r \% , n years)}}$$

Where r = pre tax required return by money lender i.e the party giving the loan

EQUAL ANNUAL LOAN INCLUSIVE OF INTEREST :- WHEN INSTALMENT IS PAID AT THE BEGINNING OF EACH YEAR

For calculating Equal Annual Loan Inclusive Of Interest we will use following formula :

$$\frac{\text{Cost Of Asset (or Loan Taken If It Differs)}}{1 + \text{PVAF (r \% , n - 1 years)}}$$

Where r = pre tax required return by money lender i.e the party giving the loan

BOWER-HERRINGER-WILLIAMSON MODEL (BHW)

BMW attempts to evaluate a lease proposal by segregating the financing aspect and tax saving (shield) aspect of leasing . The BMW can be explained as follows :

(i) **Financial Advantage of Leasing (FA)** : $FA(L) = \text{Initial Investment (Loan)} - \text{Present Value of Lease Payments}$
Discount Rate should be pre tax Cost Of Debt.

(ii) **Operating Advantage of Leasing (FA)** :

$OA(L) = \text{Present Value of Tax Saving on Lease Payments} - \text{Present Value of Tax Saving on Loan}$

Discount Rate should be post tax Cost Of Debt.

A decision is taken on the combined value of FA and OA

Decision : If $FA(L) + OA(L)$ is positive Lease is preferable . If $FA(L) + OA(L)$ is negative Loan Financing is preferable

If u look deeply into the palm of ur hand,u will see ur parents & all generations of ur ancestors. All of them are alive in this moment. Each is present in ur body. You are the continuation of each of these people.

TREATMENT OF SALVAGE VALUE :

Salvage Value should be adjusted for Tax in the following two manner.

In Case Of Loss On Sale : $\text{Salvage Value} + \text{Loss On Sale} \times \text{Tax Rate}$

In Case Of Profit On Sale : $\text{Salvage Value} - \text{Profit On Sale} \times \text{Tax Rate}$

TREATMENT OF TAXATION FOR ITEMS ARISING AT THE BEGINNING OF EACH YEAR :

Tax Savings On Items Arising At the Beginning of each year can be taken

Alt1: Either at the end of each year [Normally preferred in case of Leasing Chapter]

Alt 2: At the beginning of each year

TREATMENT OF COMMON ITEMS :

Items of income and expense which are common to both the alternative which is being evaluated should be ignored as they are irrelevant for our decision making .

However if the two options are discounted with different rates then in such case Common Items should be taken.

TREATMENT OF DEPRECIATION :

➔ Depreciation can be calculated in two ways

(i) Straight Line Method (SLM) (ii) Written Down Value (WDV).

➔ Depreciation is charged by the owner of the asset.

➔ Under Lease Agreement it is the lessor who claims the depreciation and Under Loan Agreement it is charged by the Borrower. Under Hire Purchase Agreement, it is charged by the Hire Purchaser.

Depreciation is not an item of Cash Outflow, hence it should not be considered for our analysis.

➔ **However** Tax Saving on depreciation is an item of inflow and hence must be recognized .

➔ Tax Saving On depreciation = Amount Of Depreciation x Tax Rate

When I Become a Big Boy

This is like the little boy who says when I become a big boy, I will do this and this and I will be happy. And when he becomes a big boy he says, when I finish college and do this and this and I will be happy. And when he finishes college he says when I get my first job and do this and this I will be happy. And when he gets his first job he says when I get married and do this and this and then I will be happy. And when he gets married he says when the kids get out of school and I do this and this I will be I happy. And when the kids get out of school, he says when I retire and do this and this, I will be happy. And when he retires what does he see?

He sees life has just gone by in front of his eyes.

" Life is the most wonderful gift in this world, no one can give a better gift, no one can understand this gift, it's just there, and you can make the best of it, and you can mold it into any type of gift you want, it's all in the fate of your hands."

I met money and said why everyone runs behind you, you are just a piece of paper. Money smiled and said of course I am just a piece of paper, but I haven't seen a dustbin yet in my whole life.

Develop success from failures. Discouragement and failure are two of the surest stepping stones to success. Today is life-the only life you are sure of. Make the most of today

CAPITAL BUDGETING

IMPORTANCE OF CAPITAL BUDGETING:

➔ Capital Budgeting Decisions are important due to following reasons -

- (i) Such decisions have long term implication .
- (ii) Huge sums of money are involved .
- (iii) These decisions are irreversible .

TYPES OF CAPITAL BUDGETING PROPOSALS

If more than one proposals are under considerations, then these proposals can be categorise as follows :

1. Mutually Exclusive Proposals :

Two or more proposals are said to be **Mutually Exclusive Proposals** when the acceptance of one proposal implies the automatic rejection of other proposals, mutually exclusive to it.

2. Complementary Proposals:

Two or more proposals are said to be **Complementary Proposals** when the acceptance of one proposal implies the acceptance of other proposal complementary to it, rejection of one implies rejection of all complementary proposals.

3. Independent Proposals:

Two or more proposals are said to be **Independent Proposals** when the acceptance/rejection of one proposal does not affect the acceptance/rejection of other proposals.

STEPS IN CAPITAL BUDGETING :

➔ Capital Budgeting decision involves three steps :

- (i) Estimation Of Cash Inflows and Cash Outflows
- (ii) Estimation Of the Discount Rate.
- (iii) Selecting the Techniques Of Evaluation. For Example : Net Present Value , Profitability Index etc

CASH FLOWS OR ACCOUNTING PROFIT ?

➔ In Finance or in particular Capital Budgeting we considered Cash Flows rather than Accounting Profits . We donot consider Accounting Profits due to the following reasons :

- (i) Accounting Profit is affected by the non-cash items i.e depreciation (ii) Ignores Time Value of Money

TREATMENT OF WORKING CAPITAL

➔ In the absence of information the students are advised to assume :

Introduction Of Working Capital at the beginning of the project life. This should be treated as Outflow.

Release Of Working Capital at the end of the project life . This should be treated as Inflow

➔ Note : Changes in items such as Working Capital do not affect taxes.

ADJUSTMENT OF TAX SAVING IN RELATION TO SET OFF & CARRIED FORWARD OF LOSS :

➔ A Loss no doubt is bad . But it has a silver lining. It can be set off against taxable profits . It therefore goes to reduce or save tax and hence it represents our inflows . Tax Saved (Inflow) = Loss \times Tax Rate

➔ There are two options before us for setting off the losses :

- (i) The losses may be set off in the same year in which loss has incurred . It is assumed here that firm has sufficient profit from other sources . [This Option is preferable]

End your day by privately looking directly into your eyes in the mirror and saying, 'I love you!' & 'I Can Do It'. Do this for thirty days and watch how you transform.

(ii) The loss may be carried forward for adjustment in the subsequent year . It is assumed here that the firm has insufficient profit in the current year .

TECHNIQUES OF EVALUATION :
ACCOUNTING RATE OF RETURN (ARR)

➔ Formula : $ARR = \frac{\text{Average Annual Profit After Tax}}{\text{Average Investment}}$ or $\frac{\text{Average Annual Profit After Tax}}{\text{Initial Investment}}$ Where,

$\text{Average Annual Profit After Tax} = \frac{\text{Total Expected After Tax Profits}}{\text{Number Of Years}}$; $\text{Average Investment} = \frac{\text{Initial Investment} + \text{Salvage Value}}{2}$

➔ Accept/Reject Criterion : Higher the ARR better the project .

NET PRESENT VALUE (NPV) :

➔ Formula : $\text{Net Present Value} = \text{Present Value Of Inflows} - \text{Present Value Of Outflows}$

➔ Accept/Reject Criterion : $NPV > 0$ Accept the proposal ; $NPV = 0$ Indifference point ; $NPV < 0$ Reject the proposal

➔ Note : If question has not said specifically that which evaluation technique should be used we will always prefer NPV Method.

PROFITABILITY INDEX (PI) / BENEFIT COST RATIO / PRESENT VALUE INDEX /
DESIRABILITY FACTOR :

➔ Formula : $\text{Profitability Index (PI)} = \frac{\text{Present Value Of Inflows}}{\text{Present Value Of Outflows}}$

➔ Accept/Reject Criterion Where $PI > 1$ Accept the proposal ; $PI = 1$ Indifference point ; $PI < 1$ Reject the proposal .

INTERNAL RATE OF RETURN (IRR) :

➔ IRR is the discount rate at which NPV of the project is zero.

➔ Formula : $IRR = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates}$

➔ Accept/Reject Criterion : $IRR > \text{Cost Of Capital}$ Accept the proposal; $IRR = \text{Cost Of Capital}$ Indifferent ; $IRR < \text{Cost Of Capital}$ Reject the proposal

PAY BACK PERIOD / PAY OFF PERIOD / CAPITAL RECOVERY PERIOD :

➔ **Payback Period** is the period within which the total cash inflows from the project equals the cost of the project.

➔ Formula : In Case Of Even Cash Flows : $\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflows}}$

➔ Formula : In Case Of Uneven Cash Flows : $\text{Payback Period} = \text{Completed Years} + \frac{\text{Remaining Amount}}{\text{Available Amount}}$

➔ **Decision** : The project with the lower payback period will be preferred.

DISCOUNTED PAYBACK PERIOD :

➔ The discounted payback period is calculated in the same way as the payback period except that the future cash inflows are first discounted and then payback is calculated. It is superior than Payback period as under this time value of money is also considered.

*It doesn't matter where you are coming from. All that matters is where you are going.
Either you run the day or the day runs you.*

➔ **Decision :** The lower the Discounted Payback Period better the project .

PAY BACK PERIOD RECIPROCAL :

➔ **Formula :** Payback Period Reciprocal = $\frac{1}{\text{Payback Period}} \times 100$

➔ **Decision :** The higher the Payback Period Reciprocal (and hence lower the payback period) the more worthwhile the project becomes .

NET PROFITABILITY INDEX (NET PI) :

➔ **Formula :** Net Profitability Index (PI) = $\frac{\text{NPV}}{\text{Present Value Of Outflows}}$

➔ **Accept/Reject Criterion** Higher the Net PI, better the project

ADJUSTED NET PRESENT VALUE (APV)

Adjusted Net Present Value = Base Case NPV - Issue Costs + Present Value of Interest Tax Shield/Saving

MODIFIED NPV

➔ When reinvestment rate and Cost of Capital are separately given then in such case Modified NPV is calculated.

Modified Net Present Value = $\frac{\text{Terminal Value Of Cash Inflow Using Reinvestment Rate}}{(1 + \text{Cost Of Capital})^n} - \text{Initial Cash Outflow}$

MODIFIED IRR :

The Cost Of Capital or Discount Rate at which modified NPV is zero is known as Modified IRR.

EQUITY NPV & PROJECT NPV

Equity NPV: NPV from the point of view of Equity Shareholders is called Equity NPV . This reflects the NPV that a project earns for the holders of Equity.

➔ **Initial Cash Outflows :** Equity Capital or Funds invested by all Equity Investors

➔ **Annual Cash Inflows :** Inflows available for only Equity shareholders which can be calculated in following manner ;

Cash Inflow For Equity

EBDITA	XXXX
-Interest on Short Term Loan	XXXX
-Interest on Long Term Loan	XXXX
-Depreciation	XXXX
-Amortization	XXXX
EBT	XXXX
-Tax	XXXX
EAT	XXXX
+Depreciation	XXXX
-Preference Dividend	XXXX
-Increase in Working Capital	XXXX
+Decrease in Working Capital	XXXX
-Repayment of Loan/Debenture [Short Term & Long Term Both]	XXXX

"An eye for eye only ends up making the whole world blind." "Love is all you need". Focused mind power is one of the strongest forces on earth. People rarely succeed unless they have fun in what they are doing

-Repayment to Preference Shareholders	<u>XXXX</u>
Cash Inflow for Equity	<u>XXXX</u>

➔ **Discount Rate** : Cost Of Equity or K_e .

Project NPV: NPV computed from the point of view of overall company or project is called Project NPV . This reflects NPV that a project earns for the Company as a whole.

➔ **Initial Cash Outflows** : Equity Capital + Debenture Capital + Preference Share Capital + Long Term Loan or Total Funds invested by all Investors

➔ **Annual Cash Inflows** : Inflows available for all investors.It can be calculated in the following manner :

Cash Inflow For Overall Project :

EBDITA	<u>XXXX</u>
-Interest on Short Term Loan	<u>XXXX</u>
-Depreciation	<u>XXXX</u>
-Amortization	<u>XXXX</u>
EBT	<u>XXXX</u>
-Tax	<u>XXXX</u>
EAT	<u>XXXX</u>
+Depreciation	<u>XXXX</u>
-Increase in Working Capital	<u>XXXX</u>
+Decrease in Working Capital	<u>XXXX</u>
-Repayment of Loan/Debenture [Only Short Term]	<u>XXXX</u>
Cash Inflow for Overall Project	<u>XXXX</u>

Note:In the above format,we could have also take tax advantage of Long Term Interest.

➔ **Discount Rate** :

Overall Cost Of Capital or Weighted Average Cost Of Capital (WACC) or $K_o = K_e W_e + K_d W_d + K_p W_p$

EQUITY IRR AND PROJECT IRR :

➔ **Project IRR**:Project IRR is the discount rate at which Project NPV is zero. It reflects the overall rate of return earned by a project (both for term lenders and shareholders).

➔ **Equity IRR**: Equity IRR is the discount rate at which Equity NPV is zero. It reflects the rate of return a project earns for the holders of equity.

INFLATION UNDER CAPITAL BUDGETING :

Effect of Inflation must be incorporated in Capital Budgeting decision process .For the effect of Inflation we must understand three concept: **(i)** Cash Flows **(ii)** Discount Rate **(iii)** Present Value

Cash Flows :

The future cash flows can be either expressed **(i)** inclusive of inflation which are referred as Money Cash Flows
(ii) exclusive of Inflation which are referred as Real Cash flows

Conversion of Real Cash Flows into Money Cash Flows and Vice -versa :

$$\text{Money Cash flows} = \text{Real Cash Flows} (1 + \text{Inflation Rate}) \quad \text{or} \quad \text{Real Cash Flows} = \frac{\text{Money Cash Flows}}{(1 + \text{Inflation Rate})}$$

➔ **Discount Rate** :

“You must take personal responsibility. You cannot change the circumstances, the seasons, or the wind, but you can change yourself. That is something you have charge of.”

Discount Rate can be expressed either as (i) inclusive of future inflation which is referred to as Money Discount Rate
(ii) Exclusive of future inflation which is referred to as Real Discount Rate

Conversion of Money Discount Rate into Real Discount Rate and vice versa :

$$(1 + \text{Money Discount Rate}) = (1 + \text{Real Discount Rate}) (1 + \text{Inflation Rate})$$

→ **Present Value :**

Present Value may be found either by (i) Discounting the Real Cash Flows at the Real Discount Rate or
(ii) Discounting the Money Cash Flows at the Money Discount Rate

Note : In both cases resultant NPV would be same

Note : Depreciation is not effected by Inflation rate as depreciation is charged on the book value of the asset & not market value.

**COMPARISION IN CASE OF UNEQUAL LIVES / EQUIVALENT ANNUAL
NET PRESENT VALUE (EANPV) :**

→ If two projects have unequal life ,then the two projects are not comparable . To make them comparable we will use Equivalent Annual Net Present Value Concept for each project by applying the following formula :

$$\rightarrow \text{EANPV} = \frac{\text{Net Present Value}}{\text{PVAF}(K\%, n \text{ years})} \text{ Where } K\% = \text{Discount Rate and } n = \text{Total Life of the project}$$

→ Note : By using this technique we assume that project life is infinite .

PROBABILITY DISTRIBUTION APPROACH :

We will study this concept under the following head :

1. Expected Net Present Value or Expected Cash Flows or Expected Value :

Expected NPV or Expected CF = \sum Each possible outcome of an event \times Probability of that outcome occurring

Example :

Estimated Value	Probability	Estimated Value \times Probability
1000	.1	100
2000	.3	600
4000	.3	1200
3000	.2	600
5000	.1	500

$$\underline{1} \text{ Expected Value/NPV/Cash Flow} = \underline{3000}$$

Note : Probability of any outcome will always be equal to 1

2. Standard Deviation For one year period : Standard Deviation = \sum Probability \times (Given Value – Expected Value)²

3. Variance : Variance = (Standard Deviation)²

4. Coefficient Of Variation : Coefficient Of Variation = $\frac{\text{Standard Deviation}}{\text{Expected Value/NPV/Cash Flow}}$

APPLICATION OF HILLER'S MODEL:

→ **When Cash Flows are Dependent or correlated :**

"Strength does not come from winning. Your struggles develop your strength. When you go through hardship and decide not to surrender, that is strength."

Standard Deviation of the project as a whole : $\sqrt{(SD_1 \times PVF_1)^2 + (SD_2 \times PVF_2)^2 + \dots + (SD_n \times PVF_n)^2}$

→ **When Cash Flows are Independent or uncorrelated :**

Standard Deviation of the Project as a whole : $(SD_1 \times PVF_1) + (SD_2 \times PVF_2) + \dots + (SD_n \times PVF_n)$

RISK ADJUSTED DISCOUNT RATE (RADR):

Under this technique we discount the Cash Flows by a rate higher than Risk Free Rate .Such rate is known as Risk Adjusted Discount Rate . Such rate is computed in the following manner :

Alternative 1:

Preferred : $(1 + \text{Risk Adjusted Discount Rate}) = (1 + \text{Risk Free Discount Rate}) (1 + \text{Risk Premium})$ or
 Risk Adjusted Discount Rate = Risk Free Discount Rate + Risk Premium

Alternative 2: It can also be calculated by using CAPM : $\text{RADR} = R_f + \text{Beta} \times (R_m - R_f)$

Note : The Net Present Value computed by using Risk Adjusted Discount Rate is sometimes known as Risk Adjusted Net Present Value .

CERTAINTY EQUIVALENT APPROACH :

Certainty Equivalent Approach involves discounting of Certain Cash Flows instead of the Total Future Cash Flows.

Steps In Certainty Equivalent Approach

Step 1 : Estimate the Total future cash flows from the proposal. These cash flows do have some degree of risk involved.

Step 2 : Calculate the Certainty Equivalent Coefficient (CEC) factors for different years .

The value of CEC can vary between 1 indicating no risk and 0 indicating the extreme risk. This means higher the risk lower is the value of CEC. (This value is generally given in question)

Step 3 : Multiply Total future cash flows (Step 1) x CEC (Step 2) = Certainty Cash Flows

Step 4 : Certainty Cash Flows are discounted at Risk Free Rate to find out the NPV of the proposal.

SENSITIVITY ANALYSIS / SCENARIO ANALYSIS - KEEPING NPV = 0

→ **Meaning :** Sensitivity Analysis enables managers to assess how responsive the Net Present Value is to changes in the variables or factors which are used to calculate it .

→ **Importance :** It directs the management to pay maximum attention towards the factor where minimum percentage of adverse changes causes maximum adverse effect.

→ **Decision :** If NPV were to become 0 with 2 % change in Initial Investment relative to 10 % change in Cash Inflows , Project is said to be more sensitive to Intial Investment than to Cash Inflows .

→ **Symbolically :** $\text{Sensitivity (\%)} = \frac{\text{Change}}{\text{Base}} \times 100$

<u>Factor</u>	<u>Adverse Effect</u>
Inflow	Decrease
Discount Rate	Increase
Outflow	Increase
Life	Decrease

"The best motivation is self-motivation. The guy says, "I wish someone would come by & turn me on." What if they don't show up? You've got to have a better plan for your life."

SENSITIVITY ANALYSIS USING IRR

Under this method Sensitivity is calculated by calculating IRR taking adverse changes. The adverse factor for which IRR is least is considered to be most sensitive.

SENSITIVITY ANALYSIS USING % ADVERSE VARIATION IN FACTORS

Under this method Sensitivity is calculated by taking adverse changes by a specific % which may be indicated in question. The adverse factor for which % Fall In NPV is maximum is considered to be most sensitive. In this case we calculate % Change in NPV due to adverse change is given by the following equation :

$$\% \text{ Change In NPV} = \frac{\text{Revised NPV} - \text{Original NPV}}{\text{Original NPV}} \times 100$$

APPLICATION OF JOINT PROBABILITY

Joint Probability is the product of two or more than two dependent probability. Sum of Joint Probability will always be equal to 1.

TREATMENT OF SUNK/IRRELEVANT COST :

Only Relevant Costs are considered under Capital Budgeting .Irrelevant Costs or Sunk Cost should be ignored . Example Of Sunk/Irrelevant Cost are Research & Development Cost, Allocated Fixed Cost etc.

TREATMENT OF COST SAVINGS

(ii) Cash Saved are treated as Cash Earned i.e A reduction in cost represents a Cash Inflows. In other words Any savings should be treated as Inflow. For example : Tax Saving on Loss, Tax saving on Depreciation etc

PROBABILITY OF OCCURRENCE IF THE CASH FLOWS ARE (A) PERFECTLY DEPENDENT OVERTIME (B) INDEPENDENT OVERTIME

The probability of occurrence of the worst or best case if the cash flows are

(a) Perfectly Dependent Overtime is Required Probability

(b) Independent Overtime is (Required Probability)ⁿ

REPLACEMENT DECISION

→ Under Replacement Decision we will decide:

Whether to Replace the existing machine & Buy new machine OR Whether to Repair Existing Machine

The Option which involve least outflow should be preferred.

DECISION TREE APPROACH

Decision Tree is a form of diagram that is useful for decision maker to identify and evaluate various course of action , possible outcomes etc. A decision tree is a graphic device that shows a sequence of strategic decisions and expected consequences under each possible set of circumstances.

"Never fear shadows. They simply mean that there's a light somewhere nearby."

"A goal properly set is halfway reached."

FOREIGN EXCHANGE

DOMESTIC CURRENCY (HOME CURRENCY) & FOREIGN CURRENCY :

Country's Own Currency is known as Home Currency. For Example :

For India " Rupee" is the domestic currency

For a country, any Currency other than home currency is known as Foreign Currency.

For India " US\$" is the foreign currency

SPOT RATE & FORWARD RATE :

→ **Spot Rate :** Spot Rate is the rate applicable for immediate settlement.

→ **Forward Rate :** Forward Rate is the rate applicable for future settlement .

NOSTRO/VOSTRO/LORO ACCOUNT

NOSTRO ACCOUNT : Nostro account is an account of Indian Bank maintained by a bank abroad. In other words Nostro Account can be termed as 'our account with you'.

VOSTRO ACCOUNT : A foreign bank may open rupee account with an Indian Bank. In other words Nostro Account can be termed as 'your account with us'.

LORO ACCOUNT : Let's say that State Bank of India is having an account with Citibank, New York. When Syndicate Bank of India likes to refer to this account while corresponding with Citibank, it would refer to it as Loro account, meaning 'Their account with you', in Latin.

Note : Exchange position : All purchases and sales whether spot or forward are included in computing the exchange position

Note : Cash Position : All the items related to Spot (Cash) transaction are recorded in this account

LETTER OF CREDIT :

→ A letter of credit is a promise to pay. A letter from a bank guaranteeing that a buyer's payment to a seller will be received on time and for the correct amount. In the event that the buyer is unable to make payment on the purchase, the bank will be required to cover the full or remaining amount of the purchase. Bank used to charge commission for this facility.

DIRECT AND INDIRECT QUOTE

→ **Direct Quote :** A direct quote is the home currency price for one unit foreign currency.

Example : 1\$ = Rs.44.00 is a direct-quote for an Indian.

→ **Indirect Quote :** An indirect quote is the foreign currency price of one unit of the home currency.

Example : Re.1 = \$0.0227 is an indirect quote for an Indian.

CONVERTING DIRECT QUOTE INTO INDIRECT QUOTE AND VICE-VERSA

→ **Only One Quote :** When Bid and Ask Rate are same

Direct Quotes can be converted into Indirect Quotes by taking reciprocals of each other, which can be mathematically

expressed as follows: Direct Quote = $\frac{1}{\text{Indirect Quote}}$ or Indirect Quote = $\frac{1}{\text{Direct Quote}}$

For Example : 1 DM = Rs. 20 is a direct quote for an Indian . 1 Re. = $\frac{1}{20}$ DM is indirect quote for an Indian

"You cannot afford to wait for perfect conditions. Goal setting is often a matter of balancing timing against available resources. Opportunities are easily lost while waiting for perfect conditions."

➔ **In Case of Two Way Quote** : When Bid and Ask Rate are different

Direct Quotes can be converted into Indirect Quotes by taking reciprocals of each other and then switching the position .It can be understood with the help of following example :

For Example :Direct Quote with reference to India : 1 \$ = Rs. 46.10 / 46.20.

Indirect Quote with reference to India : Re 1 = \$ $\frac{1}{46.20}$ - \$ $\frac{1}{46.10}$ or Re 1 = \$.02165 - \$.02170

Why We Take Inverse : The Rule is Ask Rate should always be greater than Bid Rate . Hence if we donot take inverse this rule will not be applicable. Hence after taking reciprocal we switch the position .

WHAT IS BID AND ASK RATE ?

There are two types of rates in a foreign exchange quote :

Bid Rate (Bank Buying Rate) : Bid Rate is the rate at which Bank Buys Left Hand Currency

Ask Rate (Bank Selling Rate / Offer Rate) : Ask Rate is the Rate at which Bank Sells Left Hand Currency .

Note : The difference between the two represents the profit for the bank .

Note : Ask Rate will always be greater than Bid Rate .

Note : The quote of Bid and Ask Rate is quoted from the banker's point of view .

SPREAD :

➔ The difference between Ask and Bid rates is called the Spread , representing the profit margin of the dealer .

➔ Spread (Rs.) = Ask Rate - Bid Rate

➔ Spread (%) = $\frac{\text{Ask Rate} - \text{Bid Rate}}{\text{Ask Rate}}$ or $\frac{\text{Ask Rate} - \text{Bid Rate}}{\text{Bid Rate}}$

SWAP POINTS / FORWARD MARGIN / FORWARD SPOT DIFFERENTIAL :

The difference between the Forward Rate and Spot Rate is known as Swap Points.

How to Calculate Forward Rate using Spot Rates :

If Swap points are given in ascending order :

➔ It represents **premium** of left hand currency .

➔ Hence we will **Add** the Swap Point in the given Spot Rates to find Forward Rate .

➔ **Example**:Spot Rate 1\$ = 47.6500-47.6595 & 2 Months Forward Swap Points are 20/26.Calculate Forward Rate ?

Solution : 2 months Forward Rate will be Rs.47.6520-Rs.47.6621.

If Swap Points are given in descending order :

➔ It represents **discount** of left hand currency.

➔ Hence we will **Deduct** the Swap Points from the Spot Rate to find Forward Rate.

➔ **Example** : Spot Rate for 1 Pound = \$1.4710 - 1.4810 and Swap Points for 1 month forwards are 65/44

Solution : 1 month forward rate will be 1 Pound= \$ 1.4645- \$ 1.4766 .

PREMIUM AND DISCOUNT :

How to Calculate Premium or Discount : Rate of Premium or Discount of Left Hand Currency is given by :

$$\frac{\text{Forward Rate} - \text{Spot Rate}}{\text{Spot Rate}} \times \frac{12}{\text{Forward Period}} \times 100$$

EXCHANGE MARGIN :

Exchange Margin is the extra amount or percentage charged by the bank over and above the rate quoted by bank .It

"I had the blues because I had no shoes until upon the street,I met a man who had no feet."

"A smile is an inexpensive way to change your looks."

represents commission, transaction related expenses etc.

→ In case of Buying Rate Quoted by bank :

Deduct Exchange Margin : i.e Actual Buying Rate = Bid Rate (1 - Exchange Margin)

→ In case of Selling Rate Quoted by bank :

Add Exchange Margin : i.e Actual Selling Rate = Ask Rate (1 + Exchange Margin)

CROSS CURRENCY RATES

Cross Rate is the exchange rate based on the cross products of two or more than two exchange rates. In other words a Cross Rate is an exchange rate between the currencies of two countries that are not quoted against each other, but are quoted against one common currency.

PURCHASE PRICE PARITY THEORY [PPPT]

Meaning : PPP Theory is based on the concept of "Law of One Price" i.e the price of the commodity shall be the same in two markets.

Symbolically : As per PPP Theory we have :
$$\text{Forward Rate (Rs/\$)} = \left(\frac{1 + \text{Rupee Inflation}}{1 + \text{Dollar Inflation}} \right) \times \text{Spot Rate (Rs./\$)}$$

$$\text{Spot Rate (Rs. / \$)} = \frac{A [\text{Current Price in India}]}{B [\text{Current Price in USA}]}$$

Remember : Higher Rate of Inflation in one country (as compared to the other country) results in discount of currency of that country and vice-versa. For Example :

If Rupee Inflation is more than dollar inflation Dollar will be at premium and Rupee will be at a Discount.

If Rupee Inflation is less than Dollar inflation Dollar will be at discount and Rupee will be at a premium.

Note : In the above calculation the rate of inflation should be taken proportionate to Forward period. For Example : If the annual Rate of Inflation is 12% , and if we are calculating or taking 6 months forward rate then Inflation rate should be taken as 6% and not 12% .

Note : If PPPT do not holds true then Arbitrage Opportunity will emerge .

INTEREST RATE PARITY THEORY (IRPT) :

Meaning : IRPT states that exchange rate between currencies is directly affected by their Interest Rate .

Symbolically :
$$\text{Forward Rate (Rs/\$)} = \left[\frac{1 + \text{Rupee Interest Rate}}{1 + \text{Dollar Interest Rate}} \right] \times \text{Spot Rate (Rs./\$)}$$

Remember : If Interest Rate of a currency is higher, the currency will be at discount in future and if the Interest Rate of a currency is lower, the currency will be at premium in future.

Note : In the above calculation the Rate of Interest should be taken proportionate to Forward period. For Example : If the annual Rate of Interest is 12% , and if we are calculating or taking 6 months forward rate then Interest rate should be taken as 6% and not 12% .

Note : If IRPT do not holds , arbitrage opportunity is possible .

INTERNATIONAL FISHER EFFECT (IFE)

"Setting goals is the first step in turning the invisible into the visible." "The tragedy of life is not that it ends so soon, but that we wait so long to begin it."

It analyses the relationship between the Interest Rates and the Expected Inflation .As per IFE we have ,
 (1+ Money or Nominal Interest Rate) = (1+ Real Interest Rate) (1+ Inflation Rate)

INTEREST RATE DIFFERENTIAL :

Interest Rate Differential is just another name of premium or discount of one currency in relation to another currency i.e

$$\Rightarrow \frac{FR[Rs/\$] - SR[Rs/\$]}{SR[Rs/\$]} \times \frac{12}{\text{Forward Period}} \times 100 = \text{Interest Rate Of Rupee} - \text{Interest Rate Of Dollar}$$

ARBITRAGE IN FOREIGN EXCHANGE MARKET

GEOGRAPHICAL ARBITRAGE

➔ Geographical Arbitrage refers to a situation in which one currency is cheaper in one foreign exchange market and costlier in the other market .

➔ Under Geographical Arbitrage the rule is " Buy Low and Sell High "

COVERED INTEREST ARBITRAGE :

If Interest Rate Parity Theory do not hold , Covered Interest Arbitrage will arise i.e there will be a possibility of Risk Less Profit .This arbitrage occur when there is mismatch of interest rate between two countries .

How To Find Out Whether there is Arbitrage Opportunity or Not :

Alt 1 : Calculate Theoretical Interest Rate of Domestic Country .

If Actual Interest Rate = Theoretical Interest Rate

No Arbitrage Opportunity

If Actual Interest Rate > Theoretical Interest Rate

Arbitrage Opportunity Exists. Invest in Domestic Country and Borrow From Foreign Country

If Actual Interest Rate < Theoretical Interest Rate

Arbitrage Opportunity Exists. Invest in Foreign Country and Borrow From Domestic Country

Note : Theoretical Interest Rate may be calculated by using IRPT Equation . Actual Interest Rate will be given in the question

Note : Invest in Home Country means Money will flow into Home Country . Invest in Foreign Copuntry means Money will flow out of Home Country .

FOREIGN EXCHANGE RISK MANAGEMENT

Following are the important techniques of Foreign Exchange Risk Management

FORWARD CONTRACTS :

➔ **Meaning :** A forward transaction is a transaction requiring delivery at a future date of a specified amount of one currency for a specified amount of another currency. The exchange rate is determined at the time of entering into the contract, but the payment and delivery take place on maturity.

➔ **Purpose :** Forward Exchange contracts are used to protect a company against the adverse movement in exchange rate

CURRENCY SWAP/PARALLEL LOAN

➔ In a currency swap, two parties agree to pay each others debt obligation denominated in different currencies.

➔ A currency swap involves (i) an exchange of principal amount today. (ii) an exchange of interest payments during the currency of loan. (iii) a re-exchange of principle amounts at the time of maturity.

CURRENCY FUTURES :

➔ It is a contractual agreement between a buyer and a seller for the purchase and sale of a particular **currency** at a

"I can accept failure -- everyone fails at something. But I can't accept not trying."

"Nothing great in the world has ever been accomplished without passion."

specified future date at a predetermined price. The application of Currency Future is same as Stock Future as studied under Futures Chapter.

CURRENCY OPTIONS

Options are contracts that offer the right but not the obligation, to buy or sell foreign **currency** in the future at a specified price. Options are of two types (i) Call Options (ii) Put Options. The application of Currency Option is same as Stock Option as studied under Option Chapter.

MONEY MARKET OPERATION-IF FOREIGN CURRENCY IS TO BE RECEIVED IN FUTURE / EXPORTER'S ANGLE / RECEIVABLES :

Step 1 : Borrow in Foreign Currency. The amount of borrowing should be such that " Amount Borrowed + Interest on it " should be equal to foreign currency to be received in future i.e Borrow the amount which is equal to Present Value of Foreign Currency to be received.

Step 2 : Convert the borrowed amount into Home Currency using Spot Rate

Step 3 : Now **invest** this amount in the domestic market for the period during which foreign currency receipt is outstanding

MONEY MARKET OPERATION-IF FOREIGN CURRENCY IS TO BE PAID IN FUTURE / IMPORTER'S ANGLE / PAYABLES :

Step 3 : Invest this foreign currency at the given investment rate. This amount when invested should be equal to the amount which is outstanding / or to be paid.

Step 1 : Borrow equivalent amount in Home Currency that is to be converted into Foreign Currency.

Step 5 : Pay off the home currency loan with interest upon maturity.

NETTING / EXPOSURE NETTING

The adjustment of receivables and payables at a given point of time is called Exposure Netting. In other words Netting is a process under which debit balances are netted off against credit balances.

Note : By adopting netting process we not only save our costs but also avoid exchange risk.

Note : Even if question is silent, netting concept is to be applied giving note to this effect.

Note : Netting is possible only in the following cases :

Inflows and Outflows are denominated in same currency

Inflows and Outflows relate to the same period

LEADING AND LAGGING

→ Leads means advancing the timing of payment or receipt.

→ Lags means postponing the timing of payment or receipt.

→ **Note:** While deciding on Leading & Lagging, we should also take into account Interest Opportunity Cost.

INTEREST RATE SWAP - TWO PARTIES

In Interest Rate Swap two parties exchange their Interest Rate Obligations.

For Practical Question we will undertake the following steps :

Step 1 : Calculate Total Interest Rate of the parties as per their own objective or choice.

Step 2 : Calculate Total Interest Rate of the parties as per swap agreement.

Step 3 : Calculate the Saving due to Swap Agreement taking the difference between Step 1 - Step 2

Step 4 : Distribute the Saving between the various parties as per the terms of the contract.

"In three words I can sum up everything I've learned about life: It goes on." "The quickest way to do many things is to do one thing at a time."

Step 5 : Finally we will calculate the Net Interest Burden of each parties by using the following relation :
Cost Under Own Choice - Saving Due To Swap

ROLLOVER FORWARD CONTRACTS

➔ Rollover Contracts is one where forward contracts is initially booked for the total amount of outstanding loan to be repaid in future. This process is repeated until the full loan amount is repaid.

INTERNATIONAL CAPITAL BUDGETING :

Home Currency Approach :

Step 1: Compute Foreign Currency Cash Flows

Step 2: Convert Foreign Currency Cash Flows into Home Currency Cash Flows by using Estimated Spot Rate or Forward Rate

Step 3 : Calculate Home Currency Discount Rate .

Step 4 : Calculate Home Currency NPV.

Foreign Currency Approach :

Step 1: Compute Foreign Currency Cash Flows .

Step 2: Compute Foreign Currency Discount Rate .

Step 3: Compute Foreign Currency NPV.

Step 4: Convert Foreign Currency NPV into Home Currency NPV by using Spot Rate.

Note : NPV arrived at both Home Currency Approach and Foreign Currency Approach will be same .

Note: Discount rate under both the approach will be different

Note: Discount rate should be Risk Adjusted Discount Rate and not Risk Free Discount Rate.

Note : How To Calculate Risk Adjusted Discount Rate :

$$(1 + \text{Risk Adjusted Discount Rate}) = (1 + \text{Risk Free Rate}) (1 + \text{Risk Premium})$$

Note: It is generally assumed that Risk Premium attached to any project will be same both in Domestic Country and Foreign Country

TT SELLING RATE OR TT BUYING RATE & BILL SELLING RATE OR BILL BUYING RATE :

TT Rate is applicable when there is no delay in Buying or Selling of Foreign Currency by Banks .

Bill Rate is applicable when there is some delay in buying or selling of Foreign Currency by bank . Bill buying or selling by any bank involves handling of documents by the bank.

➔ How to calculate TT Rate & Bill Rate From Ask Rate & Bid Rate

Spot TT Selling Rate = Ask Rate + Exchange Margin for TT Selling

Bill Selling Rate = Spot TT Selling Rate + Exchange Margin for Bill Selling

Spot TT Buying Rate = Bid Rate - Exchange Margin for TT Buying

Bill Buying Rate = Spot TT Buying Rate - Exchange Margin for Bill Buying

Accordingly Forward TT Buying or Selling and Forward Bill Buying or Selling may be calculated .

CANCELLATION OF FORWARD CONTRACT-ON DUE DATE :

Action : A forward contract can be cancelled by entering into a reverse contract i.e sale contract by purchase contract and purchase contract by sale contract .

Applicable Rate : At Spot Rate prevailing on Due Date

Settlement Of Gain or Loss : Customer will be entitled for both Profit and Loss .

CANCELLATION OF FORWARD CONTRACT-BEFORE DUE DATE :

“Don’t only help yourself in life, but try to help those truly in need, because you’ll never know when you’ll need the same support.” “If you must trust anyone in life, let it be yourself.”

Action : A forward contract can be cancelled by entering into a reverse contract i.e sale contract by purchase contract and purchase contract by sale contract .

Applicable Rate : At Forward Rate prevailing as on today for due date

Settlement Of Gain or Loss : Customer will be entitled for both Profit and Loss .

CANCEL AFTER DUE DATE BUT BEFORE THE GRACE PERIOD OF 15 DAY :

Action : A forward contract can be cancelled by entering into a reverse contract i.e sale contract by purchase contract and purchase contract by sale contract .

Applicable Rate : At Spot Rate prevailing on the date, customer contacted the bank

Settlement Of Gain or Loss : Customer will only be entitled for Loss .

**CANCEL AFTER DUE DATE AND EVEN AFTER THE GRACE PERIOD OF 15 DAY
[AUTOMATIC CANCELLATION] :**

Action : A forward contract can be cancelled by entering into a reverse contract i.e sale contract by purchase contract and purchase contract by sale contract .

Applicable Rate : At Spot Rate prevailing on the 15th date i.e on the last day of Grace Period.

Settlement Of Gain or Loss : Customer will only be entitled for Loss .

EXTENSION OF FORWARD CONTRACT :

Extension involves two steps : (i) Cancellation Of Original Contract (ii) Entering into a new contract .

EARLY DELIVERY UNDER FORWARD CONTRACT :

Early Delivery involves two steps : (i) Cancellation Of Original Contract (ii) Settlement Of Currency which is delivered before due date at the prevailing Spot Rate.

PARTIAL HONOUR FORWARD CONTRACT :

The part of the forward contract which cannot be honoured must be cancelled as per the Rules of Cancellation.

GAIN & LOSS UNDER FOREIGN EXCHANGE MARKET

When Foreign Currency Is To Be Paid :

When Forward Contract Is Taken :

Amount To Be Paid At Forward Rate: xxx

Amount To Be Paid At Spot Rate xxx

Gain or Loss xxx

When No Forward Cover Is Taken :

Amount To Be Paid At Expected Spot Rate: xxx

Amount To Be Paid At Spot Rate xxx

Gain or Loss xxx

Note: Accordingly Gain n Loss can be calculated in case Foreign Currency is to be received.

BLACK AND SCHOLES MODEL-IN CASE OF FOREX

Happiness always looks small if you hold in your hands. But learn to share it, you will realize how big & precious it is .“If opportunity does’nt knock ,build a door”

In 1983 Garman and Kohlhagen extended the Black-Scholes model to cope with the presence of two interest rates (one for each currency). Suppose that r_d is the risk-free interest rate to expiry of the domestic currency and r_f is the foreign currency risk-free interest rate.

CALL: Value of Call Option = Spot Price $\times e^{-r_f t} \times N(d_1) - \text{Exercise Price} \times e^{-r_d t} \times N(d_2)$

PUT: Value Of Put = Strike Price $\times [1 - N(d_2)] \times e^{-r_d t} - \text{Current Market Price} \times [1 - N(d_1)] \times e^{-r_f t}$

$$\text{Where } d_1 = \frac{\ln\left[\frac{\text{Current Market Price}}{\text{Exercise Price}}\right] + [r_d - r_f + .50\sigma^2] \times t}{\sigma \times \sqrt{t}} ; d_2 = d_1 - \sigma\sqrt{t}$$

Where r_d is domestic risk free simple interest rate and r_f is foreign risk free simple interest rate

DECENTRALISED CASH MANAGEMENT & CENTRALISED CASH MANAGEMENT

➔ Under Decentralised Cash Management every branch is viewed as separate undertaking. Cash Surplus and Cash Deficit of each other branch should not be adjusted.

➔ Under Centralized Cash Management every branch cash position is managed by single centralized authority. Hence Cash Surplus and Cash Deficit of each branch with each other branch is accordingly adjusted

TREATMENT OF WITHHOLDING TAX RATE UNDER FOREIGN EXCHANGE MARKET

➔ When a Foreign Company invest in a Home Country, the home country charges an additional tax over an above the normal income tax. Such tax is known as Withholding Tax.

➔ Withholding tax is applicable on surplus amount or profit which is taken back by MNC in their own country.

CALCULATION OF RETURN UNDER FOREIGN EXCHANGE MARKET

Return (In Terms Of Home Currency) = $\{ [1 + (P_1 - P_0 + I) / P_0] [1 + e] \} - 1$

Where,

P_0 = Price at the beginning ; P_1 = Price at the end ; I = Income from interest and dividend ; e = Change in exchange rate.

QUESTION (SFM Study Material) An Indian investor invests in a bond in America. If the price of the bond in the beginning of the period is \$ 100 and it is \$ 105 at the end of the period. The coupon interest during the period is \$7. The US dollar appreciates during this period by 3%. Find the return on investment in terms of home country currency.

Solution: Return in terms of Home Currency = $\left\{ 1 + \left[\frac{(105 - 100 + 7)}{100} \right] (1 + .03) \right\} - 1 = 15.36\%$

EXPECTED SPOT RATE USING PROBABILITY

Example :

\$/Pound	1.60	1.70	1.80	1.90	2.00
Probability	0.15	0.20	0.25	0.20	0.20

Calculate expected spot rate ?

Solution: Calculation of expected spot rate :

Don't waste life in doubts and fears; spend yourself on the work before you, well assured that the right performance of this hour's duties will be the best preparation for the hours and ages that will follow it.

$$1.60 \times 0.15 + 1.70 \times 0.20 + 1.80 \times 0.25 + 1.90 \times 0.20 + 2.00 \times 0.20 = 1.81$$

CALCULATION OF STANDARD DEVIATION UNDER FOREIGN EXCHANGE MARKET

Standard deviation under two assets model = $\sqrt{(Sd_1)^2 + (Sd_2)^2 + 2 Sd_1 Sd_2 cor_{12}}$

Sd_1 = Standard Deviation of Indian Security ; Sd_2 = Standard Deviation of Exchange Rate

cor_{12} = Coefficient of Correlation between Return Of Security & Exchange Rate

EFFECTIVE RATE OF PROTECTION(ERP) & DOMESTIC RESOURCE COST(DRC)

Effective Rate Of Protection (ERP) = $\frac{\text{Value added at domestic prices} - \text{Value added at world prices}}{\text{Value added at world prices}} \times 100$

If value added at domestic prices is same as the value added at world prices, ERP = 0. It means, project does not enjoy any protection. If ERP is 100 %, it means the project enjoys 100% protection against international competition.

Domestic Resource Cost DRC = $\frac{\text{Value added at domestic prices}}{\text{Value added at world prices}} \times \text{Exchange rate}$

Note : Domestic Resource Cost Ratio = $\frac{\text{Value added at domestic prices}}{\text{Value added at world prices}}$

Decision: Higher the better

VALUE OF CURRENCY CALL IN FOREIGN EXCHANGE MARKET

Option Price can be calculated by using the following formula : $\frac{[(1+i_1)s - (1+i_2)s_2] (s_1 - x)}{(1+i_1)(1+i_2)(S_1 - S_2)}$

Where : s = Spot exchange rate in Units of c1 per unit of c2 [c1 being domestic currency c2 being foreign currency]

x = Exercise / Strike rate of option.

i_1 = The risk free interest rate of domestic country

i_2 = The risk free interest rate of foreign country

$(s_1 \& s_2)$ = The expected maximum & minimum rate (range) of spot rates on maturity of the option.

Note: It can also be calculated by Normal Technique without using formula. (Refer ur Class Register)

PUT CALL PARITY THEORY-UNDER FOREX

According to Put Call Parity Theory we have

Value of Call + Present Value of Strike Price = Value of Put + PV Of Current Market Price

\Rightarrow Value of Call + EP $\times e^{-rd \times t}$ = Value of Put + Current Market Price $\times e^{-rf \times t}$

Where rd is domestic risk free simple interest rate and rf is foreign risk free simple interest rate

APPLICATION OF DTAA-DOUBLE TAXATION AVOIDANCE AGREEMENT

\rightarrow It may be noted that the provisions of DTAA override the provisions of the IT Act insofar as they are more beneficial to the assessee. Both DTAA and Normal Income Tax will not be applicable at the same time.

NET EXPOSURE

If I Believe I cannot do something, it makes me incapable of doing it. But when I believe I can, then I acquire the ability to do it even if I didn't have it in the beginning. -Mahatma Gandhi

- ➔ By Net exposure we mean advantage of using Forward Contract over Spot Contract .
- ➔ Net Exposure = Net Cash Flow x Forward Rate - Net Cash Flow x Spot Rate
- = Net Cash Flow x (Forward Rate - Spot Rate) = Net Cash Flow x Swap Points

EXPECTATION OF IMPORTER & EXPORTER

- Importer:** Will Pay Foreign Currency .They Expects Foreign Currency To Fall
Exporter: Will Receive Foreign Currency .They Expects Foreign Currency To Rise

ELASTICITY OF DEMAND

- ➔ The Price Elasticity of Demand (commonly known as just price elasticity) measures the rate of response of quantity demanded due to a price change.
- ➔ The formula for the Price Elasticity of Demand is:
 Price Elasticity Of Demand = (% Change in Quantity Demanded)/(% Change in Price)

HARD CURRENCY & SOFT CURRENCYS

- ➔ A hard currency is a stronger currency. ➔ Soft currency is weak currency.

CURRENCY PAIR

- ➔ Currency pairs are written by ISO currency codes (ISO 4217) of the base currency and the counter currency, separating them with a slash character. Currency quotations use the abbreviations for currencies that are prescribed by the International Organization for Standardization (ISO) in standard ISO 4217.
- ➔ The most traded currency pairs in the world are EUR/USD, USD/JPY, GBP/USD, AUD/USD, USD/CHF , USD/CAD , GBP/INR and USD/INR
- ➔ The first currency of a currency pair is called the “base currency”, and the second currency is called the “quote currency”. The currency pair shows how much of the quote currency is needed to purchase one unit of the base currency.
- ➔ **Example :**

A price quote of EUR/USD at 1.30851 means that one Euro is equal to 1.30851 U.S. Dollars.

USD/JPY is trading at 124.000. It means 1 U.S. Dollar is equal to 124 Japanese Yen.

With EUR/JPY at a price of 126.34, it means that 1 Euro is equal to 126.34 Japanese Yen.

EURO COUNTRIES

Today, the euro is one of the world's most powerful currencies, used by more than 320 million Europeans in twenty-two countries. The countries currently using the euro are:

(1) Andorra(2) Austria(3) Belgium(4) Cyprus(5) Finland(6) France(7) Germany(8) Greece(9) Ireland(10) Italy
 (11) Kosovo(12) Luxembourg(13) Malta(14) Monaco(15) Montenegro(16) Netherlands(17) Portugal(18) San Marino(19)
 Slovakia(20) Slovenia(21) Spain(22) Vatican City

Note : All Interest Rates in Foreign Exchange Market are given on p.a basis whether stated or not .

Note : LIBOR : London Inter Bank Offering Rate ; MIBOR :Mumbai Inter Bank Offering Rate;PLR : Prime Lending Rate

When God takes away something from your hands , dont think that he is punishing you . He is just leaving you empty handed to receive something better.Think of it.

MISCELLANEOUS

RIGHT SHARE

➔ Right Shares are those shares which are issued to existing equity shareholders at a price which is normally less than Current Market Price.

➔ **Note :** Right shares are first offered by the company to the existing shareholders

➔ **Note:**

Choice Before Shareholder In Respect Of Right Shares

Subscribe to the rights issue in full

Ignore your rights/Take No Action

Sell the rights to someone else

Subscribe to the rights issue in part & for balance Sell the right

Effect in Shareholders Wealth

no change in the wealth of the shareholders

decrease in wealth

no change in the wealth of the shareholders

no change in the wealth of the shareholders

➔ **Formula :**

Theoretical Post-Rights (ex-right) Price Per Share =

$$\frac{\text{MPS Cum Right} \times \text{Existing Number Of Equity Share} + \text{Right Share Price or Offer Price} \times \text{Number of Right Shares Issued}}{\text{Existing Number Of Equity Share} + \text{New Number Of Right Share Issued}}$$

Theoretical Value of the Rights Alone :

Alt 1: For every lot Offer : Ex-right MPS – Offer Price

Alt 2: For every one share : MPS Before Right - MPS After Right

SHARE WARRANTS

➔ Theoretical Value Of Share Warrant As on Expiry = Maximum Of [Actual Marke Price On Expiry-Exercise Price ,0]

➔ The value of warrant can never be negative.It can be zero or greater than zero.

MEANING OF COMPENSATING BALANCE & DISCOUNTED LOAN FOR CALCULATING ANNUAL % RETURN

Compensating Balance - A minimum credit balance that a bank may require a borrower to keep on deposit as a condition for granting a loan;In other words The funds that a corporate borrower is required to keep on deposit in a bank in order to satisfy the terms of a loan agreement.

Discounted Loan -If your loan is "discounted," this means that the lender will require interest up front instead of at the end of the period.This effectively raises the cost of the loan.

➔ Effective Cost Of Debt in the absence of any Compensating Balance and Discounted Loan Requirement

$$= \frac{\text{Amount Of Loan} \times \text{Rate Of Interest}}{\text{Amount Of Loan}}$$

Effective Cost Of Debt if there is Compensating Balance Requirement But no Discounted Loan Requirement

$$= \frac{\text{Amount Of Loan} \times \text{Rate Of Interest}}{\text{Amount Of Loan} - \text{Compensating Balance}} = \frac{\text{Amount Of Loan} \times \text{Rate Of Interest}}{\text{Amount Of Loan} - \text{Amount Of Loan} \times \text{Compensating Balance}(\%)}$$

Effective Cost Of Debt if there is Discounted Loan Requirement but no Compensating Balance Requirement

Dream is not what you see in sleep.A dream is the thing which does'nt let you sleep , makes you persevere till it comes out true before you eyes.

$$= \frac{\text{Amount Of Loan} \times \text{Rate Of Interest}}{\text{Amount Of Loan} - \text{Discounted Value}} = \frac{\text{Amount Of Loan} \times \text{Rate Of Interest}}{\text{Amount Of Loan} - \text{Amount Of Loan} \times \text{Rate Of Interest}(\%)}$$

PRESENT VALUE AND FUTURE VALUE

Future value = Today's Money or Present Value $\times (1 + r)^n$

Present Value = Tomorrow's Value or Future Value $\times \frac{1}{(1 + r)^n}$

PROFIT VOLUME (PV) RATIO

Profit Volume Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$; Break Even Points = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}} \times 100$

Required Turnover to achieve a given profit : $\frac{\text{Fixed Cost} + \text{Required Profit}}{\text{P/V Ratio}} \times 100$

Presentation :

Turnover	xxx
Less : Variable Cost	<u>xxx</u>
Contribution	xxx
Less Fixed Cost	<u>xxx</u>
Profit	<u>xxx</u>

EFFECTIVE RATE OF INTEREST:

$r = \left[1 + \frac{i}{m} \right]^m - 1$ Where r = Effective Rate Of Interest ; i = Nominal Rate Of Interest ; m = Frequency Of Compounding per year

COST OF CAPITAL OR WEIGHTED AVERAGE COST OF CAPITAL [WACC] OR K₀ OR COMPOSITE COST OF CAPITAL

$$K_0 = K_e \times W_e + K_r \times W_r + K_p + W_p + K_d \times W_d + K_t \times W_t$$

LEVERAGE

Degree Of Operating Leverage = $\frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$ or $\frac{\text{Contribution}}{\text{EBIT}}$

Degree Of Financial Leverage = $\frac{\% \text{ Change in EPS}}{\% \text{ Change in EBIT}}$ or $\frac{\text{EBIT}}{\text{EBIT} - \text{Interest} - \frac{\text{Preference Dividend}}{1 - t}}$

Degree Of Combined Leverage = $\frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}} \times \frac{\% \text{ Change in EPS}}{\% \text{ Change in EBIT}} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in Sales}}$

Though no one can go back and make a brand new start, anyone can start from now and make brand new ending. Don't use time or words carelessly. Neither can be retrieved.

$$\text{or } \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBIT} - \text{Interest} - \frac{\text{Preference Dividend}}{1-t}} = \frac{\text{Contribution}}{\text{EBIT} - \text{Interest} - \frac{\text{Preference Dividend}}{1-t}}$$

GAP ANALYSIS:

A gap is the difference between the opening price on a trading day and the closing price of the previous trading day.

Gap Down / Down Gap: An opening price that is below the prior day closing price.

Gap Up / Up Gap: An opening price that is above the prior day closing price.

COST OF RETAINED EARNING :

➔ We always assume $K_r = K_e$

Exception When personal income tax rate and personal brokerage of investors is given in the question then in such case $K_r = K_e (1 - \text{tax})(1 - \text{brokerage})$

➔ Note : Cost of Retained Earning is always equal to or less than Cost Of Equity .

TRADING ON EQUITY

In simple terms, trading on equity implies that one borrows at a lower rate and invests the same funds in the business to earn a higher rate.

CONFIDENCE INDEX :

It is the ratio of high-grade bond yields to low-grade bond yields

HOW INDEX IS CONSTRUCTED :

$$\text{Index Value} = \frac{\text{Today's Market Capitalisation}}{\text{Yesterday's Market Capitalisation}} \times \text{Yesterday's Index Point}$$

BOLLINGER BAND

➔ Bollinger Bands are a technical analysis tool invented by John Bollinger in the 1980s.

➔ Bollinger Bands can be used to measure the highness or lowness of the price relative to previous trades.

➔ Bollinger Bands consist of: · a middle band ; · an upper band ; · a lower band

➔ Calculation:

Upper Band = SMA + (2 × Standard Deviation)

Middle Bollinger Band = Simple Moving Average (SMA)

Lower Band = SMA - (2 × Standard Deviation)

➔ There are two indicators derived from Bollinger Bands, BandWidth. and %b pronounced 'percent b'

Bandwidth = (Bollinger Upper Band - Bollinger Lower Band) / Bollinger Middle Band

%b = (last closing value- lowerBB) / (upperBB - lowerBB)

NORMAL INCOME STATEMENT

What's greater than mom's love? Which pillow is better than Mom's lap?

Which company's better than friends? There are some things in life with no substitutes. Love them forever.

Sales	xxx
Less: Variable cost	<u>xxx</u>
Contribution	xxx
Less: Fixed cost	<u>xxx</u>
EBIT	xxx
Less: Interest	<u>xxx</u>
EBT	xxx
Less: Tax	<u>xxx</u>
EAT	xxx
Less: Preference Dividend	xxx
EFE(Earning for Equity)	xxx
No. of Equity Shares	xxx
EPS	xxx
PE Ratio	xxx
MPS (EPS x PE Ratio)	xxx

FORMAT OF COST SHEET

Opening stock of Raw Materials	XX
+ Purchases	XX
- Closing stock	(XX)
+ Direct wages	XX
+ Direct expenses	<u>XX</u>
Prime cost	XX
+ Factory overheads	<u>XX</u>
Gross Works cost	XX
+ Opening work in progress	XX
- Closing work in progress	(XX)
Net works cost/Cost of Production	XX
+ Opening finished goods	XX
- Closing finished goods	<u>XX</u>
Cost of goods sold	XX
+ Administration overheads	XX
+ Selling & Distribution overheads	<u>XX</u>
Cost of Sales	XX
+ Profit	<u>XX</u>
Sales	<u>XX</u>

TEST FOR WEAK FORM OF EFFICIENCY-RUN TEST

Step-1: First Calculate Mean Value of r & Standard Deviation in the following manner

$$\text{Mean Value Of } r = \frac{2n_1n_2}{n_1 + n_2} + 1 \quad ; \quad \text{Standard Deviation} = \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}}$$

Here n1 refers to total number of positive changes ;n2 refers to total number of negative changes.

Step-2 Calculate Standard Lower & Upper Limit in the following manner :

*Don't run through life so fast that you forget not only where you've been, but also where you are going.
"Build upon strengths, and weaknesses will gradually take care of themselves."*

The Standard Lower limit = Mean Value Of r - Table Value x SD

The Standard Upper limit = Mean Value Of r + Table Value x SD

Step-3 Decision: If our value of r lies within the standard lower limit and standard upper limit, the randomness is there i.e. the market is weakly efficient, otherwise it is not weakly efficient.

Here r refers to number of times sign changes

Note: Table Value or Degree Of freedom should be selected in following manner : $n_1 + n_2 - 1$

PRESENT VALUE OF EVA

PV Of EVA = EVA/Ko

QUESTION NOPAT = Rs. 15 lakhs; Ko=10%; Capital Employed = Rs. 100 lakhs. Calculate PV Of EVA.

Solution : EVA = NOPAT - Capital Employed x Ko = 15 Lakhs - 100 Lakhs x 10 % = Rs. 5 Lakhs

PV of EVA = 5 / 10 % = Rs. 50 Lakhs

CALCULATION OF INFLATION

$$\text{Inflation(\%)} = \left[\frac{\text{Future Price} - \text{Current Price}}{\text{Current Price}} \right]$$

SOME COMMON RATIOS

$$\text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Charges}} ; \text{Return On Investment} = \frac{\text{Profit}}{\text{Investment}} ; \text{Gear Ratio} = \frac{\text{Debt}}{\text{Equity}}$$

$$\text{Interest and Fixed Dividend Coverage} = \frac{\text{PAT} + \text{Debenture interest}}{\text{Debenture interest} + \text{Preference dividend}}$$

$$\text{Capital Gearing Ratio} = \frac{\text{Fixed interest bearing funds}}{\text{Equity shareholders' funds}} = \frac{\text{Preference Share Capital} + \text{Debentures}}{\text{Equity Share Capital} + \text{Reserves}}$$

ZERO INVESTMENT PORTFOLIO FOR THE PURPOSE OF ARBITRAGE

For the purpose of Arbitrage two conditions must be fulfilled:

1. Initial Investment must be zero
2. There must be Profit in every situation.

EFFECTIVE COST OF FUND WHEN SWAP IS DONE USING MARKET QUOTATIONS I.E TWO FIXED RATE IS GIVEN

Effective Cost Of Fund

= Fixed Rate To Be Paid As Per Original Loan - Fixed Rate Received By Swap Bank + Floating Rate To Be Paid To Swap Bank

SIMPLE RATE OF INTEREST:

→ Simple Interest = Principle Amount × Rate Of Interest per annum × Time period expressed in years

→ Total Amount = Principle + Interest

VALUE OF EQUITY AS PER RISK PREMIUM APPROACH

A man daily sent a rose to his wife. One day he died, but his wife still received roses. She asked the floweriest. He said, your husband paid advance for your whole life. MORAL: Love someone forever.

$$\text{Value of Equity Share} = \frac{\text{Actual Yield Of The Company}}{\text{Expected Yield Of Industry Adjusted According To Risk}} \times \text{Paid - Up Value Per Share}$$

$$\text{Actual Yield On Equity Shares(\%)} = \frac{\text{Yield On Shares}}{\text{Equity Share Capital}} \times 100$$

EFFECTIVE INTEREST/YIELD FOR MONEY MARKET INSTRUMENTS

$$\text{Effective Interest /Yield p.a} = \frac{\text{Face Value - Selling or Issue Price}}{\text{Selling or Issue Price}} \times \frac{12 \text{ or } 360}{\text{Maturity Months or Days}} \times 100$$

EQUAL MONTHLY INSTALMENT -WHEN INSTALMENT IS PAID AS THE END OF EACH YEAR

$$\text{EMI} = \frac{\text{Cost Of Asset (or Loan Taken If It Differs)}}{\text{PVAF (r \% p.m, n x 12 periods)}}$$

Where r = pre tax required return by money lender i.e the party giving the loan

EQUAL MONTHLY INSTALMENT -WHEN INSTALMENT IS PAID AT THE BEGINNING OF EACH YEAR

$$\text{EMI} = \frac{\text{Cost Of Asset (or Loan Taken If It Differs)}}{1 + \text{PVAF [r \% p.m, (n x 12 periods - 1)]}}$$

Where r = pre tax required return by money lender i.e the party giving the loan

SOURCE OF FINANCING

➔ Money can be raised from Equity Share Capital, Debentures, Preference Share Capital, Long Term Loan etc.

➔ Money should be raised in such a manner that it results in :

Maximization Of EPS or Maximization Of MPS for Equity Shareholders

EXTERNAL FUNDS REQUIREMENTS (EFR)

➔ External funds requirement (EFR) is given by the following formula:

$$\text{EFR} = \left(\frac{A}{S} - \frac{L}{S} \right) \Delta S - ms_1 (1 - d) \text{ Where EFR} = \text{External funds requirement}$$

A = Total assets ; S = Previous sales ; L = Payables and provisions

m = Profit Margin ; s1 = Projected sales for the next year

d = Dividend payout ratio ; Δ S = Expected increase in sales

Note: It can also be calculated by Normal Technique without using formula. (Refer ur Class Register)

OPTION TO DELAY-BLACK & SCHOLES MODEL

As per BSM Model : Value of Call Option = Spot Price $\times e^{-dy \times t} \times N(d_1) - \text{Exercise Price} \times e^{-r \times t} \times N(d_2)$

$$\text{Where } d_1 = \frac{\ln \left[\frac{\text{Current Market Price}}{\text{Exercise Price}} \right] + [r - dy + .50\sigma^2] \times t}{\sigma \times \sqrt{t}} ; d_2 = d_1 - \sigma \sqrt{t}$$

“There are some people who live in a dream world, and there are some who face reality; and then there are those who turn Dream Into Reality” . We cannot learn without pain.

Where $dy = \text{Opportunity Cost of delay} = 1/n$

Logic : Each year of delay translates into one less year of value-creating cashflows. Therefore Annual cost of delay $= 1/n$

FACTORING :

→ A factor is a firm that acquires the receivables of other firms. The factoring agency bears the right of collection and services the accounts for a fee.

→ **Types Of Factoring :**

(a) **Non Recourse Factoring:** Normally, factoring is the arrangement on a non-recourse basis where in the event of default the loss is borne by the factor. i.e if there are bad debts, it will be borne by the factor.

(b) **Recourse Factoring:** In this type of factoring, the risk of bad debt is borne by the client and not factor.

BONUS SHARE

→ Bonus Shares are those shares which are issued free of cost to existing equity shareholders

→ **Note :** There is no change in the wealth of the shareholder by issue of right share .

→ The Market Price of Share after Bonus Share will be : $\frac{S \times P_0}{S + N}$

Where S = Share Outstanding Before Issue ; P_0 = Current Market Price ; N = Number of bonus shares to be issued.

→ The company issues a bonus of 1:2. This means that for every two shares that you hold, you are allotted one bonus share

SHARE BUYBACK :

→ Buyback is reverse of issue of shares by a company where it offers to take back its shares owned by the investors at a specified price

Theoretical Post-Buyback Price Per Share = $\frac{\text{Current MPS} \times \text{Existing Number Of Equity Share}}{\text{Existing Number Of Equity Share} - \text{Buyback Number Of Share}}$

SHARE/STOCK SPLIT

→ Stock Split is the process under which number of Equity Shares of a company is increased by reducing the face value of the shares

→ There is no change in the overall wealth of shareholder or company on account of Stock Split.

→ A 2 : 1 Stock Split means company will issue 2 shares in lieu of 1 share.

REVERSE SHARE SPLIT

→ Reverse Split is just the opposite of Stock Split. This is also known as Consolidation Of Shares

→ It is a process under which number of Equity Share is decreased by increasing the Face Value of the shares.

→ No Change in wealth of shareholder or Company takes place on account of Reverse Split.

→ A 1:2 Reverse Split means one shares will be issued by the company in lieu of every 2 shares held.

NORMAL DISTRIBUTION CURVE/APPLICATION OF Z - VALUES

How To Calculate Probability

Step 1 : We first calculate Z Value which is equal to :

$Z = \frac{X - \bar{X}}{\sigma}$ Where, X = Revised Stipulated NPV (point to which the originally estimated NPV may move) ; \bar{X} = Originally

“Sometimes you cannot believe what you see. You have to believe what you feel.”

“Courage is about doing what you’re afraid to do. There can be no courage unless you’re scared.”

Estimated/Expected NPV ; σ = Standard Deviation of possible NPVs

If the Z Value is positive ,it means it falls in right tail .If the Z Value is negative ,it means it falls in left tail

Step 2 : Look at the Z Table and see the Value corresponding to Z Values .

Step 3 : Now Remember the following rules :

<u>If The Z Value Lie On</u>	<u>and the Requirement is</u>	<u>Then following Action need to be taken</u>
Left Tail	Greater than the calculated NPV	Add .5 to the value calculated above
Left Tail	Less Than the calculated NPV	Deduct .5 to the value calculated above
Right Tail	Greater than the calculated NPV	Deduct .5 to the value calculated above
Right Tail	Less than the calculated NPV	Add .5 to the value calculated above

SIMPLE MOVING AVERAGE (SMA)

➔ A “simple” moving average is calculated by adding the instrument prices for the most recent “n” time periods and then dividing by “n”.

➔ Note that a moving average cannot be calculated until you have “n” time periods of data. For example, you cannot display a 25-day moving average until we have 25 day price.

EXPONENTIAL MOVING AVERAGE (EMA)

➔ Formula: $EMA = EMA \text{ yesterday} + a \times [\text{Price Today} - EMA \text{ Yesterday}]$ Where $a = \text{Smoothing Constant} / \text{Multiplier}$. It will be normally given in question .If not given than it can be calculated by using $a = 2/(N+1)$ where N is the number of items in the average.

➔ When using the formula to calculate the first point of the EMA, you may notice that there is no value available to use as the previous EMA. This small problem can be solved

Alt 1 :by starting the calculation with a simple moving average and continuing on with the above formula from there.

Alt 2:The starting EMA may be given in question directly

CONCEPT OF FLAT RATE OF INTEREST

Under this, Interest is charged on the full amount of a loan throughout its entire term . The flat rate takes no account of the fact that periodic repayments, which include both interest and principal, gradually reduce the amount owed. Consequently the effective interest rate is considerably higher than the nominal flat rate initially quoted.

PORTFOLIO REBALANCING

➔ Portfolio Rebalancing means rebalancing our portfolio at a regular interval.

➔ There are three policies of portfolio rebalancing- Buy and hold policy, Constant mix policy, and Constant proportion portfolio insurance policy (CPPI).

Buy And Hold Policy : The initial mix that is bought is held. This is basically a ‘do nothing’ policy.No constant ratio is required to be maintained in this policy.

Constant Mix Policy : In this case Ratio of Equity & Debt is to be maintained every time portfolio is rebalanced.

Constant Proportion Portfolio Insurance Policy (CPPI) :

Investment in stocks or equity is to be maintained in the following manner = $m(\text{Portfolio value} - \text{Floor value})$ where m stands for multiplier.m and Floor Value will be given in question.

“Be who you are and say what you feel because those who mind don’t matter and those who matter don’t mind.” “For every person who doubts you, tell you that you will fail, try twice as hard to prove them wrong.”