SFM
CHALISA

SUMMARIZED NOTES
I hope all my stars are in pink of their health. I am presenting here the list of all the concepts taught in class along with short notes of each chapter which will be very useful for last time revision. It was really a tough job as more than 1000 pages of detailed class notes was to be covered in just around 100 page. But my only motive is to give the best to my students so that they can perform well in exam and fullfill all their own as well as their parents dreams.

I just want to say “NOBODY CAN GUARANTEE YOU SUCCESS.....IT IS YOU AND ONLY YOU WHO WILL HAVE TO WORK HARD FOR YOUR GOAL. ALWAYS REMEMBER THIS LINE ‘ITS ALL DEPENDS ON ME’.......THE DAY WHEN YOU WILL KNOW THE IMPORTANCE OF THIS LINE THEN NOTHING CAN EVER STOP YOU........

A mountain is not higher than ur confidence, becoz it will be under ur feet, if u reach the top.

Which Option U Want To Choose"Can I"OR"I Can".

Its All depends On U

Only as high as I reach can I grow,
Only as far as I seek can I go,
Only as deep as I look can I see,
Only as much as I dream can I be.

" To be where you've never been before,
You have to do what you've never done before."
<table>
<thead>
<tr>
<th>CHAPTERS</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Time Value Of Money</td>
<td>1-5</td>
</tr>
<tr>
<td>2. Dividend</td>
<td>6-21</td>
</tr>
<tr>
<td>3. Bond Valuation</td>
<td>22-40</td>
</tr>
<tr>
<td>4. Mutual Fund</td>
<td>41-46</td>
</tr>
<tr>
<td>5. Valuation Of Business</td>
<td>47-55</td>
</tr>
<tr>
<td>6. Merger &amp; Acquisition</td>
<td>56-73</td>
</tr>
<tr>
<td>7. Portfolio Management</td>
<td>74-98</td>
</tr>
<tr>
<td>8. Foreign Exchange</td>
<td>99-123</td>
</tr>
<tr>
<td>9. Futures</td>
<td>124-138</td>
</tr>
<tr>
<td>10. Options</td>
<td>139-159</td>
</tr>
<tr>
<td>11. Currency Futures &amp; Options</td>
<td>160-162</td>
</tr>
<tr>
<td>12. Leasing</td>
<td>163-173</td>
</tr>
<tr>
<td>13. Capital Budgeting</td>
<td>174-194</td>
</tr>
<tr>
<td>14. Right Shares</td>
<td>195-196</td>
</tr>
<tr>
<td>15. Factoring</td>
<td>197-198</td>
</tr>
<tr>
<td>16. Money Market Operation</td>
<td>199-201</td>
</tr>
<tr>
<td>17. SWAPS; FRA (ADVANCED); CAPS &amp; FLOOR</td>
<td>202-203</td>
</tr>
<tr>
<td>18. Economic Value Added (EVA)</td>
<td>204-205</td>
</tr>
<tr>
<td>19. Ratio Analysis</td>
<td>206-208</td>
</tr>
<tr>
<td>19. Miscellaneous</td>
<td>209-218</td>
</tr>
</tbody>
</table>
ALL THE BEST

SFM-For those who want to score 90+
Dare To Dream...Beyond 90

CA Aaditya Jain

ALL THE BEST

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1. INTRODUCTION

"Time Value Of Money" means that the value of money is different in different time periods. i.e Money has a time value.

For Example: Rs. 100 received today is not the same as Rs. 100 received a year later.

At first instance we will think that there is no difference between both the option. But when viewed closely we will realize that both the options are not comparable because same cash flows are arising at different period of time.

The cash flows arising at different periods of time can be made comparable by using any one of the following two ways.
(i) Future Value/Compounding Technique
(ii) Present Value/Discounting Technique

2. FUTURE VALUE OF A SINGLE CASH FLOW/
   COMPOUNDING TECHNIQUE

The process of finding tomorrow's value (future value) of today's money is known as compounding.

In other words with the help of compounding we can take all the cash flows forward to a common future date.

Symbolically: Future Value = Present Value × (1 + r)^n

3. PRESENT VALUE OF A SINGLE CASH FLOW/
   DISCOUNTING TECHNIQUE

The process of finding present value of future cash flows is known as discounting. Present value is today's value of tomorrow's money.
In other words, by discounting we can bring all the cash flows backward to a common present date.

Symbolically: Present Value = \( \frac{\text{Future Value}}{(1 + r)^n} \)

4. PRESENT VALUE OF CASH FLOW FOR MORE THAN ONE YEAR - UNEVEN CASH FLOWS UPTO DEFINITE PERIOD

Present Value = \( \frac{\text{Cash Flow}_1}{(1 + r)^1} + \frac{\text{Cash Flow}_2}{(1 + r)^2} + \frac{\text{Cash Flow}_3}{(1 + r)^3} + \ldots + \frac{\text{Cash Flow}_n}{(1 + r)^n} \)

5. PRESENT VALUE OF CASH FLOW FOR MORE THAN ONE YEAR - EQUAL CASH FLOW UPTO DEFINITE PERIOD [DEFERRED ANNUITY I.E. CASH FLOW ARISING AT THE END OF EVERY YEAR]

Present Value = Annual Cash Flow \( \times \) PVAF(r %, n years)

Where PVAF = Present Value Annuity Factor

6. PRESENT VALUE OF EQUAL CASH FLOW UPTO PERPETUITY/INFINITY/FOREVER-WITHOUT GROWTH I.E. EQUAL CASH FLOW & INDEFINITE PERIOD

Present Value = \( \frac{\text{Annual Cash Flow}}{\text{Discount Rate}} \)

7. PRESENT VALUE OF CASH FLOW UPTO PERPETUITY/INFINITY/FOREVER-WITH GROWTH I.E. GROWING CASH FLOW & INDEFINITE PERIOD

Present Value = \( \frac{\text{Cash Flows Arising At Year End}_1}{\text{Discount Rate} – \text{Growth Rate}} = \frac{\text{CF}_1}{\text{Discount Rate} – \text{Growth Rate}} \)
8. ANNUITY

What is Annuity? Annuity is a series of equal cash flows arising up to a specific period of time.

Types Of Annuity

What is Deferred Annuity? When cash flows are arising at the end of every year then such annuity is known as deferred annuity.

What is Annuity Due? When cash flows are arising at the beginning of every year then such annuity is known as annuity due.

If question is silent about the type of annuity, we will always assume cash flow arising at the end of the year i.e Deferred Annuity.

9. PRESENT VALUE OF CASH FLOW FOR MORE THAN ONE YEAR-
   EQUAL CASH FLOW AND DEFINITE PERIOD ANNUITY DUE
   I.E. CASH FLOW ARISING AT THE BEGINNING OF EVERY YEAR

Present Value = Annual Cash Flow × [1 + PVAF(r, n - 1 years)]

10. PERPETUITY

What is Perpetuity? Perpetuity is an Annuity series of equal cash flows arising up to infinity or forever.

Normally whenever question is silent life of the company or any security is assumed to be perpetual.

INTERNAL RATE OF RETURN

IRR is the discount rate at which NPV is zero.

It is the rate at which Present Value Of Cash Inflows is equal to Present Value Of Cash Outflows.

When rate is missing in the question, IRR Technique is used to find out the required rate.

In such case we should use trial & error technique to find out IRR.

We will discount the cash flows by two rates. One Higher and One Lower.

By higher rate we should get negative NPV & by lower rate we should get positive NPV.
Now to find exact discount rate we should use the following formula

\[
\frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times (\text{Higher Rate} - \text{Lower Rate})
\]

It is advisable that the difference between high rate and low rate must not be greater than 5%.

It may be noted that higher the discounting rate, lower will be the present value and vice versa.

11. INTERNAL RATE OF RETURN (IRR) IN CASE OF SINGLE CASH FLOW

**Question** Mr. Ram wants to receive Rs. 110 after one year. He invested Rs. 100 as on today. Calculate IRR?

**Solution:**
NPV = Present Value Of Cash Inflow - Present Value of Cash Outflow

\[
0 = \frac{110}{(1+r)^1} - 100
\]

or \( r = 10\% \)

12. CALCULATING IRR WHEN MORE THAN ONE PERIOD UNEQUAL CASH FLOW IS GIVEN

**Question** Cash Outflow at Year 0 = 10,000
Cash Inflow at Year 1 = 1000
2 = 1000
3 = 2000
4 = 10,000

**Solution:**
NPV = Present Value Of Cash Inflow - Present Value of Cash Outflow

\[
0 = \left[ \frac{1000}{(1+r)^1} + \frac{1000}{(1+r)^2} + \frac{2000}{(1+r)^3} + \frac{10000}{(1+r)^4} \right] - 10000
\]

Let \( r = 10\% \): NPV at 10\% = +67
Let \( r = 15\% \): NPV at 15\% = -1338
Therefore IRR =

\[ \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates} \]

\[ = 10\% + \frac{67}{67 - (-1338)} \times 15\% - 10\% = 10.24\% \]

**13. INTERNAL RATE OF RETURN (IRR) IN CASE OF MULTIPLE EQUAL CASH FLOW**

**Question** Initial Investment = Rs. 30,000; Cash Flow Year 1 - 5 = 9,000 p.a. Calculate IRR?

**Solution:**

\[
30,000 = 9,000 \times PVAF\ (r\ \%,\ 5\ \text{Years}) \text{ or } PVAF\ (r\ \%,\ 5\ \text{Years}) = 3.33.
\]

Now Looking at PVAF Table closest value of 3.33 in row 5 is when \( r = 15\% \)

At 15\% : \( \text{NPV} = 168 \); At 16\% : \( \text{NPV} = -534 \).

Now Using IRR Formula we can get IRR = 15.239\%

**Some Basic Point Relating To This Chapter:**

- Beginning of year 1 means Year 0; Beginning of year 2 means Year end 1;
  Beginning of year 3 means Year end 2.............

- If nature of rate of interest is silent, we will always assume it to be per annum rate of interest.

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1. WHY DIVIDEND/INTRODUCTION

Our focus in this chapter is to know how much dividend should be paid and how much earning should be retained for the purpose of investment.

Objective-To Increase Equity Shareholder's Wealth

2. EARNING PER SHARE (EPS)

\[ \text{Earning Per Share (EPS)} = \frac{\text{Total Earnings Available for Equity Shareholders}}{\text{Total Numbers of Equity Shares}} \]

3. DIVIDEND PER SHARE (DPS)

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

4. MARKET PRICE PER SHARE (MPS)

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

5. DIVIDEND RATE

\[ \text{Dividend Rate} = \frac{\text{Dividend Per Share}}{\text{Face Value}} \times 100 \]

Note: Dividend is always paid on face value of share and not market price. 
For example: Dividend Rate declared by the company is 10%. Face Value: Rs. 10. Market Price Per Share: Rs 50. In this case Dividend Per Share will be Re 1 and not Rs. 5.
Note: IfPaid up value is less then face value then dividend is paid on paid up value.

6. DIVIDEND YIELD (RETURN)

\[ \text{Dividend Yield (Return)} = \frac{\text{Dividend Per Share}}{\text{Market Price Per Share}} \times 100 \]

Note: If \( P1 \) and \( Po \) is separately given, then in such case we should use \( Po \).

7. DIVIDEND PAYOUT RATIO (D/P RATIO)

\[ \text{Dividend Payout Ratio} = \frac{\text{Dividend Per Share}}{\text{Earning Per Share}} \times 100 \]

8. RETENTION RATIO

\[ \text{Retention Ratio} = \left[ \frac{\text{EPS} - \text{DPS}}{\text{EPS}} \right] \times 100 \]

or \( (1 - \text{Dividend Payout Ratio}) \) or

\[ \left[ \frac{\text{Retained Earning Per Share}}{\text{EPS}} \right] \times 100 \]

9. RELATIONSHIP BETWEEN DIVIDEND PAYOUT RATIO & RETENTION RATIO

Dividend Payout Ratio = 1 - Retention Ratio
or Retention Ratio = 1 - Dividend Payout Ratio

Note: Retention Ratio + Dividend Payout Ratio = 1 or 100%

10. RETAINED EARNING PER SHARE

Retained Earning Per Share = EPS - DPS

OR
11. EARNING YIELD (EY)

\[ \text{Earning Yield} = \frac{\text{Earnings Per Share}}{\text{Market Price Per Share}} \]

12. DIVIDEND POLICY / MODELS / THEORIES

**Relevance Theory**: According to Relevance Theory, Dividend play an important role in determination of Market price of the company. i.e Market Price of the company is affected by dividend. **Example**: Walter’s Model; Gordon’s or Growth Model

**Irrelevance Theory**: According to Irrelevance Theory, Dividend do not play any role in determination of Market price of the company. i.e Market Price of the company is not affected by dividend. **Example**: MM Approach

13. WALTER’S MODEL

**Symbolically**: \[ P_o = \frac{\text{DPS}}{K_e} + \frac{r}{K_e} (\text{EPS} - \text{DPS}) \]

- \( P_o \) = Current Market Price Per Share Ex-Dividends, Theoretical Market Price Per Share, Intrinsic Value Per Share or Equilibrium Price Per Share, Present Value Market Price, Market Price Per Share as on today
- \( \text{DPS} \) = Dividend Per Share
- \( K_e \) = Cost of Equity / Investor's Expectation / Capitalization Rate / Expected Return / Discount Rate / Opportunity Cost of Shareholders
- \( r \) = Rate of Return / Internal Rate of Return (IRR) / Return on Equity / Return on Investment
- \( \text{EPS} - \text{DPS} \) = Retained Earning Per Share
14. OPTIMUM DIVIDEND PAYOUT OR OPTIMUM RETENTION RATIO AS PER WALTER'S MODEL (ALL OR NOTHING APPROACH):

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

<table>
<thead>
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15. EFFECT ON MARKET PRICE IF OPTIMUM DIVIDEND OR OPTIMUM RETENTION RATIO IS FOLLOWED AS PER WALTER AND GROWTH MODEL

If \( r > \text{Ke} \): Higher the Retention Ratio [ i.e Lower the Dividend Payout Ratio] higher the market price per share

If \( r < \text{Ke} \): Lower the Retention Ratio [ i.e Higher the Dividend Payout Ratio] higher the market price per share

If \( r = \text{Ke} \): Any Retention Ratio or Any Dividend Payout Ratio will not effect market price of share .Market Price Per Share will remain same under any Dividend Payout or Retention Ratio.

16. GORDON'S MODEL / DIVIDEND GROWTH VALUATION MODEL / GORDON GROWTH'S MODEL / DIVIDEND DISCOUNT MODEL / CONSTANT GROWTH RATE MODEL

Symbolically:

\[
\text{Po} = \frac{\text{DPS}_1}{\text{Ke} - g}
\]

\[
\text{Po} = \frac{\text{DPS}_0 (1 + g)}{\text{Ke} - g} \quad \text{or}
\]
P₀ = \frac{\text{EPS}(1 - b)}{K_e - g} \quad \text{or} \quad \text{If EPS}(1-b) \text{ is considered as D1} \quad \text{[Preferred]}

P₀ = \frac{\text{EPS}(1 - b)(1 + g)}{K_e - g} \quad \text{[If EPS}(1-b) \text{ is considered as Do]}

DPSₙ = \text{DPS next year / Dividend to be paid / Expected Dividend / Dividend not yet paid}

DPS₀ = \text{DPS of current year / Dividend just paid / DPS as on today / Dividend Per Share of previous year / Dividend Recently Paid / Last year dividend}

\text{EPS} = \text{Earning Per Share}

Kₑ = \text{Cost of Equity / Investor's Expectation / Capitalization Rate / Expected Return / Discount Rate / Opportunity Cost for shareholders}

\text{Po} = \text{Current Market Price Per Share Ex-Dividends, Theoretical Market Price Per Share, Intrinsic Value Per Share or Equilibrium Price Per Share, Present Value Market Price, Market Price Per Share as on today}

g = \text{Growth rate of dividend} = b \times r

b = \text{Retention Ratio (\%)}

r = \text{Rate of Return / Internal Rate of Return (IRR) / Return on Equity / Return on Investment (ROI)}

(1-b) = \text{Dividend Payout Ratio}

17. PRICE/EARNING RATIO

\text{Price Earning Ratio} = \frac{\text{MPS}}{\text{EPS}}

18. CONFUSION REGARDING D₁ OR D₀

This confusion arises when students applies Growth Model. In case question is not clear, an appropriate assumption can be taken regarding D₁ or D₀ and then students can solve the question accordingly.

Some hint specified in question: Paid-D₀; To Be Paid-D₁; Last OR Current Year OR Latest Dividend-D₀; Expected OR Next Year OR Year End Dividend-D₁

Normally when EPS or b are given in question we use this formula: \( P₀ = \frac{\text{EPS}(1 - b)}{K_e - g} \)
19. OPTIMUM DIVIDEND PAYOUT OR OPTIMUM RETENTION RATIO AS PER GROWTH MODEL (ALL OR NOTHING APPROACH)

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20. RELATIONSHIP BETWEEN GROWTH RATE; RETURN ON EQUITY; RETENTION RATIO

\[ g = b \times r \]

**Note:** Other things remaining constant "g" and "b" are directly related to each other.

21. DETERMINATION OF GROWTH RATE \((g)\)

- Assuming growth rate to be constant, we can find the growth rate by using any of the following two relations:
  1. \[(a) \quad g = b \times r\]
  2. \[(b) \quad D_{\text{Latest or Current}} = D_{\text{Base}} (1+g)^{n-1}\]

22. ZERO GROWTH RATE

- When company is distributing all its earnings as dividend i.e. when \(\text{EPS} = \text{DPS}\) [i.e. no retention], growth rate will be NIL.
- In such case growth model will become:

\[ p_0 = \frac{\text{EPS}}{K_e} \]

23. VALUE OF DECLINING FIRM/NEGATIVE GROWTH FIRM

- Market Price Per Share of a firm whose dividend is declining at a constant rate p.a. forever is given by
24. RELATIONSHIP BETWEEN GROWTH RATE, EPS & DPS

WHEN GROWTH RATE IS POSITIVE

EPS > DPS  RETENTION IS POSITIVE  \( P_0 = \frac{DPS_0(1 + g)}{K_e - g} \)

WHEN GROWTH RATE IS NEGATIVE

EPS < DPS  RETENTION IS NEGATIVE  \( P_0 = \frac{DPS_0(1 - g)}{K_e + g} \)

WHEN GROWTH RATE IS ZERO

EPS = DPS  NO RETENTION  \( P_0 = \frac{EPS}{K_e} \)

25. UNEQUAL GROWTH RATE/VARIABLE GROWTH RATE CONCEPT

Dividend Growth Model cannot be applied directly in case where dividend is not growing at a constant rate from year 1 onwards. In such case we will modify Dividend Growth Model and calculate Current Market Price in the following manner

\[
P_0 \left( \text{Assuming Dividend is growing constantly from year 4 onwards} \right)
= \frac{D_1}{(1 + K_e)} + \frac{D_2}{(1 + K_e)^2} + \frac{D_3}{(1 + K_e)^3} + \frac{D_4}{(1 + K_e)^4} + \left( \frac{D_5}{K_e - g} \right) \times \frac{1}{(1 + K_e)^4}
\]

26. IRR TECHNIQUE WITH VARIABLE GROWTH MODEL

\[
\text{IRR} = \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates}
\]
When to use IRR Technique in Dividend Growth Model:
(i) If in any question we are asked to calculate Discount Rate (Ke)
(ii) Question is based on Variable Growth Rate Model

27. PRESENT VALUE OF GROWTH OPPORTUNITY (PVGO)

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

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

28. CONSTANT DIVIDEND AMOUNT APPROACH

Under this model, a fixed amount of dividend is paid each year irrespective of the earnings.
Example: Assume Constant Dividend Amount = Rs. 4

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS</td>
<td>10</td>
<td>25</td>
<td>45</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>DPS</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

29. CONSTANT DIVIDEND PAYOUT APPROACH

Under this approach, Dividend Payout Ratio is kept constant.
Example: Assume Constant Dividend Payout = 50 %

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
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<td>45</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>DPS</td>
<td>5</td>
<td>12.5</td>
<td>22.5</td>
<td>1</td>
<td>3.5</td>
</tr>
</tbody>
</table>

30. RESIDUAL DIVIDEND APPROACH

Under this Approach, 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

31. INTERNAL FINANCING AND EXTERNAL FINANCING

- There are two main ways for a firm to raise money. One is internal financing and the other way of raising money is external financing.
- **Internal sources** - finance which comes mainly from own funds i.e retained earnings
- **External sources** - is capital obtained from outside mainly Equity Shares, Preference Shares, Debentures & loans
- Internal financing is generally thought to be less expensive for the firm than external financing because the firm does not have to incur transaction costs or flotation cost to obtain it.

32. 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 Po should be taken net of flotation cost i.e Net Proceeds
- Flotation cost is applicable for new equity share and hence Flotation Cost for Existing Equity Share and Retained Earning is Nil.

33. OVERVALUED & UNDERVALUED SHARES

- When Current Market Price [i.e. price prevailing in stock market] and Theoretical (Fair OR Present Value) Market Price [i.e. price which we calculate by applying present value concept] are not same we will undertake following decision:

<table>
<thead>
<tr>
<th>Case</th>
<th>Valuation</th>
<th>Decision</th>
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<td>Sell</td>
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<td>If Current Market Price &lt; Present Value Market Price</td>
<td>Undervalued</td>
<td>Buy</td>
</tr>
<tr>
<td>If Current Market Price = Present Value Market Price</td>
<td>Correctly Valued</td>
<td>Hold</td>
</tr>
</tbody>
</table>
34. RELATIONSHIP BETWEEN KE & PE RATIO

\[ Ke = \frac{1}{P/E \text{ Ratio}} \]

The given equation should be rarely used. In other words when no other option is available, we can use this equation for Ke calculation.

35. ASSET TURNOVER RATIO (ATR)

\[ \text{Asset Turnover Ratio} = \frac{\text{Net Sales}}{\text{Total Asset}} \]

Decision: Higher the better

36. TYPES OF DIVIDEND

Interim Dividend: Dividend that is declared and paid, before the declaration of final dividend.

Final Dividend: Final Dividend is the dividend paid at year end, based on the profits of the Company.

Note: In case question is silent, always assume Annual dividend.

37. NPV TECHNIQUE UNDER DIVIDEND POLICY

\[ \text{Net Present Value} = \text{Present Value Of Cash Inflows} - \text{Present Value Of Cash Outflows} \]

Decision:
If NPV is positive: Accept the Project
If NPV is negative: Reject the Project
If NPV is zero: Indifferent Position

If NPV is positive we should undertake the given project, otherwise we should distribute dividend to shareholders as per residual approach.

38. INCREASE OR DECREASE IN MPS DUE TO INVESTMENT

Example: Present MPS of the Company as per its existing policy is Rs. 10 with 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.

If company is giving negative NPV of Rs. 2,00,000 then in such case revised MPS will be Rs. 8.

39. RETURN ON EQUITY (ROE)

\[ \text{Return On Equity (ROE)} = \frac{\text{Total Earnings Available For Equity Shareholder}}{\text{Total Equity Shareholder's Fund}} \times 100 \]

40. BOOK VALUE PER SHARE (BVPS)

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

41. RELATIONSHIP BETWEEN ROE, BVPS & EPS

\[ \text{EPS} = \text{Book Value Per Share} \times \text{Return on Equity} \]

42. CALCULATION OF HOLDING PERIOD RETURN (HPR)

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

43. CAPITAL GAIN YIELD

\[ \text{Capital Gain Yield} = \frac{P_1 - P_0}{P_0} \times 100 \]
44. PRICE AT THE END OF YEAR 1

P₁ is normally calculated by using this equation:

\[ P₀ = \frac{D₁ + P₁}{(1 + Kₑ)İ} \]

45. PREFERENCE TO DIVIDEND PAYMENT

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

46. IRRELEVANCE THEORY: MODIGLIANI-MILLER MODEL

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

\[ nP₀ = \frac{(n + m) P₁ + E₁ - İ₁}{1 + Kₑ} \]

Where,

\[ P₀ = \text{Current or Prevailing Market Price Ex-Dividend ; Theoretical Market Price Per Share, Intrinsic Value Per Share or Equilibrium Price Per Share, Present Value Market Price, Market Price Per Share as on today} \]

\[ P₁ = \text{Year end Market Price Ex-Dividend} \]

\[ İ₁ = \text{Total Investment made at year end} \]

\[ E₁ = \text{Total Earning at the end of the year} \]

\[ Kₑ = \text{Capitalization Rate/Cost of Equity/Investor’s Expectation/Expected Return/Discount Rate/Opportunity Cost Of Equity} \]

\[ n = \text{Present / Existing Number of Equity Shares} \]

\[ m = \text{Additional or New Number of Equity Shares issued at year end, at year end market price to finance capital expenditure.} \]

\[ nP₀ = \text{Market Value of all existing shares in beginning of year/ Market Value of the firm as on today} \]

Note: When dividend is declared or it is not declared the above value will be same.
47. NUMBER OF NEW EQUITY SHARES TO BE ISSUED AS PER MM

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

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

48. VALUE OF FIRM AT THE END AS PER MM

\[(n+m)P_1 = \text{MPS at the end} \times \text{Total number of Equity Shares at the end}\]

**Note:** When dividend is declared or it is not declared the above value will be same.

49. CONFUSION REGARDING ACTUAL PO AND FAIR PO

- Actual Price cannot be calculated. It depends on demand supply pressure based on market expectation.
- Fair Price can be calculated by using various models like Dividend Growth Model, Walter's Model etc. It is based on Present Value concept.
- It may be noted that difference in above two price give rise to overvalued and undervalued concept.
- If question is silent always assume Actual Price = Fair Price

50. 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 \( r = 10\% \) ?

**Solution:** If \( r = \text{Ke} \), then the Dividend Payout Ratio (D/P Ratio) does not affect the price or value of the share. Here we have \( r = 10\% \). Hence \( \text{Ke} \) should also be 10%.

Now we know that, \( \text{Ke} = \frac{1}{\text{P/E Ratio}} \Rightarrow .10 = \frac{1}{\text{P/E Ratio}} \Rightarrow \text{P/E Ratio} = 10 \) times

Hence PE Ratio should be 10 times so that any dividend pay-out ratio will have no effect on the value of the share.
51. **Calculation of KE in Case of Walter’s Model**

In this case we need to use quadratic equation for solving Ke.

A general quadratic equation can be written in the form \( ax^2 + bx + c = 0 \)

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

**Example:** \( 36.25Ke^2 - 1.80Ke - .64 = 0 \)

Here, \( a = 36.25; b = -1.80; c = -.64 \)

\[
Ke = \frac{-(-1.8) \pm \sqrt{(-1.8)^2 - 4 \times 36.25 \times (-.64)}}{2 \times 36.25} = 16 \%
\]

52. **Calculation of Operating Cost When Operating Profit Margin is Given**

\( \Rightarrow \) Operating Cost = 1 - Operating Profit Margin

53. **Treatment of Capital Gain Tax**

Capital Gain = \( P_1 - P_0 \)

Capital Gain Tax = \( (P_1 - P_0) \times \) Capital Gain Tax Rate

54. **Strategy When Investor is Already Holding Shares**

Actual \( P_0 > \) Fair \( P_0 \) - Overvalued \n\( \Rightarrow \) Sell

Actual \( P_0 < \) Fair \( P_0 \) - Undervalued \n\( \Rightarrow \) Hold

55. **E/P Ratio or Earning Price Ratio**

\( \Rightarrow \) E/P Ratio = \( \frac{Earnings \ Per \ Share}{Market \ Price \ Per \ Share} \)

56. **Calculation of Po Using Growth Model When \( g > Ke \)**

\( \Rightarrow \) In such case \( Po \) cannot be calculated as \( Po \) in that case will be negative.

\( \Rightarrow \) Hence growth model cannot be applied in cases where \( g \) is greater than \( Ke \)
57. CONFUSION REGARDING USE OF PE RATIO

- PE Ratio can be used in calculation of Ke or For Calculation Of MPS
- How to use PE Ratio will depend on framing of question.

(i) If question ask us to calculate Ke and PE Ratio is given:
- Avoid Ke = 1/PE Ratio
- Use PE Ratio for calculation of Po i.e MPS

(ii) If question ask us to calculate Po and PE Ratio is given:
- Avoid PE Ratio for calculation of Po i.e MPS
- Use Ke = 1/PE Ratio for Ke Calculation.

58. LINTER'S MODEL (CORPORATE DIVIDEND BEHAVIOUR MODEL)

- Symbolically: \[ D_1 = D_0 + [(\text{EPS} \times \text{Target Dividend Payout Ratio}) - D_0] \times AF \]
  
  Where \( D_1 \)=Dividend to be declared ; \( D_0 \)=Dividend in previous year or Dividend paid ;
  
  AF= Adjustment Factor / Speed of Adjustment / % increase in Dividend which can be maintained in future

- Under this model, dividend should not fall from previous level. It may remain constant or may increase but not fall.

59. CALCULATION OF PO TAKING BEFORE AND AFTER TAX

- When Equity Shareholders pay tax in dividend income received then Ke must be taken before tax since in such case they will expect more as they will be liable to pay tax.
- When tax on Dividend Income is paid by company in the form of CDT, Ke must be taken after tax as now shareholder will expect less.

60. EX & CUM DIVIDEND MPS

Cum-Dividend Date: When MPS include the amount of Current Dividend ,then it is known as Cum-Dividend

Ex-Dividend Date: When MPS does not include the amount of Current Dividend ,then it is known as Ex-Dividend

Note: If question is silent, always assume Ex-Dividend.

Note: It may also be noted that in all the formula, we consider Ex-Dividend and not Cum-Dividend.
61. VALUE AS PER PE MULTIPLE APPROACH AND EARNING GROWTH MODE

**Value of stock under the PE Multiple Approach**
Market Price per Share = EPS x PE
Where PE Multiple (1/Return on Equity)

**Value of the Stock under the Earnings Growth Model**
Market Price per Share = \( \frac{\text{EPS}(1 + g)}{\text{Ke} - g} \)

62. VALUE AT THE END OF “N” YEAR FROM WHERE GROWTH RATE BECOMES CONSTANT

Assuming that growth rate becomes constant after 3 years price will be:

\[ P_3 = \frac{D_4}{\text{Ke} - g} \]
1. INTRODUCTION/WHY BOND VALUATION?

- Bond means Debenture.
- Bond valuation is the process of determining the fair price of a bond.
- Bonds or Debentures are long term loan which pay periodical interest and principal amount upon maturity.
- Determining the value of the bond is an application of the present value concept.

2. FACE VALUE

- It is also called Par Value.
- Interest is paid on face value or par value.
- Unless otherwise stated bond is assumed to be issued at Face Value or Par Value.
- The par value or face value may be normally assumed to be Rs. 100 or Rs. 1000 depending upon the question.

3. MATURITY VALUE (REDEMPTION VALUE)

- The value which the bondholder will get on maturity is called Redemption Value.
- If silent, bond are always assumed to be redeemed at face value.

4. COUPON AMOUNT AND COUPON RATE

- **Coupon Rate**: The annual interest rate on a bond. It is the rate at which company pays interest.
- **Coupon Amount**: The amount of interest which is paid by the company. 
  \[ \text{Amount Of Interest} = \text{Face Value Of Debenture} \times \text{Coupon Rate} \]

5. YEARS TO MATURITY

- The year on which the principal amount of a bond is fully repaid is known as years to maturity.

**Note**: If the question is silent about the maturity period of any investment say preference
shares, bonds, debentures etc then we will assume such investment as irredeemable or perpetual

- It is denoted as "n"

6. VALUE OF STRAIGHT COUPON BOND OR EQUAL COUPON BOND

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

- Symbolically

Value of Bond \((B_0)\)

\[
\frac{\text{Interest}}{(1 + \text{Yield})^1} + \frac{\text{Interest}}{(1 + \text{Yield})^2} + \ldots + \frac{\text{Interest}}{(1 + \text{Yield})^n} + \frac{\text{Maturity Value}}{(1 + \text{Yield})^n}
\]

\[
= \text{Interest} \times \text{PVAF (Yield \%, n years)} + \text{Maturity Value} \times \text{PVF (Yield \%, n years)}
\]

Where \(n = \) Number of Years to Maturity

7. 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 \((B_0)\) = \(\frac{\text{Annual Interest}}{\text{Yield}}\)

8. VALUE OF ZERO COUPON BOND OR DEEP DISCOUNT BOND

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

- Symbolically:

Value of Bond \((B_0)\) = \(\frac{\text{Maturity Value}}{(1 + \text{Yield})^n}\)

9. OVERPRICED AND UNDERPRICED BONDS

- When Current Market Price [i.e. price prevailing in stock market] and Theoretical (Fair) Market Price [i.e. price which we calculate by applying present value concept] are not same
we will undertake following decision:

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</table>

10. VALUE OF BOND WITH FLUCTUATING COUPON RATE

Sometimes bonds are issued with Fluctuating Coupon Rate. It means that coupon rate may change from one year to another as per the terms of the contract or as per given in question.

11. VALUE OF SEMIANNUAL INTEREST BOND

**Meaning**: Semi Annual Interest Bonds are those bonds which pay interest semiannually.

To value such bonds we have to make three changes:

1. \( \frac{\text{Annual Interest Amount}}{2} \)
2. \( \text{Years To Maturity} \times 2 \)
3. \( \frac{\text{Yield p.a}}{2} \)

12. VALUE OF MONTHLY COUPON INTEREST BOND

1. \( \frac{\text{Annual Interest Amount}}{12} \)
2. \( \text{Years To Maturity} \times 12 \)
3. \( \frac{\text{Yield p.a}}{12} \)

13. VALUE OF QUARTERLY COUPON INTEREST BOND

1. \( \frac{\text{Annual Interest Amount}}{4} \)
2. \( \text{Years To Maturity} \times 4 \)
3. \( \frac{\text{Yield p.a}}{4} \)

14. VALUE OF SELF AMORTIZING BONDS

Bonds which pay part of principal amount over a period of time rather than on maturity are called Self Amortizing Bonds.
15. VALUE OF BOND UNDER REINVESTMENT CONCEPT

In such case our equation is:

\[ B_0 = \frac{\text{Coupon Amount} \times n + \text{Face Value}}{(1 + \text{YTM})^n} \]

Where \( n \) = Life of Bond

16. CALCULATION OF \( B_0 \) WHEN ENTIRE PRINCIPAL & INTEREST AMOUNT IS RECEIVED AT MATURITY YEARS

In such case our equation is:

\[ B_0 = \frac{\text{Face Value}(1 + \text{Coupon Rate})^n}{(1 + \text{YTM})^n} \]

YIELD

There are number of ways to express yield which are:

(i) Coupon Yield / Normal Yield [In this case Coupon Rate and YTM are equal]
(ii) Current Yield / Flat Yield / Current Interest Yield
(iii) Yield to Maturity / Redemption Yield / Kd / Cost Of Debt / Market Interest Rate
(iv) Yield To Call (YTC)
(v) Yield To Put (YTP)
(vi) Holding Period Return (HPR)
(vii) Yield Of Perpetual Bond
(viii) Capital Gain Yield

Note: If in question both Current (Actual) Market Price and Intrinsic/Fair Value are available, we will take Current (Actual) Market Price and not Intrinsic Value (Present Value) for all the calculation of yield.

Note: Final answer of all types of yield must always be in p.a basis

17. HOLDING PERIOD RETURN (HPR)

Holding Period Return (R) or Total Return

\[ = \frac{I_1 + (B_1 - B_0)}{B_0} \quad \text{or} \quad \frac{I_1}{B_0} + \frac{(B_1 - B_0)}{B_0} \]

or Current Interest Yield + 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
Note: The holding period is generally assumed to be of one year period unless otherwise specially stated.

18. CAPITAL GAIN YIELD

Capital Gain Yield = \( \frac{(B_1 - B_0)}{B_0} \times 100 \)

19. CURRENT YIELD / FLAT YIELD / CURRENT INTEREST YIELD / BASIC YIELD

Current Yield = \( \frac{I_1}{B_0} \)

\( I_1 = \) Interest To Be Paid at Year End 1

20. YIELD (K\text{d}) OR YIELD TO MATURITY (YTM) OR COST OF DEBT/REDEMPTION YIELD / INTERNAL RATE OF RETURN/MARKET RATE OF INTEREST / 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 methods:

**Trial n Error Method:** Value of Bond (B\text{0})

\[ \text{Interest} \left(1 + \text{Yield}\right)^1 + \text{Interest} \left(1 + \text{Yield}\right)^2 + \ldots + \text{Interest} \left(1 + \text{Yield}\right)^n + \frac{\text{Maturity Value}}{(1 + \text{Yield})^n} \]

Now for finding Yield we should use IRR Technique:

\[ \text{Kd} = \text{Lower Rate NPV} + \frac{\text{Lower Rate NPV} - \text{Higher Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates} \]

**Approximation Method:**

\[ \text{Kd} \text{ p.a} = \frac{\text{Interest p.a} + \left(\frac{\text{Maturity Value} - \text{Bo}}{n}\right)}{\text{Maturity Value} + \text{Issue Value}} \]

Where Bo is current value of bond in case of existing bond or issue price or new proceeds in case of new issue of bond.
21. **CALCULATION OF YTM OF HALF YEARLY INTEREST PAYMENT BOND**

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

Now \( Kd \) p.a = \( Kd \) for 6 month \( \times 2 \)

22. **KD OF PERPETUAL BOND**

\[
\text{Yield or } Kd = \frac{\text{Annual Interest}}{\text{Bo}}
\]

23. **RELATIONSHIP BETWEEN DURATION AND YTM**

姮 The Duration of a Bond and YTM are inversely related.
姮 The higher the YTM , the lower is the duration,
姮 The lower the YTM , the higher is the duration
姮 other things remaining constant.

24. **RELATIONSHIP BETWEEN BOND VALUE AND YTM**

姮 YTM and the Bond Value has inverse relationship :
姮 If YTM increases the price or bond value will decrease
姮 If YTM decreases the price or bond value will increase
姮 ......Other things remaining constant
姮 In other words An inverse relationship exists between bond prices and interest rates. Think of it as a see-saw relationship where one goes up whenever the other goes down and vice versa.

25. **RELATIONSHIP BETWEEN YTM AND COUPON RATE**

<table>
<thead>
<tr>
<th>Case</th>
<th>Nature Of Bond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupon Rate = YTM</td>
<td>Par Value Bond i.e Bo = Par Value</td>
</tr>
<tr>
<td>Coupon Rate &gt; YTM</td>
<td>Premium Bond i.e Bo &gt; Par Value</td>
</tr>
<tr>
<td>Coupon Rate &lt; YTM</td>
<td>Discount Bond i.e Bo &lt; Par Value</td>
</tr>
</tbody>
</table>
Note: For the above relationship to be true the maturity (redeemable) value of the bond must be equal to face value.

26. TYPES OF BOND OR DEBENTURES ON THE BASIS OF CURRENT VALUE

There can be three types of Bond On the basis of Current Value -
1. Premium Bond - $B_o > \text{Face Value}$
2. Face value Bond - $B_o = \text{Face Value}$
3. Discount Bond - $B_o < \text{Face Value}$

27. TAXATION EFFECT ON INTEREST INCOME

✦ If income tax rate is given in question then Interest should be taken after tax.

28. TAXATION EFFECT ON CAPITAL GAIN INCOME

✦ If Capital Gain Tax Rate is given then Maturity Value should be taken after tax i.e after adjusting it for Capital Gain Tax

✦ Hence Maturity Value Net Of Capital Gain Tax will be equal to (Maturity Value - Capital Gain Tax)
  
i.e Maturity Value - Capital Gain Tax Rate x [ Maturity Value - Issue Price i.e $B_o$ ]

✦ Equation:

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

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

QUESTION (CA. Final May, 2004) There is a 9%, 5 year bond issue in the market. The issue price is Rs.90 and the redemption price is Rs.105. For an investor with marginal Income tax rate of 30% and capital gains tax of 10%, what is the post tax yield to maturity?

Solution:

Let the face value of the bond be Rs. 100.
Interest \( (1 - t) + \left( \frac{\text{Maturity Value net of Capital Gain Tax} - \text{Issue Value}}{\text{n}} \right) \)

\[
K_d = \frac{\text{Maturity Value Net Of Capital Gain Tax} + \text{Issue Value}}{2}
\]

After tax coupon or interest = Rs. 9 \times (1 - 0.30) = 6.3%

After tax redemption price = 105 - (15 \times 0.10) = Rs. 103.50

Therefore YTM = \[ \frac{6.3 + (103.5 - 90)/5}{(103.5 + 90)/2} \] = 9.3%

### 29. Bond Strips

- Bond Strips = Interest Strips + Principal 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.

- **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 Years)} = 12 \times 3.791 = 45.49

Principal Strip = 125 \times \text{PVF (10\%,5 Years)} = 125 \times 0.621 = 77.63

### 30. Dirty Price and Clean Price

- Dirty Price = Clean Price + Accrued Interest

### 31. Callable Bond

- A Callable Bond is one when the company has an option to retire or redeem the bonds prior to the date of maturity.

- The amount of money the issuer has to pay to call a Callable Bond is known as Call Price.
While discounting Callable Bond we should take "Yield To Call" and not "Yield To Maturity".

### 32. CALL YEAR

The year on which bonds is called by the company prior to the date of maturity is called Call Year.

### 33. YIELD TO CALL (YTC)

\[
YTC = \frac{\text{Interest} + \left( \frac{\text{Call Value} - B_0}{\text{Call Years}} \right)}{2}
\]

### 34. PUTTABLE BOND

A Puttable Bond is one where the investor has an option to get the bond redeemed prior to the date of maturity.

The amount of money the investor receive by selling a Bond to the company prior to the date of maturity is known as Put Price.

While discountig Puttable Bond we should take "Yield To Put" and not "Yield To Maturity".

### 35. PUT YEARS

The year on which bond is sold by the investor prior to the date of maturity is called Put Year.

### 36. YIELD TO PUT (YTP)

\[
YTP = \frac{\text{Interest} + \left( \frac{\text{Put Value} - B_0}{\text{Put Years}} \right)}{2}
\]

### 37. 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%

38. 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.
- Note: It may be noted that any change in market interest rate will only change yield rate and not coupon rate. In other words Coupon rate always remain constant unless otherwise specifically stated. It is not subject to change according to market condition.

39. GAIN & LOSS DUE TO CHANGE IN BOND VALUE

| Bo At Old Yield | xxx |
| Bo At New Yield | xxx |
| Gain Or Loss Due To Change In Yield | xxx |

40. REQUIREMENT OF CREDIT RATING

- Most Bond/Debenture issues are rated by specialised credit rating agencies.
- Credit rating agencies in India are CRISIL, CARE, ICRA and Fitch.
- A credit rating estimates the credit worthiness of an individual, corporation, or even a country.
- It measures the probability of the timely repayment of principal and interest of a bond.
- For Example:
  AAA-Highest Credit Quality;
  AA-Superior Credit Quality
  A-Satisfactory Credit Quality
- Higher the risk, Higher the Kd

41. 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.

Interest + \( \left[ \frac{Maturity \ Value - B_0 \ [1 - f \ ]}{n} \right] \)

Equation: \( K_d = \frac{Maturity \ Value + B_0 \ [1 - f \ ]}{2} \)

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. \( B_0 - f \)

42. TYPES OF BOND ON THE BASIS OF CONVERSION

There are two types of bond (i) Convertible Bond (ii) Non-Convertible Bond

43. FAIR VALUE OF CONVERTIBLE BONDS AS ON TODAY/STOCK VALUE OF BOND

- Convertible Bonds are bond that can be converted into few number of equity shares after some time.
- Fair Conversion Value or Stock Value Of Bond
  = Number Of Equity Shares Received on Conversion x Market Price Per Share prevailing at the time of conversion
- Decision: If Fair Conversion Value Of Convertible Bond is greater than Basic Bond Value Of Debenture, investor will convert otherwise not.

44. CONVERSION RATIO

- Conversion Ratio directly specifies the number of equity shares we get in place of one convertible bond.

45. PERCENTAGE OF DOWNSIDE RISK

- Downside Risk = Market Value Of Convertible Bond - Market Value Of Non Convertible Bond or Straight Coupon Bond
- It should be further divided by Market Value Of Non-Convertible Bond to calculate answer in %.
46. CONVERSION PREMIUM

Conversion Premium or Premium Over Conversion Value
= Market Price Of Convertible Bond - Fair Conversion Value Of Convertible Bond As On Today
It should be further divided by Fair Value Of Convertible Bond to calculate answer in %.

47. CONVERSION PARITY PRICE

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

It is the price at which premium will be 0.

48. TYPES OF PREFERENCE SHARE CAPITAL

Redeemable Preference Shares
 Those preference shares, which can be redeemed or repaid after the expiry of a fixed period

Non-redeemable Preference Shares
 Those preference shares, which can not be redeemed during the life time of the company, are known as non-redeemable preference shares.

49. CONVERSION RATIO IN RESPECT OF CONVERTIBLE PREFERENCE SHARE CAPITAL

Conversion Ratio directly specifies the number of equity shares we get per convertible Preference Share Capital

50. FAIR CONVERSION VALUE IN RESPECT OF CONVERTIBLE PREFERENCE SHARE CAPITAL OR PREFERENCE SHARE CONVERSION VALUE

Fair Conversion Value
= Number Of Equity Shares Received on Conversion x Market Price Per Share prevailing at the time of conversion
51. CONVERSION PREMIUM IN RESPECT OF CONVERTIBLE PREFERENCE SHARE CAPITAL

Conversion Premium or Premium Over Conversion Value
= Market Price Of Convertible Preference Share Capital - Fair Conversion Value Of Preference Share Capital
It should be further divided by Fair Conversion Value Of Preference Share Capital to calculate answer in %.

52. FLOOR VALUE

The minimum of the two will be termed as Floor Value
Value Of Convertible Bond & Value of Non-Convertible Bond i.e Straight Value Of Bond

53. CONVERSION PARITY PRICE PREMIUM PER EQUITY SHARE

IN Rs: [Also Known As Conversion Premium Per Share ]
Conversion Parity Price of Equity - Actual Market Price of Equity
IN %: [Also Known As Ratio Of Conversion Premium ]
Conversion Parity Price of Equity - Actual Market Price of Equity
Actual Market Price of Equity

54. FAVOURABLE INCOME DIFFERENTIAL PER SHARE

Coupon Interest From Debenture – Conversion Ratio \times \text{Dividend Per Share}
Conversion Ratio i.e No. Of Equity Shares

55. PREMIUM PAY BACK PERIOD

Conversion premium per Equity share
Favourable Income Differential Per Share

56. DURATION OF NORMAL BOND OR FREDRICK MACAULAY 'S DURATION
Symbolically: Duration

\[
= \frac{1}{B_0} \left[ 1 \times \frac{\text{Interest}}{(1 + Kd)^1} + 2 \times \frac{\text{Interest}}{(1 + Kd)^2} + \ldots \ldots \ldots \ldots n \times \frac{\text{Interest}}{(1 + Kd)^n} + n \times \frac{\text{Maturity Value}}{(1 + Kd)^n} \right]
\]

Short Cut Formula:

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

57. 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 will always be less than the maturity.

58. DURATION OF PERPETUAL BOND

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

59. VOLATILITY/SENSITIVITY/MODIFIED DURATION

Meaning: Modified Duration is a measure of volatility. In other words, Modified Duration is a measure of % change in bond value for every 1 % change in Yield to Maturity.

Symbolically: Volatility or Modified Duration or Sensitivity [ % ]

\[
= \frac{\text{Duration Of Bond}}{1 + \text{Yield To Maturity}}
\]

Note: % Change in Bond Price = - Modified Duration \times Change In Yield To Maturity

Note: The Modified Duration will always be lower than the Macaulay Duration

60. FLOATING RATE BONDS OR NOTES (FRN)

Floating rate bonds or notes (FRNs) are those bonds on which Coupon Rate changes according to market conditions.
In other words under such Bond, Kd & Coupon Rate will be same

61. STRATEGY WHEN INVESTOR IS ALREADY HOLDING BOND

Actual Bo > Fair Bo - Overvalued  
Sell  
Actual Bo < Fair Bo - Undervalued  
Hold

62. INCREASE AND DECREASE IN BOND DURATION

- A portfolio manager may manipulate portfolio duration by buying and selling bonds for minimizing risk and maximizing return.

- **When a fall in Market Interest Rate is anticipated:**
  In such case our objective should be to **Increase** our portfolio duration.  
  This can be achieved by **buying high duration bond and selling low duration bonds**.

- **When a rise in Market Interest Rate is anticipated:**
  In such case our objective should be to **Decrease** our portfolio duration.  
  This can be achieved by **selling high duration bond and buying low duration bonds**.

63. COST OF REDEEMABLE PREFERENCE SHARES

\[
K_p = \frac{\text{Annual Dividend} + \left( \frac{\text{Maturity Value} - PSC_0}{n} \right)}{\text{Maturity Value} + PSC_0} \frac{1}{2}
\]

Where PSCo = Preference Share Capital Value as on today

64. COST OF IRREDEEMABLE PREFERENCE SHARES

\[
K_p = \frac{\text{Annual Dividend}}{PSC_0}
\]

- Sometimes when relevant information is not given for calculation of \( K_p \) then we simply use \( K_p = \text{Rate Of Preference Dividend} \)
65. VALUE OF REDEEMABLE PREFERENCE SHARES

Value of Preference Share \( (PS_0) \)

\[
\text{Dividend} \cdot \frac{1}{(1 + Kp)^1} + \frac{\text{Dividend}}{(1 + Kp)^2} + \ldots + \frac{\text{Dividend}}{(1 + Kp)^n} + \frac{\text{Maturity Value}}{(1 + Kp)^n}
\]

66. VALUE OF IRREDEEMABLE PREFERENCE SHARES

\( \text{Value Of Irredeemable Preference Shares(PSCo)} = \frac{\text{Annual Dividend}}{Kp} \)

67. COMPUTATION OF CHANGE IN BO WHICH COMES FROM CHANGE IN INTEREST AND CHANGE IN PRINCIPLE AMOUNT

QUESTION

<table>
<thead>
<tr>
<th>Current Data</th>
<th>Revised Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life : 5 years</td>
<td>5 Year</td>
</tr>
<tr>
<td>Face Value : Rs. 1,000</td>
<td>Rs.1000</td>
</tr>
<tr>
<td>Coupon Rate : 8%</td>
<td>8%</td>
</tr>
<tr>
<td>Bo Rs.1000</td>
<td>Rs.1,083.96</td>
</tr>
<tr>
<td>Kd 8%</td>
<td>6%</td>
</tr>
</tbody>
</table>

(i) What percentage of Bo increase/decrease comes from a change in the present value of bond's principal amount?

(ii) What percentage of Bo increase/decrease comes from a change in the present value of bond's interest payments?

Solution:

Total Increase in 5 year’s bond price = Rs.1083.96 - Rs. 1000 = Rs. 83.96

(i) Change in price due to change in Present Value of Principal

= Rs. 1,000 x PVF(6%, 5) – Rs. 1,000 x PVF (8%,5)

= Rs. 1,000 x 0.747 – Rs. 1,000 x 0.681 = Rs. 747.00 – Rs. 681.00 = Rs. 66.00

Therefore % change in price due to change in Present Value of Principal

= (Rs 66/ Rs. 83.96) x 100 = 78.6%

(ii) Price Increase Due To Change In Present Value Of Interest

Rs. 80 x PVAF (6%,5) – Rs. 80 x PVAF( 8%, 5)
= Rs. 80 x 4.212 – Rs. 80 x 3.993 = Rs. 336.96 – Rs. 319.44 = Rs. 17.52
Therefore % change in price due to change in Present Value of Interest
= (Rs.17.52/83.96) x 100 = 20.86%

68. BASIS POINT

1 % = 100 basis points

69.CALCULATION OF RETURN WHEN MORE THAN ONE BOND IS PURCHASED OR SOLD WITHIN A TIME FRAME

Question: Vipin purchased at par a bond with a Face Value of Rs. 1,000. The bond had five year to maturity and a 10% coupon rate. The bond was called two years later for a price of Rs. 1,200 after making its second annual interest payment. Vipin then purchased a bond selling at its Face Value of Rs. 1,000 with three years to maturity and a 7% coupon rate. What was Vipin's actual YTM over the five-year period? Use IRR Technique

Solution:

Present Value of all cash inflows and outflows occurred in 5 year period is:

\[-1000 + \frac{100}{(1+r)^1} + \frac{100}{(1+r)^2} + \frac{1200}{(1+r)^2} - \frac{1000}{(1+r)^3} + \frac{70}{(1+r)^4} + \frac{70}{(1+r)^5}\]

\[+ \frac{1000}{(1+r)^5}\]

Using discount rate 12%:

\[-1000 + (100 \times .893) + (100 \times .797) + (1200 \times .797) - (1000 \times .797) + (70 \times .712) + (70 \times .636) + (1000 \times .567) = \text{Rs. 29.45}\]

Using discount rate 14%:

\[-1000 \times .769 + 70 \times .675 + 70 \times .592 + 70 \times .519 + 1000 \times .519 = \text{Rs. 37.58}\]

\[\text{YTM} = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates} = \]

\[12\% + \frac{29.45}{29.45 - ( - 37.587)} \times 2\% = 12.88\%\]

CONFUSION REGARDING ACTUAL BO AND FAIR B0
Actual Price cannot be calculated. It depends on demand supply pressure based on market expectation.

Fair Price can be calculated by using various models. It is based on Present Value concept.

It may be noted that difference in above two price give rise to overvalued and undervalued concept.

If question is silent always assume Actual Price = Fair Price

71. TAX FREE BONDS

**CALCULATION OF YIELD OF TAX FREE BOND**:  
In this case yield of tax free bond must be equal to yield of taxable bond.

**CALCULATION OF PRICE OF TAX FREE BOND**:  
Now price of Tax Free Bond can be calculated with the help of yield of tax free bond calculated above.

72. EXTENSION OF BOND LIFE

Sometimes when bond matures, company may extend its life subject to investor’s and other approvals.

Company will exercise this option when interest rate rises.

73. YTM OF ZERO COUPON BOND

$$B_0 = \frac{Face \ Value}{(1 + Kd)^n}$$

Use IRR or any other technique to calculate Kd

**QUESTION** A company issues Zero Coupon bonds of 10 years maturity. Issue Price is Rs. 260. Maturity Value is Rs. 1000. Calculate YTM?

**Solution**:

$$260 = \frac{1000}{(1 + Kd)^{10}}$$
Now solve for \( K_d \), by proper calculation students can find \( K_d = 14.43\% \)

[Hint: NPV at 14\% = +10; NPV at 15\% = -13; IRR (Kd) = 14.43\%]

**NOTE: Normal Yield / Coupon Yield :**

When Yield of any bond is equal to Coupon Rate such Yield is known as Normal Yield / Coupon Yield. It is possible when the bond is purchased at par value and redeemable also at par value.

**NOTE: Concept Of Tax Saving :**

<table>
<thead>
<tr>
<th></th>
<th>A Ltd. [ with Interest ]</th>
<th>A Ltd [ Without Interest ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>- Interest</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Profit After Tax</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>- Tax @ 50 %</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Profit After Tax</td>
<td>35</td>
<td>50</td>
</tr>
</tbody>
</table>

**Conclusion :** When A Ltd pay interest its tax payment is Rs. 35
When A Ltd. do not pays interest its tax payment is Rs. 50

Hence Tax Saving Due to Interest = 50 - 35 = 15
Therefore Effective Cost Of Interest = 30 - 15 = 15 and not 30.
Effective Cost of Interest can be directly calculated by
Interest ( 1 - Tax ) = 30 ( 1 - .50 ) = 15
1. INTRODUCTION

A Mutual fund is an organisation that pools together the resources of investors for investment in Capital Market.

2. NET ASSET VALUE (NAV)

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

Where net assets of the scheme will normally be: \( \text{Total Asset} - \text{Total External Liability} = [\text{Market Value of Investments + Receivables + Accured Income + Other Assets}] - [\text{Accured Expenses + Payables + Other Liabilities}] \)

Example: If total assets of a scheme are Rs. 200 lacs and liabilities are Rs. 20 lacs and there are 10 lakhs unit holders, the NAV per unit is Rs. 18

3. VALUATION RULES

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

4. EXPENSE RATIO

\[ \text{Expense Ratio} = \frac{\text{Expenses Incurred Per Unit}}{\text{Average NAV}} \]

Where Average NAV = \( \frac{\text{Opening NAV + Closing NAV}}{2} \)
5. 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:

Return Required By Investors =

\[
\text{Return Required By Investors} = \left( \text{Return Of Mutual Fund} - \text{Recurring Expenses} \right) \left(1 - \text{Initial Expenses}\right)
\]

6. ENTRY 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 Load.

Total amount paid by the investor i.e purchase price or Amount received by company in selling 1 unit = NAV \(1 + \text{Entry Load}\)

It is also known as Sale Price of Unit charged by Mutual Fund

7. EXIT 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 Load.

Total amount received by the investor on sale of unit or Amount paid by company in repurchasing 1 unit = NAV \(1 - \text{Exit Load}\)

It is also known as Repurchase/Buyback price of Mutual Fund Company

8. FUND OF FUNDS (FOF)

**Meaning:** A Fund of Funds (FoF) scheme is a mutual funds scheme that invests in other mutual funds schemes rather than in securities.

**Advantages:** Investing in a fund of funds arrangement will achieve even greater diversification than traditional mutual funds.

**Disadvantages:** Expense fees on fund of funds are typically higher than those on regular funds.
**9. 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 distribution will be Rs. 12.

**10. HOLDING PERIOD RETURN (HPR)**

Holding Period Return

\[
[\text{NAV end} - \text{NAV beginning}] + \text{Dividend Received} + \text{Capital Gain Received} - \text{NAV at the beginning}
\]

**11. OPEN ENDED AND CLOSE ENDED MUTUAL FUNDS**

(i) **Number Of Units**: The number of units outstanding under the schemes of Open Ended Funds keeps on changing. A closed-end mutual fund is a publicly traded investment company with a limited number of units i.e number of units under Close Ended Funds is fixed.

(ii) **Maturity Period**: Open Ended schemes usually don’t have a fixed maturity period whereas Close Ended Schemes have fixed maturity period.

(iii) **NAV / Market Price**: The price at which an investor buys or sell shares of a Close Ended Fund after the NFO (New Fund Offer) is the market price, as determined by the demand and supply market principles. In contrast, the price at which an investor buys or sells shares of a mutual fund is the NAV of the Mutual Fund at the close of a given business day.

(iv) **Sale and Purchase**: The Units of Open Ended Funds are available for subscription and redemption on an ongoing basis. An investor is allowed to join or withdraw from the fund at any time by the mutual fund companies at NAV related prices. The Units of Close Ended Funds can be purchased or sold by the investor only from the secondary market i.e stock market after the initial public offerings.
(v) **Listing**: Open Ended Funds are **not listed** on any stock exchange. While **listing** of close ended funds are compulsory on any Stock Exchange.

(vi) **Example**: The Unit Scheme - 1964 (US-64) was an open ended mutual fund scheme. Recently introduced Reliance Natural Resources Fund was also an Open Ended Mutual Fund. UTI has come up with new fund offer (NFO) with name “India Lifestyle Fund”. This will be the three year close ended scheme.

**12. DIVIDEND PAYOUT PLAN**

Under this plan, Mutual Fund Companies declare and distribute dividend to its unit holders.

**13. BONUS PLAN**

Under this plan free units are distributed to investors. It is just like bonus shares.

**14. REINVESTMENT PLAN**

Under this plan although dividend or any other income is declared but it is not paid. The amount of dividend or income is again reinvested at NAV prevailing at the time of declaration, for purchasing additional units.

**15. GROWTH PLAN**

Under this plan neither dividend is distributed nor bonus units are given. But the value of existing units are increased to the amount of growth of the scheme of Mutual Fund Companies.

**16. CONFUSION REGARDING DIVIDEND OR ANY INCOME UNDER MUTUAL FUND CHAPTER**

- Income may be received by -
  - Mutual Fund Companies on investment made by them in various securities
  - Investor from investment made by them in Mutual Fund Companies

- **For Example**: If Mr A invested in Reliance Mutual Fund and Reliance Mutual Fund invested this money in buying shares of Tata Motors.
1st CASE - Now when Tata Motor distribute dividend it will be treated as income of Reliance Mutual Fund Company.

2nd CASE - When Reliance Mutual Fund distribute dividend it will be treated as income of Mr. A.

In 1st case NAV will increase and in 2nd case NAV will decrease.

17. MEANING OF NFO

Like the IPO for a stock, NFO is for a mutual fund. This is how a Mutual Fund Schemes will enter into the market for the first time.

NAV of New Fund Offer (NFO) is always assumed to be Rs 10 per unit.

18. KIM (KEY INFORMATION MEMORANDUM)

All the information relating to Mutual Fund is available in this document.

19. MEANING OF UNITS & UNIT HOLDERS

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

20. WHAT IS UNIT PREMIUM RESERVE?

Units start off as Rs. 10 of "face value". If it goes up to Rs. 12, and a new person buys at Rs. 12, then Rs. 10 goes to the unit itself, and the Rs. 2 is a "premium". The Rs. 2 per unit goes into the premium reserve.

21. DIVIDEND EQUALISATION RESERVE

New investors are not entitled to any share of the income of a mutual fund scheme which arose before they bought their units. To compensate for this an equalisation payment is added to the cost of new units. This is the amount of income that has arisen up to the date of purchase of the unit. Equalizing dividends are paid to existing unitholders to compensate them for any dividend income lost.
## 22. Calculation of Closing Cash Balance in MF Schemes

### Calculation Of Closing Cash Balances:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amt in Rs. lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Bank</td>
<td>xxx</td>
</tr>
<tr>
<td>Add: Proceeds from sale of securities</td>
<td>xxx</td>
</tr>
<tr>
<td>Add: Dividend received</td>
<td>xxx</td>
</tr>
<tr>
<td>Deduct:</td>
<td></td>
</tr>
<tr>
<td>Cost of securities purchased</td>
<td>xxx</td>
</tr>
<tr>
<td>Fund management expenses paid in Cash</td>
<td>xxx</td>
</tr>
<tr>
<td>Capital gains distributed</td>
<td>xxx</td>
</tr>
<tr>
<td>Dividend distributed</td>
<td>xxx</td>
</tr>
<tr>
<td>Closing Cash Balance</td>
<td>xxx</td>
</tr>
</tbody>
</table>
1. WHY VALUATION/INTRODUCTION

- Valuation is a very complex term
- It changes from time to time, person to person and from place to place. It is never constant.
- Valuation is the process of determining the true worth of a company

2. DIVIDEND YIELD METHOD OR DIVIDEND CAPITALIZATION VALUATION METHOD

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

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

3. EARNING YIELD METHOD OR INCOME OR EARNING CAPITALIZATION VALUATION METHOD

Earning Yield = \( \frac{\text{Earning Per Share (EPS)}}{\text{Market Price Per Share (MPS)}} \)

\( \Rightarrow \text{Market Price Per Share} = \frac{\text{Earning Per Share (EPS)}}{\text{Earning Yield}} \)

4. WALTER'S MODEL

Current Market Price (Po) = \( \frac{\text{DPS}}{K_e} + \frac{r}{K_e} \frac{(\text{EPS} - \text{DPS})}{K_e} \)
5. GROWTH'S MODEL

\[ P_0 = \frac{DPS_1}{K_e - g} \text{ or } \]

\[ P_0 = \frac{DPS_0 (1 + g)}{K_e - g} \text{ or } \]

\[ P_0 = \frac{EPS(1 - b)}{K_e - g} \text{ or [If EPS(1-b) is considered as D1] [Preferred]} \]

\[ P_0 = \frac{EPS(1 - b)(1 + g)}{K_e - g} \text{ [If EPS(1-b) is considered as Do]} \]

6. NET ASSET VALUATION METHOD

Net Assets Value = [Total Assets - Total External Liability]

Net Asset Value Per Equity Shareholder = \(\frac{\text{Net Asset}}{\text{Total Number Of Equity Share}}\)

**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.

**Note**: If question is silent always use Market Value Approach

7. VALUE OF EQUITY WHEN THERE IS EARLY REDEMPTION OF BOND

Existing Market Value \(xxx\)
NPV of new investment \(xxx\)
[PV of Cash Inflow - PV of Cash Outflow]
Value Received From issue of new share \(xxx\)
Outflow on Issue costs of 4% \(xxx\)
Present value benefit due to early redemption \(xxx\)
Total Market Value Of Equity \(xxx\)

**Working Note:**
Present value benefit due to early redemption
Outflow if there is early redemption: (a)
Payment to Debenture holder + Penalty charge
Outflow if there is no early redemption: (b)
Present Value Of Interest + PV of repayment in year 5
Present value benefit from early redemption (a-b)

8. MODIGLIANI & MILLER VALUATION MODEL

\[ n \cdot P_0 = \frac{(n + m) P + E - I}{(1 + K_e)^n} \]

9. VALUE OF FIRM USING FUTURE MAINTAINABLE PROFITS (FMP)

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

Calculation Of Future Maintainable Profits:

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

10. TREATMENT OF SUNK/IRRELEVANT COST

~ Only Relevant Costs are considered under Finance. Irrelevant Costs or Sunk Cost should be ignored.
~ Example Of Sunk/Irrelevant Cost are Research & Development Cost, Allocated Fixed Cost etc.
11. PRESENTATION OF INCOME STATEMENT TO CALCULATE MPS

Sales  xxx
Less: Variable cost  xxx
Contribution  xxx
Less: Fixed cost  xxx
EBIT  xxx
Less: Interest  xxx
EBT  xxx
Less: Tax  xxx
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

12. PRICE EARNING [P/E] RATIO VALUATION METHOD

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

**Note**: Total Market Value can be calculated by multiplying MPS with Number of Equity Share.

**Note**: If we take total earning in the above formula we will directly get Market Value.

13. DISCOUNTED CASH FLOW (DCF) APPROACH/
FREE CASH FLOW APPROACH

→ It is a method of evaluating an investment by estimating future cash flows and taking into consideration the time value of money.
Note: How To Calculate Free Cash Flow:

- EBDITA
- (-)Depreciation
- (-)Amortization
- (-)Interest
- EBT
- (-)Tax
- EAT
- + Depreciation
- +Amortization
- -Increase In Working Capital
- +Decrease In Working Capital
- -Capital Expenditure
- Free Cash Flow

14. OPERATING & NON OPERATING ITEMS

- **Operating Income**
  Includes revenues and expenses directly related to the principal revenue-generating activities of the company

- **Non operating Income**
  Includes revenues and expenses related to peripheral or incidental activities of the company

- **Operating expenses** are the costs a business incurs as part of its regular business activities.

- **Non-operating Expenses**: Some business expenditures are incurred for reasons that don’t involve normal business operations. One example of a non-operating expense is interest on borrowed money. Non-operating expenses also include one-time or unusual costs. The expenditure required for a business reorganization or to pay expenses due to a lawsuit are examples.

15. EFFECT ON CASH FLOW WHEN AMOUNT OF DEPRECIATION AND AMOUNT OF CAPITAL EXPENDITURE ARE SAME

- When amount of Capital Expenditure and Amount of Depreciation is equal the net effect of Cash Flow will be zero.
16. **CHOP-SHOP APPROACH/ BREAK-UP APPROACH**

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 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.

17. **VALUATION OF COMPANY/FIRM**

Value Of Firm = Value Of Equity + Value Of Debt

18. **CHOICE OF CORRECT DISCOUNT RATE WHILE CALCULATING VARIOUS VALUES**

<table>
<thead>
<tr>
<th>Use Of Discount Rate</th>
<th>Value Of Firm</th>
<th>Ko</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value Of Equity</td>
<td>Ke</td>
</tr>
<tr>
<td></td>
<td>Value Of Debt</td>
<td>Kd</td>
</tr>
</tbody>
</table>

19. **CONTINUING VALUE OR SALVAGE VALUE OR TERMINAL VALUE APPROACH**

Continuing (Salvage) Value is the value which we get after the forecasted period. Continuing Value is also known as Terminal Value. This is the remaining value of the assets of the business at the end of the projected period.

20. **CALCULATION OF CAPITAL EMPLOYED**

Capital employed can be calculated in two ways

one way is to calculate from liabilities side and

other way is to calculate through asset side.

Let’s look at both ways

**Liabilities side**
Capital employed = Equity Share Capital + Preference Share Capital + Reserves – Fictitious Assets + Debentures + Long Term Loans

**Assets Side**
Capital Employed = Fixed assets (excluding Fictitious Assets) + Current assets – Current liabilities

### 21. VALUE OF EQUITY & DEBT UNDER LIQUIDATION SITUATION

→ If Value Of Debt is more than Value Of Firm then the given case can be termed as Liquidation. In such case Value of Equity will be zero. Also in such case Debt Amount will be reduced accordingly.

### 22. VALUE OF EQUITY BASED ON CAPITAL EMPLOYED CONCEPT

\[
P_0 = \frac{FCFE(1 + g)}{Ke - g}
\]

Where FCFE = Free Cash Flow For Equity

**Calculation Of Free Cash Flow For Equity (FCFE)**
- Earning For Equity: xxx
- +Depreciation x Weight Of Equity: xxx
- -Capital Expenditure x Weight Of Equity: xxx
- -Increase In Working Capital x Weight Of Equity: xxx
- Cash Flow From Equity: xxx

### 23. VALUE OF COMPANY WHEN COMPANY ADOPTS NEW STRATEGY


### 24. ALLOCATION OF SHARES BETWEEN FULLY PAID AND PARTLY PAID SHAREHOLDERS

**Question:** A Ltd wants to acquire B Ltd. B Ltd. Balance Sheet

<table>
<thead>
<tr>
<th>Share Capital</th>
<th>Rs. In Lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Lakhs equity shares of Rs. 10 each, fully paid</td>
<td>200</td>
</tr>
<tr>
<td>10 Lakhs equity shares of Rs. 10 each, Rs. 5 paid</td>
<td>50</td>
</tr>
</tbody>
</table>

Number of shares to be issued by A Ltd. to B Ltd = 84240 shares
How fully paid and partly paid shareholder will allocate shares between themselves?

**Solution:**

Total number of shares issued will be 84240. Now this 84240 shares will be allocated among shareholders which are partly paid and fully paid.

Fully paid equivalent shares in B Ltd. is \((20,00,000 + 5,00,000) = 25,00,000\)

Distribution to fully paid shareholders:

\[
\frac{84240}{25,00,000} \times 20,00,000 = 67,392
\]

Distribution to party paid shareholders:

\[
\frac{84240}{25,00,000} \times 5,00,000 = 16,848 \text{ or } (84240 - 67392 = 16848)
\]

25. **Calculation of Average Fair Value Using Two Valuation Technique**

**Question:**

Value per share as per Net Asset Value = Rs.21.6

Value as per Profit-Earning Capacity Method = Rs.19.4

**Fair Price of Share**

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

\[
= \frac{21.6 + 19.4}{2} = \text{Rs. 20.5}
\]

26. **Which is a Better Measure: MPS or EPS**

As per EPS: Project with higher EPS Should be selected

As per MPS: Project with higher MPS Should be selected

Both EPS and MPS measure are good.

Decision whether to use EPS and MPS will depend on requirement of question

27. **Determination of Correct Value of Company Using Market Value Weights**

When we are asked to calculate value of firm we must always give importance to market value weights over book value weights.
28. **CALCULATION OF RANGE OF VALUATION**

**Example:**
Value as per MPS : Rs. 100 per share;
Value as per DCF Approach Rs. 150 per share

Calculate Range Of Valuation ?

**Solution:**
Range of Valuation: Maximum:Rs.150 per share Minimum:Rs.100 per share

29. **TREATMENT OF DEPRECIATION WHEN IT IS INCLUDED IN COGS AND OPERATING EXPENSE**

- There are two types of depreciation charged by any company, one factory depreciation included in COGS and one office depreciation included in operating expenses.
- When this amount is added in Net Profit, we get Cash Flow.

**Question:**
Revenues Rs. 9000.00Crores
Cost of Goods Sold (COGS) Rs. 3600.00Crores
Operating Expenses Rs. 2700.00 Crores
Capital Expenditure Rs. 750 Crores
Depreciation (included in COGS & Operating Expenses) Rs. 600 Crores

**Solution:**

<table>
<thead>
<tr>
<th>Particular</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>9000.00</td>
</tr>
<tr>
<td>COGS</td>
<td>3600.00</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>2700.00</td>
</tr>
<tr>
<td>EBIT</td>
<td>2700.00</td>
</tr>
<tr>
<td>Tax @ 30%</td>
<td>810.00</td>
</tr>
<tr>
<td>EAT</td>
<td>1890.00</td>
</tr>
<tr>
<td>Less:Capital Exp.</td>
<td>750.00</td>
</tr>
<tr>
<td>Add:Depreciation</td>
<td>600.00</td>
</tr>
<tr>
<td>Free Cash Flow (FCF)</td>
<td>1740</td>
</tr>
</tbody>
</table>
1. INTRODUCTION/WHY MERGER & ACQUISITION

Because In Merger & Acquisition  1+1=2 But 1+1 = 11
Today the buzzword is "Combine and Rule" and not "Divide and Rule ". In India Merger & Acquisition is a rule now rather than an exception.

Two biggest Mergers and Acquisitions deals in India
”Tata Steel acquired 100% stake in Corus Group on January 30, 2007. It was an all cash deal which cumulatively amounted to $12.2 billion.”
Vodafone purchased administering interest of 67% owned by Hutch-Essar for a total worth of $11.1 billion on February 11, 2007.
For this chapter we will assume Acquiring Company as A Ltd and Target Company as B Ltd.

2. SHARE EXCHANGE RATIO (SER)

Whenever a firm ‘A’ acquires another firm ‘B’, the compensation to the shareholders of the acquired firm is usually paid in the form of shares of the acquiring firm. In other words, shares of firm A will be given in exchange for shares of firm B. Thus, the exchange ratio is a very important factor in any kind of merger. Firm A will want to keep this ratio as low as possible, while firm B will want it to be as high as possible.

3. SHARE EXCHANGE RATIO BASED ON EPS

Share Exchange Ratio = \( \frac{\text{EPS of Target Firm (B Ltd)}}{\text{EPS of Acquiring Firm (A Ltd)}} \)

4. SHARE EXCHANGE RATIO BASED ON MPS

Share Exchange Ratio = \( \frac{\text{MPS of Target Firm (B Ltd)}}{\text{MPS of Acquiring Firm (A Ltd)}} \)
5. **SHARE EXCHANGE RATIO BASED ON NET ASSET VALUE PER SHARE (NAV)**

Share Exchange Ratio = \( \frac{\text{Net Asset Value of Target Firm (B Ltd)}}{\text{Net Asset Value of Acquiring Firm (A Ltd)}} \)

6. **SHARE EXCHANGE RATIO BASED ON BOOK VALUE PER SHARE (BVPS)**

Share Exchange Ratio = \( \frac{\text{Book Value Per Share of Target Firm (B Ltd)}}{\text{Book Value Per Share of Acquiring Firm (A Ltd)}} \)

7. **SHARE EXCHANGE RATIO BASED ON PE RATIO**

Share Exchange Ratio = \( \frac{\text{PE Ratio of Target firm (B Ltd)}}{\text{PE Ratio of Acquiring firm (A Ltd)}} \)

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

8. **TOTAL NO. OF EQUITY SHARES AFTER MERGER**

\[ N_A + N_B \times ER \]

9. **EPS (A+B) WHEN SHARES ARE ISSUED**

EPS of the Combined Firm after Merger = \( \frac{\text{Total Earning After Merger}}{\text{Total No. Of Equity Shares After Merger}} \)

\[ = \frac{E_A + E_B + \text{Synergy Gain}}{N_A + N_B \times ER} \]

10. **MPS (A+B) WHEN SHARES ARE ISSUED:**
11. MARKET VALUE OF MERGED FIRM

1st Preference: \[ MV(A+B) = \text{EPS}_{A+B} \times P/E \text{ Ratio}_{A+B} \times [N_A + N_B \times ER] \]

2nd Preference: \[ MV(A+B) = \text{MV}_A + \text{MV}_B + \text{Synergy} \]

12. EQUIVALENT EPS OF B LTD IN A NEW COMPANY

\[ \text{EPS (A+B) } \times \text{ER} \]

13. EQUIVALENT MPS OF B LTD IN A NEW COMPANY

\[ \text{MPS (A+B) } \times \text{ER} \]

14. NEW NO. OF EQUITY SHARES ISSUED TO B LTD.

\[ N_B \times \text{ER} \]

15. MINIMUM AND MAXIMUM EXCHANGE RATIO

**Firm A** will try to keep the ratio of exchange as low as possible and hence it will calculate Maximum Exchange Ratio because Minimum Exchange Ratio for Firm A Ltd. will be zero as the company will want to give nothing and hence it will be of no relevance.

**Firm B** will try to keep the ratio of exchange as high as possible and hence it will calculate Minimum Exchange Ratio because Maximum Exchange Ratio for Firm B will be infinity as it will always want to receive more and hence it will be of no relevance.
16. MAXIMUM EXCHANGE RATIO TAKING EPS BASE-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)

EPS Before Merger = EPS after Merger

\[ \Rightarrow \text{EPS}_A = \text{EPS}_A + \text{EPS}_B \]

\[ \Rightarrow \text{EPS}_A = \frac{\text{Total Earnings After Merger}}{\text{Total Number Of Equity Shares After Merger}} \]

\[ \Rightarrow \text{EPS}_A = \frac{\text{Earnings}_A + \text{Earnings}_B + \text{Synergy Gain}}{\text{No. Of Equity Shares}_A + \text{No. of Equity Shares}_B \times \text{Exchange Ratio}} \]

\[ \Rightarrow \text{EPS}_A = \frac{E_A + E_B + \text{Synergy}}{N_A + N_B \times \text{ER}} \]

Now by solving the above equation keeping Exchange Ratio constant we can find desired Exchange Ratio.

17. MINIMUM EXCHANGE RATIO TAKING EPS BASE-FOR B LTD

**Minimum Exchange Ratio** (i.e. the Exchange ratio at which EPS of Firm’s B shareholder before and after merger will be same)

EPS Before Merger = Equivalent EPS after Merger

\[ \Rightarrow \text{EPS}_B = \text{EPS}_A + \text{EPS}_B \times \text{ER} \]

\[ \Rightarrow \text{EPS}_B = \frac{\text{Total Earnings After Merger}}{\text{Total Number Of Equity Shares After Merger}} \times \text{ER} \]

\[ \text{EPS}_B = \left[ \frac{\text{Earnings}_A + \text{Earnings}_B + \text{Synergy Gain}}{\text{No. Of Equity Shares}_A + \text{No. of Equity Shares}_B \times \text{ER}} \right] \times \text{ER} \]

Symbolically

\[ \text{EPS}_B = \frac{E_A + E_B + \text{Synergy}}{N_A + N_B \times \text{ER}} \times \text{ER} \]

Now by solving the above equation keeping Exchange Ratio constant we can find desired Exchange Ratio.
18. IF DECISION IS BASED ON MPS [AND 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)

MPS Before Merger = MPS After Merger

\[ \Rightarrow MPS_A = MPS_{A+B} \]

\[ \Rightarrow MPS_A = \frac{P/E\ Ratio_{A+B} \times EPS_{A+B}}{\text{Total Earnings After Merger}} \times \frac{\text{Total Number Of Equity Shares After Merger}}{\text{Total Earnings After Merger}} \]

Now by solving the above equation keeping Exchange Ratio constant we can find desired Exchange Ratio.

For B Ltd:

**Minimum Exchange Ratio** (i.e. the Exchange ratio at which MPS of Firm’s B shareholder before and after merger will be same)

MPS Before Merger = Equivalent MPS after Merger

\[ \Rightarrow MPS_B = ER \times MPS_{A+B} \]

\[ \Rightarrow MPS_B = ER \times EPS_{A+B} \times P/E\ Ratio_{A+B} \times \text{ER} \]

\[ \Rightarrow MPS_B = \]
ER × P/E Ratio\(_{A+B}\) × \[\frac{\text{Earnings}_A + \text{Earnings}_B + \text{Synergy Gain}}{\text{No. of Equity Shares}_A + \text{No. of Equity Shares}_B × \text{ER}}\]

\[\Rightarrow \text{MPS}_B = \text{ER} × \frac{\text{Equity Shares}_B}{\text{Equity Shares}_A × \text{ER}}\]

Now by solving the above equation keeping Exchange Ratio constant we can find desired Exchange Ratio.

**20. IF DECISION IS BASED ON MPS [AND IF P/E RATIO AFTER MERGER IS NOT GIVEN]**:

*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):

\[\text{MPS Before Merger} = \text{MPS After Merger}\]

\[\Rightarrow \text{MPS}_A = \text{MPS}_{A+B}\]

\[\Rightarrow \text{MPS}_A = \left[\frac{\text{Total Market Value After Merger}}{\text{Total Number Of Equity Shares After Merger}}\right]\]

\[\Rightarrow \text{MPS}_A = \left[\frac{\text{MPS}_A × N_A + \text{MPS}_B × N_B + \text{Synergy Gain}}{\text{No. of Equity Shares}_A + \text{No. of Equity Shares}_B × \text{Exchange Ratio}}\right]\]

Now by solving the above equation keeping Exchange Ratio constant we can find desired Exchange Ratio.

**21. IF DECISION IS BASED ON MPS [AND IF P/E RATIO AFTER MERGER IS NOT GIVEN]**:

*For B Ltd:*

**Minimum Exchange Ratio** (i.e. the Exchange Ratio at which MPS of Firm’s B shareholder before and after merger will be same):

\[\text{MPS Before Merger} = \text{Equivalent MPS after Merger}\]

\[\Rightarrow \text{MPS}_B = \text{ER} × \text{MPS}_{A+B}\]
22. FINANCIAL RESTRUCTURING/RE-CONSTRUCTION

When a company cannot pay its cash obligations - for example, when it cannot meet its bond payments or its payments to other creditors (such as vendors) - it goes bankrupt. In this situation, a company can, of course, choose to simply shut down operations and walk away. On the other hand, it can also restructure and remain in business. This process is known as Financial Restructuring.

23. CALCULATION OF % HOLDING IN MERGED COMPANY

For ALtd:

\[
\text{Total No. Of A Ltd Shares} = \frac{\text{MPS_B}}{\text{Total No. Of A Ltd Shares} + \text{Total No. Of New Shares Issued To B Ltd}}
\]

For BLtd:

\[
\text{Total No. Of New Shares Issued To B Ltd} = \frac{\text{MPS_B}}{\text{Total No. Of A Ltd Shares} + \text{Total No. Of New Shares Issued To B Ltd}}
\]

24. GAIN OR LOSS-BASED ON EPS

There may be gain or loss which may arise out of merger transaction. Gain or Loss may be calculated in the following manner:

**Based On EPS:**

<table>
<thead>
<tr>
<th></th>
<th>A Ltd</th>
<th>B Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS After Merger</td>
<td>xxx</td>
<td>xxx*[ For B Ltd. we should we Equivalent]</td>
</tr>
<tr>
<td>EPS Before Merger</td>
<td>xxx</td>
<td>xxx</td>
</tr>
<tr>
<td>Gain/Loss</td>
<td>xxx</td>
<td>xxx</td>
</tr>
</tbody>
</table>
25. GAIN OR LOSS-BASED ON MPS

**Based On MPS:**

<table>
<thead>
<tr>
<th></th>
<th>A Ltd</th>
<th>B Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPS After Merger</td>
<td>xxx</td>
<td>xxx [For B Ltd. we should we Equivalent]</td>
</tr>
<tr>
<td>MPS Before Merger</td>
<td>xxx</td>
<td>xxx</td>
</tr>
<tr>
<td>Gain/Loss</td>
<td>xxx</td>
<td>xxx</td>
</tr>
</tbody>
</table>

**Note:** In place of EPS and MPS we may also use total figure i.e Earnings and Market Value.

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

26. EPS A+B WHEN SYNERGY IS EXPRESSED IN %

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

27. EPS A+B WHEN SYNERGY IS EXPRESSED IN AMOUNT

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

28. FREE FLOAT MARKET CAPITALIZATION

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. Their 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 x 10 = 10,00,000
Free Float Market Value = 1,00,000 x 10 x 40% = 4,00,000

29. COMPONENTS OF MARKET PRICE PER SHARE

Market Price Per Share (MPS) = Earning Per Share (EPS) x Price Earning Ratio (PE Ratio)

\[
\text{MPS} = \frac{\text{Earning For Equity Shareholder}}{\text{No. of Equity Share}} \times \frac{\text{Market Price Per Share}}{\text{Earnings Per Share}}
\]

\[
\text{Return on Equity (ROE)} = \frac{\text{Earning For Equity Shareholder}}{\text{Equity Shareholder's Fund}} \times \frac{\text{Equity Shareholder's Fund}}{\text{No. of Equity Shares}}
\]

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

30. EXPECTATION OF A LTD & B LTD IN MERGER

A Ltd wants to issue exchange ratio as low as possible
B Ltd wants to receive exchange ratio as high as possible

31. PURCHASE PRICE PREMIUM

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

32. 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. Shareholders of the original company are usually given an equivalent stake of ownership in the new company. A demerger is often done to help each of the segments operate more smoothly, as they can now focus on a
more specific task.

The year 2005-06 was a landmark year in the history of RIL. It marked a new strategic decision to unlock value for its shareholders by reorganizing RIL’s business through a process of demerger. The successful implementation of the largest demerger process in Indian corporate history has demonstrated RIL’s ability to seed new businesses, gain leadership in each of these businesses which are large enough to be independent and thereby create value for RIL’s shareholders. The oil and chemical business remained with Mr. Mukesh Ambani, while power, financial services and telecom were hived off to Mr. Anil Ambani.

SYNERGY

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

33. SYNERGY GAIN-BASED ON EARNINGS

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

34. SYNERGY GAIN-BASED ON MARKET VALUES

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

Note: Synergy should be calculated in question only if asked.

Note: If Synergy is not given in question we should assume it to be zero.

35. NPV OF A LTD UNDER MERGER

PV Of Cash Flows Received By A Ltd From B Ltd  xxx
Less: Cost of Acquisition Paid By A Ltd To B Ltd  xxx
NPV Of A Ltd if B Ltd is acquired         xxx

Decision: If NPV is positive, Altd should takeover Bltd.
36. DELISTING

Delisting involves removal of listed securities of a company from a stock exchange where it is traded, on a permanent basis.

37. 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 (loan/borrower).

- **Recent example:** India has experienced a number of leveraged buyouts. A successful example of LBO is the acquisition of Tetley brand, the biggest tea brand of Europe by Tata Tea of India at 271 million pounds. It was one of the biggest cross border acquisition by an Indian Company. Another recent example of a leveraged buyout is Tata Steel (India) acquiring Corus (United Kingdom) for $11.3 billion.

38. NUMBER OF EQUITY SHARES AFTER MERGER IN CASE OF CASH TAKEOVER

- Number of equity shares after merger do not increase or remain same in case of cash takeover.

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

\[
EPS_{A+B} = \frac{(Earning_A + Earning_B - Borrowed \text{ Amount} \times Interest \text{ Rate} \times (1 - Tax \text{ Rate})}{N_A}
\]

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

\[
EPS_{A+B} = \frac{(Earning_A + Earning_B - Cash \text{ Paid} \times Opportunity \text{ Cost Of Interest} \times (1 - tax)}{N_A}
\]
41. 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.

42. EFFECT OF CASH TAKEOVER IN EARNINGS AND MARKET VALUE

- Total Earning After Merger
  = Earning A + Earning B - Opportunity Cost Of Cash Paid Adjusted For Tax
- Total Market Value After Merger = Market Value A + Market Value B - Cash Paid

43. MINIMUM & MAXIMUM MPS

Maximum MPS To Be Paid By A Ltd will normally be equal to All the Value or Benefits derived by acquiring B Ltd including Synergy.

Minimum MPS Which Will Be Accepted By B Ltd is the least value which they are already deriving from B Ltd. excluding Synergy.

44. COST OF MERGER-WHEN CASH IS PAID-FOR A LTD

Cost = Cash Paid - Market Value Of B received

45. COST OF MERGER-WHEN SHARES ARE ISSUED-FOR A LTD

Cost
46. **MARKET VALUE AFTER MERGER WHEN GROWTH RATE OF B LTD UNDER NEW MANAGEMENT INCREASES**

Market Value After Merger = MPS A x No. of Equity Share A + New MPS B Taking new growth rate x No. of Equity Share B + Synergy to be taken as zero

47. **CALCULATION OF SER ON THE BASIS OF WEIGHTS**

**Question:**
Board of Directors of both the Companies have decided to give a fair deal to the shareholders and accordingly for swap ratio the weights are decided as 40%, 25% and 35% respectively for EPS, BVPS and MPS of share of each company:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>MPS</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>BVPS</td>
<td>40</td>
<td>32</td>
</tr>
</tbody>
</table>

(i) Calculate the swap ratio

**Solution:**

**Based on EPS:**

Share Exchange Ratio = \( \frac{\text{EPS of Target Co.}}{\text{EPS of Acquires Co.}} = \frac{20}{5} = 4 \)

**Based on MPS:**

Share Exchange Ratio = \( \frac{\text{MPS of Target Co.}}{\text{MPS of Acquires Co.}} = \frac{100}{50} = 2 \)

**Based on Book Value:**

Share Exchange Ratio = \( \frac{\text{Book Value of Target Co.}}{\text{Book Value of Acquires Co.}} = \frac{32}{40} = .8 \)

Now as the per given question weights for Swap Ratio for EPS, MPS and Book Value should be taken as 40%, 35% and 25% respectively. Therefore the required Swap Ratio
will be:

For EPS $4 \times 40\% = 1.6$;

For MPS $2 \times 35\% = 0.7$;

For Book Value $.8 \times 25\% = 0.2$

Total $2.5$

48. PROMOTER HOLDING AFTER MERGER

Question:

A Ltd. B Ltd.

<table>
<thead>
<tr>
<th>Promoter’s Holding (No. of shares)</th>
<th>4.75 lakhs</th>
<th>5.00 lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. Of Equity Shares</td>
<td>10.00 lakhs</td>
<td>75 lakhs</td>
</tr>
<tr>
<td>SER:2.5:1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Calculate Promoter’s holding % after merger?

Solution:
Promoters holding After Merger $= 4.75 \text{ lakh shares} + 5 \times 2.5 = 17.25 \text{ lakh}$

Therefore Promoter’s holding % in the new company after merger is

$\frac{17.25}{10 + 7.5 \times 2.5} \times 100 = 60\%$

49. CHOICE GIVEN BY A LTD. TO B LTD. WHETHER THEY WANT CASH OFFER OR SHARE OFFER

Example:

In case of share to share offer:

% Gain to Shareholders of B Ltd. = 21.44%.

In case of Merger by Cash Payment:

% Gain to the shareholders of B Ltd. = 13.55%.

Decision: Shareholders of B Ltd. are gaining more from the merger through share exchange than cash alternative. Hence Share alternative is likely to be accepted by shareholders of B Ltd.

50. BOOK VALUE PER SHARE AFTER MERGER
**Question:**

<table>
<thead>
<tr>
<th></th>
<th>Abhiman Ltd.</th>
<th>Swabhiman Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Rs.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share capital</td>
<td>200 lacs</td>
<td>100 lacs</td>
</tr>
<tr>
<td>Free reserves &amp; surplus</td>
<td>900 lacs</td>
<td>600 lacs</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1100 lacs</td>
<td>700 lacs</td>
</tr>
<tr>
<td>No. of shares</td>
<td>2 lacs</td>
<td>10 lacs</td>
</tr>
</tbody>
</table>

SWAP Ratio is 0.148825 shares of Abhiman Ltd. for every share of Swabhiman Ltd. Calculate Book Value After Merger?

**Solution:**

Total No. shares = 200000 + 148825 = 348825
Total capital = Rs. 200 lakh + Rs. 148.825 lac = Rs. 348.825 lac
Reserves = 1451.175 Lakhs

Book value = \( \frac{348.825 \text{ Lakhs} + 1451.175 \text{ Lakhs}}{3.48825 \text{ Lakhs}} \) = Rs. 516.018

**BEFORE Merger:**

**A Ltd.**

<table>
<thead>
<tr>
<th>Liability</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Share Capital</td>
<td>200 Lakhs</td>
</tr>
<tr>
<td>Reserves</td>
<td>900 Lakhs</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1100 Lakhs</td>
</tr>
</tbody>
</table>

**B Ltd.**

<table>
<thead>
<tr>
<th>Liability</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Share Capital</td>
<td>100 Lakhs</td>
</tr>
<tr>
<td>Reserves</td>
<td>600 Lakhs</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>700 Lakhs</td>
</tr>
</tbody>
</table>

**AFTER Merger:**

<table>
<thead>
<tr>
<th>Liability</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Share Capital</td>
<td>348.825 Lakhs</td>
</tr>
<tr>
<td>Rs. 200 lakh + 10 lakh x 0.148825</td>
<td>(1100 Lakhs+700 Lakhs)</td>
</tr>
<tr>
<td>i.e Rs. 148.825 lac</td>
<td></td>
</tr>
<tr>
<td>Reserves (Bal Fig)</td>
<td>1451.175 Lakhs</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1800 Lakhs</td>
</tr>
</tbody>
</table>
51. EVALUATION OF MERGER WHEN A LTD. ACQUIRE MORE THAN ONE COMPANY

Question:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>A+B</th>
<th>A+C</th>
<th>A+B+C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings</td>
<td>Rs. 1,80,000</td>
<td>Rs. 2,16,000</td>
<td>Rs. 2,52,000</td>
<td></td>
</tr>
<tr>
<td>No. of Shares</td>
<td>90,000</td>
<td>1,34,388</td>
<td>1,03,800</td>
<td>1,48,188</td>
</tr>
<tr>
<td>EPS</td>
<td>Rs. 2</td>
<td>Rs. 1.61</td>
<td>Rs. 2.08</td>
<td>Rs. 1.70</td>
</tr>
</tbody>
</table>

The existing EPS of A Ltd. is Rs. 2. It can be increased by merging with C Ltd. only. So, A Ltd. should take over and merge C Ltd. only.

52. CONFUSION REGARDING EXCHANGE RATIO IN THIS CHAPTER

There are various ways of calculating exchange ratio-
1. On the basis of EPS, MPS, BVPS, PE Ratio, NAV
2. On the basis of maximum/minimum ratio concept
3. On the basis of desired weights given in question

Method to be preferred Will Depend On The Framing Of Question.

53. PREPARATION OF BALANCE SHEET AFTER MERGER

- When two company merged, their Balance Sheet also get merged. Assets & Liability Of two companies will be added depending upon the requirement of question.
- Normally any balancing figure in liability will be treated as Capital Reserve

54. CALCULATION OF SWAP RATIO IN CASE OF NEGATIVE FACTOR LIKE GROSS NPA

Swap Ratio = \( \frac{\text{Gross NPA Of A Ltd.}}{\text{Gross NPA Of B Ltd.}} \)

55. GROSS NPA
GNPA Ratio = \( \frac{\text{Gross NPA}}{\text{Gross Advance or Deposit Given By Bank}} \times 100 \)

**56. CAR [CAPITAL ADEQUACY RATIO] OR CRWAR [CAPITAL TO RISK WEIGHTED ASSET RATIO]**

\[
\text{CAR or CRWAR or Total Capital To Risk Weight Asset Ratio} = \frac{\text{Total Capital}}{\text{Risky Weighted Assets}}
\]

**57. BONUS SHARES OR STOCK DIVIDEND**

- 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 on issue of bonus share.

- The Market Price of Share after Bonus Share will be:
  \[
  \text{Market Price} = \frac{S \times P_0}{S + N}
  \]
  Where \( S \) = Share Outstanding Before Issue; \( P_0 \) = Current Market Price Before Issue; \( N \) = 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.

- **Journal Entry**: Reserve & Surplus AC Dr.
  To Equity Share Capital Ac

**58. 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.

**59. 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.

60. CONTINGENT LIABILITY

A contingent liability is a potential obligation that may be incurred depending on the outcome of a future event. A contingent liability is one where the outcome of an existing situation is uncertain, and this uncertainty will be resolved by a future event.

It is advisable to assume that the contingent liability will materialize at its full amount and hence taken as a part of current liability.

61. FLOOR VALUE

Floor Value per share is the lowest value.

Example: Value As Per MPS = £4; Value As Per BVPS = £5.95; Value As Per Cash Flow = £7.11

Here Floor Value per share is £4

NOTE:

CALCULATION OF PURCHASE CONSIDERATION/COST OF ACQUISITION

Market Value Of Equity issued to various party       xxx
Market Value Of Debentures issued to various party   xxx
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
1. WHY PORTFOLIO MANAGEMENT?

- A Portfolio means set of investment. Portfolio Management is a process of selection of bundle of securities with an objective of maximizing return and minimizing risk.
- "No Risk No Return", Higher the Risk, Higher the Return. "Risk and Return" are two sides of the same coin.
- The investors not only like return but also dislike risk. So what is required is:
  (i) clear understanding of what risk and return are
  (ii) what creates them and
  (iii) how can they be measured
- Everyone of us apply the techniques of Portfolio Management in our daily life. We never invest our money in one security. We invest in number of avenues such as Property, Equity Shares, Debentures, Jewellery, Bank Deposit, Mutual Fund, Insurance etc.
- Investment in securities are now no longer regarded as gambling activity. Selection Of Investment is now based on research.
- In this chapter we will try to select those combination of securities which gives us maximum return with minimum possible risk by applying the concept of Portfolio Management.
- The focus point of this chapter is to analyse as to how investors can construct the best possible portfolio.

2. CALCULATION OF RETURN OF A SECURITY OR ASSET

- Holding Period Return

\[
\text{Return} = \frac{(\text{Price At The End} - \text{Price At The Beginning}) + \text{Any Income Distribution}}{\text{Price At The Beginning}}
\]

- Return may be of two types: 1. Average Return 2. Expected Return

3. AVERAGE RETURN BASED ON PAST DATA

Example:

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return (%)</td>
<td>10</td>
<td>20</td>
<td>15</td>
<td>30</td>
<td>25</td>
</tr>
</tbody>
</table>
Calculate Average Return?

**Solution:** Average Return = \( \frac{10 + 20 + 15 + 30 + 25}{5} = 20\% \)

### 4. EXPECTED RETURN BASED ON PROBABILITY

**Example:** Calculate Expected Return

<table>
<thead>
<tr>
<th>Return (%)</th>
<th>Probability</th>
<th>( \text{Return} \times \text{Probability} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>.15</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>.10</td>
<td>2.10</td>
</tr>
<tr>
<td>22</td>
<td>.60</td>
<td>13.20</td>
</tr>
<tr>
<td>23</td>
<td>.10</td>
<td>2.30</td>
</tr>
<tr>
<td>24</td>
<td>.05</td>
<td>1.20</td>
</tr>
</tbody>
</table>

\[ \text{Expected Return} = 21.80 \]

### 5. RISK OF A SECURITY OR ASSET

We will study Risk of a Security or Asset under the following head:

(i) Standard Deviation  
(ii) Variance  
(iii) Coefficient Of Variation

### 6. STANDARD DEVIATION \((\sigma)\) BASED ON PAST DATA

- Standard Deviation is the deviation from arithmetic mean and is a measure of Total Risk.

\[ \sigma = \sqrt{\frac{\sum (\text{Given Return} - \text{Average Return})^2}{n}} \]

- **Note:** Sometimes in place of 'n' we can use 'n-1'. However, students must give preference to "n" formula and not "n-1" in exam.
7. STANDARD DEVIATION ($\sigma$) BASED ON PROBABILITY

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

8. VARIANCE

$\text{Variance} = (\text{Standard Deviation})^2 = \sigma^2$

$\text{Decision:} \text{Higher the variance, higher the risk.}$

9. COEFFICIENT OF VARIATION (CV):- PAST DATA

$\text{Coefficient Of Variation measures Risk Per Unit Of Return.}$

$\text{CV} = \frac{\text{Standard Deviation}}{\text{Average Return}}$

$\text{Decision:} \text{Higher the CV, higher the risk.}$

10. COEFFICIENT OF VARIATION (CV) BASED ON PROBABILITY

$\text{CV} = \frac{\text{Standard Deviation}}{\text{Expected Return}}$

$\text{Decision:} \text{Higher the CV, higher the risk.}$

11. RULE OF DOMINANCE BASED ON SECURITY RETURN & RISK IN CASE OF TWO SECURITY

(i) **If Return of two security are different but their Standard Deviation are Same**.

**Decision**: Security with higher Return is preferred.

**Example**: Tata 10 15  Reliance
Return  5  5
Risk

**Choose**: Reliance

(ii) **If Return of two security are same but Their Standard Deviation are Different**.

**Decision**: Security with Lower Standard Deviation is preferred.

**Example**: Tata  Reliance

Return 10 10
Risk 15 5

Choose: Reliance

(iii) 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.

Example: A Ltd B Ltd

Return 10 15
Risk 5 20

\[ CV = \frac{Risk}{Return} \]

For A Ltd. \( CV = \frac{5}{10} = .5 \); For B Ltd. \( CV = \frac{20}{15} = 1.33 \)

Choose: A Ltd

Note: The above Rule Of Dominance cannot be applied in case of Portfolio Selection. It can only be applied in case of individual security. i.e. when we are asked to select either Security A or Security B.

12. RETURN OF PORTFOLIO-BASED ON PAST DATA

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

\[ \text{Return Of Portfolio} = A's \text{Average Return} \times \text{Weight}_A + B's \text{Average Return} \times \text{Weight}_B \]

13. RETURN OF PORTFOLIO ON THE BASIS OF PROBABILITY

Return Of Portfolio = A's Expected Return \( \times \) Weight\(_A\) + B's Expected Return \( \times \) Weight\(_B\)

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

14. RISK OF PORTFOLIO

Risk of portfolio of securities will be understood under the following head:

15. STANDARD DEVIATION OF THE PORTFOLIO

CONSISTING OF TWO SECURITY
Standard Deviation\(\sigma_{1+2} = \sqrt{\sigma_1^2 w_1^2 + \sigma_2^2 w_2^2 + \sigma_1 w_1 \sigma_2 w_2 r_{1,2}}\)

Where, \(\sigma_{1+2}\) = Standard Deviation of Portfolio consisting of Security 1 & 2
\(\sigma_1\) = Standard Deviation Of Security 1; \(\sigma_2\) = 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

**16. COEFFICIENT OF CORRELATION** (r)

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

**17 COVARIANCE - BASED ON PAST DATA**

Covariance (A, B)

\[
\frac{\sum (\text{Given Return}_A - \text{Average Return}_A) \times (\text{Given Return}_B - \text{Average Return}_B)}{n}
\]

\[
= \frac{\sum (d_A \times d_B)}{n}
\]

\textbf{Note:} Sometimes in place of 'n' we can use 'n-1'. However students must give preference to "n" formula and not "n-1" in exam

Covariance (A, B)

\[
= \frac{\sum (\text{Given Return}_A - \text{Average Return}_A) \times (\text{Given Return}_B - \text{Average Return}_B)}{n - 1}
\]

\[
= \frac{\sum (d_A \times d_B)}{n - 1}
\]

**18. COVARIANCE BASED ON PROBABILITY**

Covariance (A, B) =

\[
\sum \text{probability} \times (\text{Given Return}_A - \text{Expected Return}_A) \times (\text{Given Return}_B - \text{Expected Return}_B)
\]
= \sum \text{probability} \times (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 +\(\alpha\) i.e it can be any number.
(ii) The sign of Coefficient of Correlation (r) always depends on Covariance as Standard Deviation of A and B will always be positive.
(iii) The covariance or coefficient of correlation between the risk free security and risky security will always be zero.

**19. WHEN RISK REDUCTION IS ACHIEVED BY BUILDING A PORTFOLIO**

- Risk Reduction is achieved when Portfolio Standard Deviation is less than Weighted Average Standard Deviation Of Individual Security.

- **When r = +1:** There is No Risk Reduction by building a portfolio, because in that case Standard Deviation (Risk) Of Portfolio will become equal to weighted average risk i.e

\[
(\sigma_{A+B}) = \sigma_A \times W_A + \sigma_B \times W_B
\]

**20. MEANING OF r=+1**

*When r = +1*
- It is a Perfect Positive Correlated Portfolio
- Portfolio Risk will be Maximum
- Standard Deviation Of Portfolio will become \((\sigma_{A+B}) = \sigma_A \times W_A + \sigma_B \times W_B\)
- It means two securities are moving in same direction.

**21. MEANING OF r=-1**

*When r = -1*
- It is a Perfect Negative Correlated Portfolio
- Portfolio Risk will be minimum
- Standard Deviation Of Portfolio will become \((\sigma_{A+B}) = \sigma_A \times W_A - \sigma_B \times W_B\)
- It means two securities are moving in opposite direction.
22. MEANING OF r = 0

- It is a No Correlated Portfolio
- Portfolio Risk will be between minimum and maximum range
- Standard Deviation Of Portfolio will become

\[ \sigma_{A+B} = \sqrt{\sigma_A^2 \times W_A^2 + \sigma_B^2 \times W_B^2} \]

23. RANGE OF ‘R’ OR COEFFICIENT OF CORRELATION

- Range of r is between -1 to +1

24. DECISION ON THE BASIS OF VALUE OF ‘R’

- Higher the r, higher the risk.
- As r increases, risk also increases
- When r = -1 : Minimum Risk
- When r = +1 : Maximum Risk

25. 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 and lowest 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%

**Note**: 
(i) Sum Of The Probability will always be equal to 1  
(ii) Sum Of the Deviation i.e Given Return - Average Return should always be equal to zero if we are calculating Standard Deviation on the basis of Past Data. 
(iv) Sometimes Expected Return and Average Return are used interchangeably.

**Overall Decision**: Lower the Standard Deviation, Coefficient Of Variation, Variance or Range Lower will be the Risk Of Security.
26. STANDARD DEVIATION OF PORTFOLIO CONSISTING OF THREE SECURITIES

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

\[ \text{When } r = +1 \text{ we can use short cut formula} \]

\[ \sigma_{ABC} = \sigma_A w_A + \sigma_B w_B + \sigma_C w_C \]

27. STANDARD DEVIATION OF PORTFOLIO CONSISTING OF FOUR SECURITIES

\[ \sigma_{ABCD} = \sqrt{\sigma_A^2 w_A^2 + \sigma_B^2 w_B^2 + \sigma_C^2 w_C^2 + \sigma_D^2 w_D^2 + 2w_A \sigma_A \sigma_B r_{AB} + 2w_A \sigma_A \sigma_C r_{AC} + 2w_B \sigma_B \sigma_C r_{BC} + 2w_D \sigma_D \sigma_C r_{CD} + 2w_A \sigma_A \sigma_D r_{DA} + 2w_B \sigma_B \sigma_D r_{DB} + 2w_C \sigma_C \sigma_D r_{CD}} \]

\[ \text{When } r = +1 \text{ we can use short cut formula} \]

\[ \sigma_{ABC} = \sigma_A w_A + \sigma_B w_B + \sigma_C w_C + \sigma_D w_D \]

28. RULE OF DOMINANCE IN CASE OF SELECTION OF MORE THAN ONE SECURITY/MODERN PORTFOLIO THEORY/HARRY MARKOWITZ MODEL

![Graph showing efficient frontier with risk and return points, indicating the rule of dominance.](image)
What are Efficient Portfolio? Efficient Portfolio is one which:
(i) Gives Same Return but Undertakes Lower Risk
(ii) Undertake Same Risk but Gives Higher Return
(iii) Gives Higher Return and also Undertakes Lower Risk
(iv) Undertakes Higher Risk But also Gives Higher Return

What are Inefficient Portfolio? Inefficient Portfolio are one which are not efficient.

29. MEANING OF RISK FREE SECURITY OR RISK FREE RATE

Risk Free Securities are assumed to provide Riskless Return to investors unless otherwise specially stated.
Risk Free Securities are: (i) Government Securities (ii) Treasury Bill (T-Bill) (iii) GOI Bonds (iv) Gilt Edged Securities (v) RBI Bonds

30. STANDARD DEVIATION OF PORTFOLIO CONSISTING RISK FREE & RISKY SECURITY

\[ (\sigma_A + B) = \sigma_A \times W_A \]
Where A is risky security & B is risk free security

31. CALCULATION OF EXPECTED MPS WHEN PROBABILITY IS GIVEN

The calculation of expected MPS is same as calculation of Expected Return with the help of probability.

32. FAMA'S NET SELECTIVITY MODEL
Fama's Net Selectivity = \[ \text{Actual Return} - \left( R_F + \left( \frac{\sigma_S}{\sigma_M} \right) (R_M - R_F) \right) \]

33. PORTFOLIO CONSISTING RISK FREE SECURITY & MARKET PORTFOLIO

Case 1: **Invest 100 % in Market Portfolio**
Standard Deviation ( Risk ) (\( \sigma \))
= Standard Deviation of Market or Risk of Market or \( \sigma_{\text{Market}} \)
Return = Return from Market or \( R_m \)

Case 2: **Invest 0 % in Market Portfolio & 100 % in Risk Free Security**
Standard Deviation ( Risk ) (\( \sigma \)) = 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
Return Of Portfolio
= Market Return \( \times \) Weight Of Market Portfolio + 
+ Risk Free Return \( \times \) Weight Of Risk Free Security
= \( R_m \times W_m + R_f \times W_f \)
Standard Deviation / Risk Of Portfolio = 
Standard Deviation Of Market \( \times \) Weight Of Market Portfolio = \( \sigma_m \times W_m \)

Case 4: **Invest more than 100 % in Market Portfolio** (Risk Free Borrowing)
In such case he is **investing 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 \( x \).
Return Of Portfolio =
Market Return \times (1 + x) - Risk Free Return Paid on Borrowing \times x = \\
R_m \times (1 + x) - R_f \times x

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

34. CALCULATION OF OPTIMUM WEIGHTS TO MINIMIZE PORTFOLIO RISK WHEN WEIGHTS ARE MISSING

~ Under this concept we will try to find out that "What percentage in each of the security consisting in the portfolio would result into lowest possible risk". Hence if we are asked to calculate optimum weights which will reduce our portfolio risk then we will use following formula:

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

and \( W_B = 1 - W_A \) (Since \( W_A + W_B = 1 \))

35. SHORT CUT FORMULA FOR OPTIMUM WEIGHTS WHEN \( r = -1 \)

~ When \( r = -1 \) then we can also use the following formula for finding Optimum Weights

\[
W_X = \frac{\sigma_Y}{\sigma_X + \sigma_Y}; W_Y = \frac{\sigma_X}{\sigma_X + \sigma_Y} \text{ or } 1 - W_X \quad \text{(Since } W_X + W_Y = 1 \text{)}
\]

Note: If we find the Standard Deviation (risk) from this optimum weights when \( r = -1 \) then portfolio risk will be zero.

36. CAPITAL ASSET PRICING MODEL (CAPM) BASED RETURN

~ Symbolically:

Expected Return /Required Return /Equilibrium Return /Desired Return = \\
\[
R_f + \frac{\text{Beta}_{\text{Security}}}{\text{Beta}_{\text{Market}}}[\text{(Rm} - \text{Rf})] = R_f + \text{Beta}_{\text{Security}}[\text{(Rm} - \text{Rf})]
\]

Where \( R_f = \text{Risk Free Return} \), \( \text{Rm} = \text{Market Return} \)
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
     = Beta Security [Return From Market - Risk Free Return]
(iv) Risk Free Securities are:
     (i) Government Securities
     (ii) Treasury Bill (T-Bill)
     (iii) GOI Bonds
     (iv) Gilt Edged Securities
     (v) RBI Bonds
(v) Risk Free Rate and Normal/Market Risk Premium are common to all securities
(ix) Index (Sensex or Nifty) represents Market and hence Return of Market means Return on Nifty/Sensex.
(x) The Rate of Return as given by the CAPM equation is the minimum required rate of return which a security must offer otherwise the investor may not like to invest in that security.
(xi) Higher the Beta, higher will be the CAPM return.

37. MEANING & CALCULATION OF MARKET RETURN

Market means all the securities taken together.
In India Sensex or Nifty is denoted as market.
Market Return is always calculated on total basis.

38. CAPITAL ASSET PRICING MODEL (CAPM) BASED DECISION

<table>
<thead>
<tr>
<th>Case</th>
<th>Valuation</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>If CAPM Return &gt; Given Return</td>
<td>Overvalued or Overpriced</td>
<td>Sell</td>
</tr>
<tr>
<td>If CAPM Return &lt; Given Return</td>
<td>Undervalued or Underpriced</td>
<td>Buy</td>
</tr>
<tr>
<td>If CAPM Return = Given Return</td>
<td>Correctlyvalued or Correctly priced</td>
<td>Hold</td>
</tr>
</tbody>
</table>

Note: Given Return means any return which may be given in question. At most of the times it is referred to as Expected Return or Average Return which we use to calculate by using Concept No.3 & 4

39. UNDERSTANDING OF SYSTEMATIC RISK AND UNSYSTEMATIC RISK
Total Risk = Systematic Risk + Unsystematic Risk

**Systematic Risk or Non-Diversifiable Risk or Market Risk**
- This risk affects all companies operating in the market.
- They cannot be controlled by the management of entity.
- **Example**: Interest Rate; Inflation; Taxation; Political Development; Credit Policy.

**Unsystematic Risk or Diversifiable 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, special export order, the research & development expert of company leaves; the company loses a big contract in a bid etc.

**40. BETA OF AN ASSET OR SECURITY / MARKET SENSITIVITY INDEX / BETA COEFFICIENT**

- **Meaning**: Beta is a measure of firm's Systematic Risk or Non Diversifiable Risk. The Sensitivity Of a Security to market movements is called Beta.
- Beta is always calculated with respect to Market.

**41. 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 and market is same. Security price are expected to move same with the market index.

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

**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%.

**Note**: Beta of Risk Free Security is assumed to be zero unless otherwise stated.

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

### 42. HOW TO CALCULATE BETA

Beta can be calculated in the following manner:

1. Beta With % Return Change Formula
2. Beta With Covariance Formula
3. Beta With Coefficient Of Correlation Formula
4. Beta With Regression Formula

### 43. BETA OF A SECURITY BASED ON % RETURN 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:

\[
\text{Beta} = \frac{\text{Change in Security Return}}{\text{Change in Market Return}}
\]

This equation is normally applicable when two return data is given.

### 44. CALCULATION OF BETA USING COVARIANCE FORMULA

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

Beta of an Asset or Security =

\[
\text{Beta} = \frac{\text{Covariance}(s,m)}{\sigma_m^2}
\]

### 45. BETA OF AN ASSET OR SECURITY USING SLOPE OF REGRESSION FORMULA
Slope (b) or Beta of an Asset or Security is given by:

\[
\beta = \frac{\sum XY - n\bar{X}Y}{\sum X^2 - n\bar{X}^2}
\]

Where X represents Market Return and Y represents Security Return.

**Note:** It is advisable to prefer Covariance Formula rather than the given formula for Beta calculation. The given equation can be ignored altogether.

### 46. Beta of a Security Using Correlation

\[\beta_S = \frac{r_{s,m} \times \sigma_S}{\sigma_m}\]

### 47. Beta of a Portfolio

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

**Symbolically:**

Beta Of Portfolio

\[\beta_P = \beta_A \times W_A + \beta_B \times W_B\]

### 48. Portfolio Evaluation Technique - Sharpe Ratio

This ratio indicates the amount of return earned per unit of risk. It is also known as Reward to Risk Ratio or Reward to Variability Ratio.

**Symbolically:** Sharpe Ratio =

\[
\frac{\text{Return Of Security} - \text{Return Of Risk Free Investment}}{\text{Standard Deviation Of Security}}
\]

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

### 49. Treynor Ratio

This ratio measures the return earned per unit of systematic risk. It is also known as the Reward to Volatility Ratio.

**Symbolically:** Treynor Ratio =
Return Of Security – Return Of Risk Free Investment
Beta Of Security

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

### 50. JENSEN’S ALPHA / JENSEN'S INDEX

- This is the difference between a fund’s actual return and CAPM Return. It is an absolute measure of evaluating a fund's performance.
- **Symbolically**:
  
  \[
  \text{Jensen’s Alpha} = \text{Actual or Given or Expected or Average Return} - \text{CAPM Return}
  \]
  
  where, \( \text{CAPM Return} = \text{Rf} + \text{Beta} \times (\text{Rm} - \text{Rf}) \)
- **Decision**: If Alpha is **positive** it shows that the portfolio has performed better and it has outperformed 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.

### 51. 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.

### 52. UNDERSTANDING OF STRAIGHT LINE EQUATION

Straight Line Equation is \( Y = a + b \times X \)

### 53. SECURITY MARKET LINE (SML)

- A Graphical representation of CAPM is known as Security Market Line.
Security Market Line shows the relationship between CAPM Return and Beta of security.

Security Market Line takes into account Systematic Risk.

Expected Return under SML is calculated by using following equation:

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

[ Remember : Beta of Market is always assumed to be equal to 1 ]

**Decision :**

**If a security lie on SML**
Efficient Security Correctly Priced Hold Security giving Optimum Return as expected

**If a security lie below SML**
Inefficient Security Over Priced Sold Security giving Low Return than expected

**If a security lie above SML**
Inefficient Security Under Priced Buy Security giving High Return than expected

---

**54. CAPITAL MARKET LINE (CML)**

Capital Market Line shows the relationship between Return & Standard Deviation of security.

Capital Market Line takes into account Total Risk.

Return under CML is calculated by using following equation:

\[ R_f + \left( \frac{\sigma_{S}}{\sigma_{m}} \right) \times [R_m - R_f] \]

**Decision :**

**If a security lie on CML**

**If a security lie below CML**

**If a security lie above CML**
55. SLOPE OF SML

Slope Of SML may be obtained as follows:

$$\frac{R_m - R_f}{B_m} = R_m - R_f$$

56. SLOPE OF CML

Slope Of CML may be obtained as follows:

$$\frac{R_m - R_f}{\sigma_m}$$

[This is also known as Market Total Risk Return Trade Off]

57. CHARACTERISTICS LINE (CL)

The Characteristic Line shows the relationship between the Return Of an Investment in Security and Return Of Market Portfolio.

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
- $\beta =$ Beta of Security
- $a =$ Intercept or alpha which can be calculated as $Y - \beta \times X$

58. SLOPE OF CHARACTERISTICS LINE (CL)

Beta of a security is a slope of Characteristics Line.

59. CONFUSION REGARDING ALPHA VALUE

In SFM, the word Alpha is used in two places.

One when we calculate Jensen's Measure

Jensen’s Alpha = Actual or Given or Expected or Average Return - CAPM Return

Other when we calculate the equation of Characteristic Line (CL)

$$Y = a + \beta \times R_m$$, where $a$ stands for Alpha i.e. $\text{Alpha} = Y - \beta \times R_m$

Note: Students must not confused themselves by their name. Calculation of Alpha will depends upon the requirement of question.
60. CONFUSION REGARDING CAPM; AVERAGE; ACTUAL; EXPECTED RETURN

- CAPM Return = \( R_f + \beta \times [ R_m - R_f ] \)
- Any other return can be termed as Given, Average, Expected, Actual Return
- Such bifurcation is only required while using following concept:
  a) Jensen's Measure;
  b) CAPM Based Decision;
  c) SML; CML; CL and similar concept

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

- Arbitrage Pricing Theory breaks the Systematic Risk into several parts such as Interest Rates, Inflation, Gross National Product, Balance Of Payment, Foreign Currency Fluctuations etc.
- Under CAPM we use to calculate Expected Return by taking only Beta. But in APT Model we take several factors and then calculate Expected Return.

- Symbolically:
  Overall Return in case of APT will be
  \[ R = R_f + (\beta \times \text{Risk Premium}) \] Of Each Factor
  \[ R = R_f + \{ \beta_{\text{Inflation}} \times \text{Inflation Differential or Premium} \} + \{ \beta_{\text{GNP}} \times \text{GNP Differential or Premium} \} \ldots \]
  Where, Differential or Premium = [ Actual Value - Expected/Estimated Value ]

62. RISK RETURN TRADE OFF OF MARKET

Risk Return Trade Off Of Market = \( \frac{R_m - R_f}{\sigma_m} \)

63. NEW FORMULA OF COVARIANCE USING BETA

Covariance between any 2 stocks = \( \beta_1 \times \beta_2 \times \sigma^2_m \)
64. COVARIANCE OF A SECURITY WITH THE SAME SECURITY

Covariance(A, A) = Variance Of A

Note: Covariance with oneself is variance.

65. COVARIANCE MATRIX

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>cov(A,A)</td>
<td>cov(A,B)</td>
<td>cov(A,C)</td>
</tr>
<tr>
<td>cov(A,B)</td>
<td>cov(B,B)</td>
<td>cov(B,C)</td>
</tr>
<tr>
<td>cov(A,C)</td>
<td>cov(C,B)</td>
<td>cov(C,C)</td>
</tr>
</tbody>
</table>

66. HOW BETA IS EXPRESSED??

⇒ Beta is expressed in terms of "Times"

67. HOW TO CALCULATE SYSTEMATIC RISK AND UNSYSTEMATIC RISK / SHARPE INDEX MODEL

FOR A SECURITY
Total Risk = $\sigma_s^2$

Systematic Risk Of a Security = $\sigma_m^2 \beta_s^2$

Unsystematic Risk Of a Security = Total Risk - Systematic Risk = $\sigma_s^2 - \sigma_m^2 \beta_s^2$

FOR A PORTFOLIO
Total Risk = $\sigma_P^2$

Systematic Risk Of a Portfolio = $\sigma_m^2 \beta_P^2$

Unsystematic Risk Of a Portfolio = Total Risk - Systematic Risk

= $\sigma_P^2 - \sigma_m^2 \beta_P^2$ or $\sum_{i=1}^{n} \sigma_{USR}^2 w_i^2$
68. CALCULATION OF SYSTEMATIC & UNSYSTEMATIC RISK USING 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

\[\text{Variance of Security Return} \times r^2 \text{ or } \sigma_s^2 \times r_s^2, m\]

**Not explained by the index (Unsystematic Risk) =**

Variance of Security Return \(\times (1 - \text{Co-efficient of Determination of Security})\)

or Variance of Security Return \(\times (1 - r^2)\) or \(\sigma_s^2 \times (1 - r_s^2, m)\)

69. CAN BETA BE NEGATIVE

→ 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.

70. CALCULATION OF ISSUE PRICE USING WEIGHTED AVERAGE

→ Under this process, we use weighted average to calculate issue price.

71. TYPES OF BETA

Security can have betas that are positive, negative or zero.

- **Positive Beta-** indicates that security’s return is dependent on the market return and moves in the **same direction** in which market moves.
- **Negative Beta-** indicates that security’s return is dependent on the market return but moves in the **opposite direction** in which market moves.
- **Zero Beta-** indicates that security’s return is **independent** of the market return.
72. APPLICATION OF GEOMETRIC MEAN

- Geometric Mean is a type of averaging technique just like weighted average, simple average etc.
- Geometric Mean between a and b will be \( \sqrt{a \times b} \)

73. 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.

74. WHEN RISK FREE RETURN IS MORE THAN MARKET RETURN

**Question:**
Rf=11%; Beta=1.345; Rm=10.2%; Calculate Required Return As Per CAPM?

**Solution:**
Required Return = Rf + Beta \((Rm - Rf)\) = 11% + 1.345(10.2 - 11) % = 9.924%

**Note:** We should always avoid such security, Whenever Rm is less than Rf

75. MARKET RISK PREMIUM

**Question:** T-bills give a return of 5%. Market return is 13%. What is the Market Risk Premium?

**Market Risk Premium:** Market Risk Premium = \( R_m - R_f \) = 13% - 5% = 8%

76. SECURITY RISK PREMIUM

**Question:** The risk premium for the market is 10%. Assuming Beta values of 0, 0.25, 0.42, 1.00 and 1.67. Compute the risk premium on security K

**Solution:**
0.00 0%
0.25 2.50%
Question: CAPM return 15.50%; return on the market is 12%. Risk Free Rate 4.3% and 4.6%. What is Tata Ltd’s beta?

[Additional Analysis: Since two Risk Free Rates are given at different bid, for our analysis we will take average of Risk Free Rate]

Solution:
As per CAPM we have
\[ \text{ER} = R_f + \beta \times (R_M - R_f) \]
\[ 15.5\% = 4.45 + \beta \times (12 - 4.45) \]
\[ \beta \times (12 - 4.45) = 15.5 - 4.45 \]
\[ \beta \times 7.55 = 11.05 \]
\[ \beta = \frac{11.05}{7.55} = 1.464 \]

Working Notes: Determining Risk-Free Rate:

.: Average of 4.30 and 4.60 is taken. i.e. \[ \frac{4.30 + 4.60}{2} = 4.45 \]

Question: Calculate Return for two financial years?

Year | Price
---|---
2005 | 200
2006 | 220
2007 | 253

Solution:
For year 2005-2006: \( \frac{220-200}{200} = 10\% \); For year 2006-2007: \( \frac{253-220}{220} = 15\% \)

79. Covariance Formula Using Correlation

\[ \text{Covariance}(A, B) = r_{A,B} \times \sigma_A \times \sigma_B \]
80. PORTFOLIO CONSISTING OF PURCHASING, SELLING & BORROWING

**Question:** Invest 3,00,000 in Security A by using 1,00,000 of own money, 1,00,000 borrowing at Risk Free Rate, 1,00,000 by selling Security B. What is the sensitivity of the portfolio

<table>
<thead>
<tr>
<th>Security A</th>
<th>Security B</th>
<th>Risk free Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity (Beta)</td>
<td>0.80</td>
<td>1.50</td>
</tr>
</tbody>
</table>

**Solution:** Sensitivity of Portfolio = 3.0 x 0.80 + (-1 x 1.50) + (-1 x 0) = 0.90

**Calculation Of Weights:**
- Security A: Rs. 300000 / Rs. 100000 = 3
- Security B: -Rs. 100000 / Rs. 100000 = -1
- Risk free asset: -Rs. 100000 / Rs. 100000 = -1

81. CORRELATION OF A SECURITY WITH SAME SECURITY \( r_{A,B} \)

\[ r_{A,B} = 1 \]

82. CALCULATION OF RISK FREE RETURN UNDER CAPM

**QUESTION**
Market Return 15%; 7% Treasury Bond Trading at $140
Beta of Security 1; Calculate Risk Free Rate & CAPM Return?

**SOLUTION:**
Risk Free Rate = Coupon Payment / Current Market Price = 7 / 140 = 5%
Note: Face Value = Rs. 100 assumed
CAPM Return = 5% + 1 x (15% - 5%) = 15%

83. WHEN PRICE OF EQUITY SHARE IS GIVEN CUM DEBENTURE

In such case we must take, only value of equity deducting value of debenture from it.

Value Of Equity = Cum Debenture Value Of Equity - Value of Debenture

84. CALCULATION OF PORTFOLIO RETURN WITH THE HELP OF MARKET RETURN AND PORTFOLIO BETA

**QUESTION** Market Beta is 1, Market Return is 12; Portfolio Beta is 1.22, Calculate Portfolio Return ?
SOLUTION: Portfolio Return will be $12 \times 1.22 = 14.64\%$.

NOTE:
(i) **Rule Of Diversification or Benefit Of Portfolio**
- The main benefit of portfolio is diversification.
- Diversification means "Do not put all your eggs in one basket"
- Diversification refers to investing in more than one security.
- Diversification reduces risk by allowing possible loss of one investment to be set off against possible gain from others.
- Greater the diversification lower should be the risk.

(ii) Sometimes Equity shares are also referred to as Stock
1. WHY FOREIGN EXCHANGE?

- While doing this chapter, we hope to demonstrate to the student importance of "International Finance" in today's world.

- The world economy is becoming a single gigantic and complex organism with highly interdependent constituents.

- The country and the companies can ignore the developments in the world economy only at the risk of being left behind in the global race. Today no country is self-sufficient in its demand and supply of goods and services.

- More exports, More imports, raising more funds from abroad and making investment abroad mean that international finance has become a crucial job.

- You cannot become a top notch CFO unless you master International Finance.

- During the last five years or so, particularly after the opening up of the Indian Economy, the study of corporate finance in a multinational context has acquired tremendous importance.

- The Finance Manager of the new century cannot afford to remain ignorant about international financial markets. The world is becoming a global village and the job of the finance manager is becoming exciting, demanding and challenging in this international arena.

- The Foreign Exchange Market is by far the largest financial market in the world. A recent survey placed the average foreign exchange trading volume at over $650 billion or 160 trillion a year.

- Indian Population 1/6th of the world's population. Foreign Exchange Volume of India $3-4 trillion i.e. 0.001% of total world's population. India's share in International Trade is 1%
Indian Foreign Exchange Market is controlled by RBI and FEDAI (Foreign Exchange Dealers Association of India)

2. DOMESTIC OR HOME CURRENCY

Country's Own Currency is known as Home Currency. For Example:
For India "Rupee" is the domestic currency
For Japan "Yen" is the domestic currency
For Germany "Euro" is the domestic currency

3. FOREIGN CURRENCY

For a country, any Currency other than home currency is known as Foreign Currency.
For India "US$" is the foreign currency
For Japan "Rs." is the foreign currency
For Germany "Rs." is the foreign currency

4. SPOT RATE

Spot Rate: Spot Rate is the rate applicable for immediate settlement.

5. FORWARD RATE

Forward Rate: Forward Rate is the rate applicable for future settlement.

6. EXCHANGE RATE-ONE WAY QUOTE

Example: 1 $ = Rs. 42.50
Here Bid and Ask Rate is same that's why it is known as One-way Quote.

7. EXCHANGE RATE-TWO WAY QUOTE

Example: 1 $ = 47.6500-47.6595
In this quote 47.6500 is the bid rate and 47.6595 is the ask rate.
8. LETTER OF CREDIT

- ‘Letter of Credit’ is also known as L/C, LC, and LOC
- 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.
- For this service bank charges commission from party taking loan.

9. DIRECT AND INDIRECT QUOTE

- **Direct Quote:** A direct quote is the home currency price for one unit foreign currency.
  **Example:** the quote $1 =Rs.44.00 is a direct-quote for India.

- **Indirect Quote:** An indirect quote is the foreign currency price of one unit of the home currency.
  **Example** the quote Re.1 =$0.0227 is an indirect quote for India.

10. CONVERTING DIRECT QUOTE INTO INDIRECT QUOTE AND VICE-VERSA - WHEN BID & 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:
  
  \[
  \text{Direct Quote} = \frac{1}{\text{Indirect Quote}} \quad \text{or} \quad \text{Indirect Quote} = \frac{1}{\text{Direct Quote}}
  \]

  **For Example:** 1 DM = Rs. 20 is a direct quote for India. 1 Re. = \( \frac{1}{20} \) DM is indirect quote for India

11. CONVERTING DIRECT QUOTE INTO INDIRECT QUOTE AND VICE-VERSA - 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.
**For Example:**
Direct Quote with reference to India: $1 = Rs. 46.10 / 46.20.

Indirect Quote with reference to India: $1 = Rs. $\frac{1}{46.20} - \frac{1}{46.10}$ 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.

12. **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:* Ask Rate will always be greater than Bid Rate.

*Note:* The quote of Bid and Ask Rate is given from the banker's point of view.

13. **SPREAD**

- The difference between Ask and Bid Rates is called the Spread, representing the profit margin of the dealer.
- Spread = Ask Rate - Bid Rate

14. **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**: 1 $ = Rs. 107.45 - 107.75 ; 1 Months Swap : 55 / 105

**Solution**: Spot Rate

\[
\begin{array}{c c c c}
\text{Add : Swap} & 0.55 & 1.05 \\
1 \text{ months Forward Rate} & 108.00 & 108.80
\end{array}
\]

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**:

\[
\begin{array}{c c c c}
\text{Deduct : Swap} & 0.0065 & 0.0044 \\
1 \text{ months Forward Rate} & 1 \text{ Pound} = $1.4645 - $1.4766
\end{array}
\]

**Note**: **Rule Of Adding and Subtracting**: The points should be adjusted in the Spot Rate in the reverse order i.e from the last decimal points.

**Note**: The Swap Points normally do not carry plus and minus signs and decimal points also.

**15. TYPES OF INTEREST RATE QUOTATION**

There are two types of Interest Rate Quotations:

(i) Fixed Rate Of Interest
(ii) Floating Rate Of Interest like LIBOR, MIBOR etc
16. PREMIUM AND DISCOUNT

- **Premium or Appreciation of a Currency**: If the currency is costlier in future as compared to Spot it is said to be at a premium.
  
  **Example**: Spot Rate: 1 $ = Rs. 43 and 6 Month Forward Rate: 1 $ = Rs. 45
  
  In the above example $ is at a premium.

- **Discount or Depreciation of a Currency**: If the currency is cheaper in future as compared to Spot it is said to be at a discount.
  
  **Example**: Spot Rate: 1 $ = Rs. 43 and 6 Month Forward Rate: 1 $ = Rs. 42
  
  In the above example $ is at a discount.

- **How to Calculate Premium or Discount**: Rate of Premium or Discount of Left Hand Currency is given by:

  \[
  \text{Rate of Premium or Discount} = \frac{\text{Forward Rate} - \text{Spot Rate}}{\text{Spot Rate}} \times \frac{12}{\text{Forward Period}} \times 100
  \]

  **Example**: Spot Rate: 1 US $ = Rs. 50; 12 Months Forward Rate: 1 US $ = Rs. 55
  
  Calculate Rate of Premium or Discount of Dollar and Rupees.

  Rate of Premium of Dollar = \( \frac{55 - 50}{50} \times \frac{12}{12} \times 100 = 10\% \)

  Now for calculating Rate of Discount of Rupee we have to convert the exchange rate in terms of Rupee (because Premium and Discount using above formula is always calculated for Left Hand Currency)

  Spot Rate: 1 Re=$ \frac{1}{50} =$ .02; 12 Months Forward Rate: 1 Re = $ \frac{1}{55} = $.01818

  Now Rate of Discount of Rupee = \( \frac{0.01818 - 0.02}{0.02} \times \frac{12}{12} \times 100 = -9.09\% \)

  **Note**: It can be seen from the above example that rate of premium of one currency is not exactly equal to the rate of discount of another currency.
17. EXCHANGE MARGIN

Exchange Margin is the extra amount or percentage charged by the bank over and above the rate quoted by the bank. It 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)

18. EXPORT RATE AND IMPORT RATE

EXPORT RATE - BID RATE
IMPORT RATE - ASK RATE

19. CROSS CURRENCY RATES

- Cross Rate is the exchange rate based on the cross products of two other 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.

20. PURCHASE PRICE PARITY THEORY [PPPT] - CALCULATION OF SPOT RATE

- **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. If it were not true, arbitrageurs would buy in cheaper market and sell in expensive market to make riskless gain. It was enunciated by a Swedish economist, Gustav Cassel in 1918.

\[
\text{Spot Rate (Rs. / $) = } \frac{A \ [\text{Current Price in India}]}{B \ [\text{Current Price in USA}}
\]

21. PURCHASE PRICE PARITY THEORY [PPPT] - CALCULATION OF FORWARD RATE-USING INFLATION
Symbolically: As per PPP Theory we have:

\[
\text{Forward \ Rate (Rs/$)} = \left(1 + \frac{\text{Rupee Inflation}}{1 + \text{Dollar Inflation}}\right) \times \text{Spot Rate (Rs./$)} \quad \text{or}
\]

\[
\frac{\text{Forward \ Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \left(1 + \frac{\text{Rupee Inflation}}{1 + \text{Dollar Inflation}}\right)
\]

Note: The Purchasing Price Parity Theory can be used for any two currencies. It need not necessarily be a Dollar or Rupees.

Note: In the above calculation the rate of inflation should be taken proportionate to Forward period.

Case (i) When Forward Period is less than one year

\[
\frac{\text{Forward \ Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \left(1 + \frac{\text{Rupee Inflation Adjusted For Period}}{1 + \text{Dollar Inflation Adjusted For Period}}\right)
\]

Case (ii) When Forward Period is more than one year

\[
\frac{\text{Forward \ Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \left[\frac{(1 + \text{Rupee Inflation})^n}{(1 + \text{Dollar Inflation})^n}\right]
\]

Note: If PPPT do not holds true then Arbitrage Opportunity will emerge.

22. Determination of Premium & Discount Using PPPT

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.

23. Interest Rate Parity Theory (IRPT)
**Meaning**: IRPT is based on the concept that investment opportunity in any two given country will always be same.

**Symbolically**: \[
\frac{\text{Forward Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \frac{1 + \text{Rupee Interest Rate}}{1 + \text{Dollar Interest Rate}}
\]

In the above calculation the rate of interest should be taken proportionate to Forward period

**Case (i) When Forward Period is less than one year**

\[
\frac{\text{Forward Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \frac{1 + \text{Rupee Interest Adjusted For Period}}{1 + \text{Dollar Interest Adjusted For Period}}
\]

**Case (ii) When Forward Period is more than one year**

\[
\frac{\text{Forward Rate (Rs/$)}}{\text{Spot Rate (Rs./$)}} = \frac{(1 + \text{Rupee Interest})^n}{(1 + \text{Dollar Interest})^n}
\]

**Note**: The Interest Rate Parity Theory can be used for any two currencies. It need not necessarily be a Dollar or Rupees.

**Note**: If IRPT do not holds true then Arbitrage Opportunity will emerge.

**24. Determination of Premium & Discount using IRPT**

Higher Rate of Interest in one country (as compared to the other country) results in discount of currency of that country and vice-versa. For Example:

- If Rupee Interest is more than dollar Interest, Dollar will be at premium and Rupee will be at a Discount.
- If Rupee Interest is less than Dollar Interest, Dollar will be at discount and Rupee will be at a premium.

**25. 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.
**FOREIGN EXCHANGE-108**

**SFM-For those who want to score 90+**

**Dare To Dream...Beyond 90**

**CA Aaditya Jain**

*For Example*: In New York: 1 Pound = 1.9800 $ - 1.9810$ and in London: 1 Pound = 1.9700$ - 1.9710$

Buy 1 Pound at 1.9710
Sell 1 Pound at 1.9800
Risk Less Profit 0.009

**Under Geographical Arbitrage** the rule is "Buy Low and Sell High"

**26. COVERED INTEREST ARBITRAGE - WHEN ASK RATE & BID RATE ARE SAME/INVESTMENT & BORROWING RATE ARE SAME**

- If Interest Rate Parity Theory do not hold, Covered Interest Arbitrage will arise i.e there will be a possibility of Riskless Profit.
- In such case we will borrow from the country where borrowing is cheap and will invest in country where investment return is more.
- For deciding which country is better for investment, a country must have better interest rate and also a better exchange rate.

**27. FORWARD CONTRACTS & ITS OBJECTIVE**

**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.

**28. CURRENCY SWAP/PARALLEL LOAN ARRANGEMENT**

- 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 period of loan.
  (iii) a re-exchange of principal amounts at the time of maturity.
29. FRAMING OF EXCHANGE RATE WHEN EXCHANGE MARGIN IS ATTACHED TO IT

**Example:** Spot rate (€ per £) : 1.998 ± 0.002
Determine Ask Rate and Bid Rate?

**Solution:**
BID RATE = € 1.998 – 0.002 = €1.996 per £
ASK RATE = € 1.998 + 0.002 = €2.000 per £

30. 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 and invest this amount in the domestic market for the required period.

**Step 3:** Use Foreign Currency receipt to repay the "Amount Borrowed + Interest on it" in foreign currency.

**Step 4:** Receive maturity amount of investment with interest in Domestic Country.

31. MONEY MARKET OPERATION-IF FOREIGN CURRENCY IS TO BE PAID IN FUTURE / IMPORTER'S ANGLE / PAYABLES

**Step 1:** Borrow in Home Currency an amount which when converted into Foreign Currency by using Spot Rate and then invested at the given investment rate of foreign currency for the period of credit becomes equal to the amount which is to be paid in foreign currency.

**Step 2:** Convert the home currency amount borrowed, in foreign currency by using Spot Rate
**Step 3**: Invest this foreign currency at the given investment rate. This amount should be equal to the amount which was outstanding / or to be paid.

**Step 4**: Use this amount to pay the amount outstanding.

**Step 5**: Pay off the home currency loan with interest upon maturity.

### 32. 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 and
- Inflows and Outflows relate to the same period.

### 33. LEADING TECHNIQUE

- Leads means advancing the timing of payment or receipt.

### 34. LAGGING TECHNIQUE

- Lags means postponing the timing of payment or receipt.

**Note**: While deciding on Leading & Lagging, we should also take into account Interest Opportunity Cost.

### 35. ARBITRAGE ON THE BASIS OF DIFFERENCE IN INTEREST RATE
When Difference in Interest Rates Between The Two Countries is equal to Premium Or Discount - No Arbitrage Is Possible

**Example**-Rs Interest Rate = 10%; $ Interest Rate = 7%; Discount In Rs = 1%;
Arbitrage Is Possible ; Invest In Rs & Borrow From $

**Example**-Rs Interest Rate = 10%; $ Interest Rate = 7%; Discount In Rs = 5%;
Arbitrage Is Possible ; Invest In $ & Borrow From Rs

### 36. FORWARD RATE AGREEMENTS (FRA'S)-NORMAL

**Meaning**: A **Forward Rate Agreement** (FRA) is a contract which fixes the interest cost on a specified date in the future.

**Settlement Of Gain or Loss**: On the specified date if the originally contracted rate turns out to be different from the FRA Rate, the differential will have to be received or paid.
If the actual original bank rate is higher than what is agreed upon under FRA, the bank compensates the borrower. [Gain To Customer]
On the other hand, if the actual original bank rate at the specified future date is lower than what is agreed upon under FRA the borrower is required to pay the differential to the bank [Loss To Customer]

**Advantage**: It helps a borrower in elimination interest rate risks associated with borrowing or investing funds.

### 37. 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 by discounting Home Currency Cash Flows by Home Currency Discount Rate
38. INTERNATIONAL CAPITAL BUDGETING - FOREIGN CURRENCY APPROACH

**Step 1:** Compute Foreign Currency Cash Flows.

**Step 2:** Compute Foreign Currency Discount Rate.

**Step 3:** Compute Foreign Currency NPV by Discounting Foreign Currency Cash Flows by Foreign Currency Discount Rate.

**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:** Calculation of Discount Rate:

\[
(1 + \text{Risk Adjusted Discount Rate}) = (1 + \text{Risk Free Rate})(1 + \text{Risk Premium})
\]

**Note:** Risk Adjusted Discount Rate in Domestic Country and Foreign Country will be different.

**Note:** It is generally assumed that Risk Premium attached to any project will be same both in Domestic Country and Foreign Country Approach.

39. 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.

40. CANCELLATION OF FORWARD CONTRACT-BEFORE 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 Forward Rate prevailing as on today for due date

**Settlement Of Gain or Loss:** Customer will be entitled for both Profit and Loss.
41. EXTENSION OF FORWARD CONTRACT

Extension involves two steps:
(i) Cancellation of Original Contract
(ii) Entering into a new contract.

42. CURRENCY PAIR

- 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.
- The most traded currency pairs in the world are EUR/USD, USD/JPY, GBP/USD, AUD/USD, USD/CHF, USD/CAD, GBP/INR, USD/INR, EUR/JPY, EUR/INR.
- 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.

43. TREATMENT OF WITHHOLDING TAX RATE UNDER FOREIGN EXCHANGE MARKET

- When a Foreign Country invest in a Home Country, the home country charges an additional tax over and 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.

44. CALCULATION OF RETURN UNDER FOREIGN EXCHANGE MARKET

Return (In Terms Of Home Currency) = \[1 + \frac{(P1 - P0 + I)}{P0} \left(1 + \frac{e}{e}\right)-1\]

Where,
\(P0\) = Price at the beginning; \(P1\) = Price at the end; \(I\) = Income from interest and dividend; \(e\) = Change in exchange rate.

Question (CA Final May 2012) (5 Marks) The price of a bond just before a year of maturity is $5,000. Its redemption value is $5,250 at the end of the said period. Interest is
$ 350 p.a. The Dollar appreciates by 2% during the said period. Calculate the rate of return.

**Solution:**

Here we can assume two cases

(i) If investor is US investor then there will be no impact of appreciation in $.

(ii) If investor is from any other nation other than US say Indian then there will be impact of $ appreciation on his returns.

(i) First we shall compute return on bond which will be common for both investors.

\[
\text{Return} = \frac{\text{Price at end} - \text{Price at begining}}{\text{Price at begining}} + \frac{\text{Interest}}{\text{Price at begining}}
\]

\[
\frac{5250 - 5000}{5000} + \frac{350}{5000} = 0.12 \text{ say } 12\%
\]

For US investor the return shall be 12% and there will be no impact of appreciation in $.

(ii) If $ appreciate by 2% then return for non-US investor shall be:

\[
\text{Return} \times 1.02 = 0.12 \times 1.02 = 0.1224 \text{ i.e. } 12.24\%
\]

Alternatively it can also be considered that $ appreciation will be applicable to the amount of principal as well. The answer therefore could also be

\[
(1+0.12)(1+0.02) - 1 = 1.12 \times 1.02 - 1 = 0.1424 \text{ i.e. } 14.24\%
\]

45. **EXPECTED SPOT RATE USING PROBABILITY**

**Example :**

<table>
<thead>
<tr>
<th>$/Pound</th>
<th>1.60</th>
<th>1.70</th>
<th>1.80</th>
<th>1.90</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.15</td>
<td>0.20</td>
<td>0.25</td>
<td>0.20</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Calculate expected spot rate?

**Solution:** Calculation of expected spot rate:

<table>
<thead>
<tr>
<th>$ / £</th>
<th>Probability</th>
<th>Expected $/£</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.60</td>
<td>0.15</td>
<td>0.24</td>
</tr>
<tr>
<td>1.70</td>
<td>0.20</td>
<td>0.34</td>
</tr>
<tr>
<td>1.80</td>
<td>0.25</td>
<td>0.45</td>
</tr>
<tr>
<td>1.90</td>
<td>0.20</td>
<td>0.38</td>
</tr>
<tr>
<td>2.00</td>
<td>0.20</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>1.00</strong></td>
<td></td>
<td><strong>1.81</strong></td>
</tr>
</tbody>
</table>

Therefore, the expected spot rate would be $ 1.81

46. **CALCULATION OF STANDARD DEVIATION UNDER FOREIGN EXCHANGE MARKET**
Standard deviation under two assets model

\[
\sigma = \sqrt{(\sigma_1)^2 + (\sigma_2)^2 + 2 \sigma_1 \sigma_2 \rho_{12}}
\]

\(\sigma_1\) = Standard Deviation of Indian Security; \(\sigma_2\) = Standard Deviation of Exchange Rate
\(\rho_{12}\) = Coefficient of Correlation between Return Of Security & Exchange Rate

47. APPLICATION OF DTAA-DOUBLE TAXATION AVOIDANCE AGREEMENT

- The Double Tax Avoidance Agreement (DTAA) is primarily an agreement entered into between two countries. The basic objective is to promote and foster economic trade and investment between the two contracting countries (‘States’) by avoiding double taxation of the same income which would constitute a prohibitive burden on the tax-payer.

- Under Section 90 of the Income Tax Act, the Central Government has been authorized to enter into DTAA’s with other countries.

- 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.

- In other words when DTAA is applicable no other tax rate will be applicable.

48. DETERMINATION OF DISCOUNT COMPONENT AND CURRENCY FLUCTUATION COMPONENT

- If the firm decides to pay today rather than in future he may get two type of benefits:
  (i) Benefits on account of Discount for Prepayment
  (ii) Benefits on account of Currency Fluctuations

49. EXPECTATION OF IMPORTER OR PARTY PAYING FOREIGN CURRENCY

**Importer:** Will Pay Foreign Currency
It Expects Foreign Currency To Fall

**Example:** ONGC
50. EXPECTATION OF EXPORTER OR PARTY RECEIVING FOREIGN CURRENCY

**Exporter:** Will Receive Foreign Currency  
It Expects Foreign Currency To Rise

**Example:** INFOSYS

51. GAIN & LOSS UNDER FOREIGN EXCHANGE MARKET

**When Forward Contract Is Taken:**
Amount At Forward Rate: \( xxx \)
Amount At Spot Rate: \( xxx \)
Gain or Loss: \( xxx \)

**When No Forward Cover Is Taken:**
Amount At Expected Spot Rate: \( xxx \)
Amount At Spot Rate: \( xxx \)
Gain or Loss: \( xxx \)

52. TRANSACTION RISK/LOSS/EXPOSURE

Amount paid or received Before Exchange Rate Change: \( xxx \)
Amount paid or received After Exchange Rate Change: \( xxx \)
Transaction Loss or Gain Due To Currency Fluctuation: \( xxx \)

53. INTERNATIONAL FISHER EFFECT (IFE)

- It analyses the relationship between the Interest Rates and the Inflation.
- As per IFE we have \((1 + \text{Money Interest Rate}) = (1 + \text{Real Interest Rate})(1 +\text{Inflation Rate})\)

54. APPLICATION OF NORMAL TAX IN FOREIGN EXCHANGE MARKET

- It may be noted that whenever tax rate is given in question following adjustment are advisable:
  1. Any inflow or outflow should be taken on after tax basis if it is a part of profit and loss account. Normally such treatment are applicable for interest payments & interest received.
  2. Any tax payment on profit or tax saved on loss arising on account of currency exchange
fluctuation should also be accounted. Loss & Gain can be calculated by taking difference between forward rate and spot rate.

55. EVALUATION OF QUOTATIONS FROM TWO BANKS

When quotations are received from two banks, customer should select that quotation which is more beneficial to him.

56. INTEREST RATE DIFFERENTIAL

Interest Rate Differential is just another name of premium or discount of one currency in relation to another currency i.e

\[
\frac{FR[Rs/$] - SR[Rs/$]}{SR[Rs/$]} \times \frac{12}{\text{Forward Period}} \times 100
\]

= Interest Rate Of Rupee – Interest Rate Of Dollar

57. EVALUATION OF FOREIGN JOINT VENTURE

When a company enter into a joint venture with another company for a new project, the decision whether to go ahead with the project or not depends whether the NPV of the project is positive or negative. If its positive, company should enter into joint venture otherwise not.

58. PROFIT & LOSS CALCULATION IN CASE POSITION IS CLOSED/SQUARE OFF/SETTLED

Squaring or Settling the position in foreign currency means a buying position is to be settled by selling position and vice-versa to calculate profit or loss.

59. EXPECTED SPOT RATE

The exchange rate between two currencies that is anticipated to prevail in the spot market on a given future date. It is the rate which is expected by the exporter or importer.

It is different from Forward rate as Forward Rate is quoted by banks.

If question is silent we assume Expected Spot rate and forward rate to be same.
60. INTEREST RATE SWAP

In Interest Rate Swap two parties exchange their Interest Rate Obligations.

For Solving Practical Question we will undertake the following steps:

Step 1: Calculate Total Interest Rate of the parties as per their own objective i.e without swap
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
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

61. GAIN OR LOSS DUE TO EXPORT BILL

Amount received under forward contract under an export bill
Amount which could have received at today's value of export bill
Gain or Loss

62. CALCULATION OF CONTRIBUTION TO SALES RATIO UNDER FOREX

Contribution to Sales Ratio = \( \frac{\text{Contribution}}{\text{Sale}} \times 100 \)

Decision: Higher the C/S Ratio better the situation

63. SUB CURRENCY (SELECTED)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CURRENCY</th>
<th>SUB-CURRENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>1 Euro</td>
<td>100 cents</td>
</tr>
<tr>
<td>India</td>
<td>1 Rupee</td>
<td>100 paise</td>
</tr>
<tr>
<td>Japan</td>
<td>1 Yen</td>
<td>100 cen</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1 Rupee</td>
<td>100 paisa</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1 Franc</td>
<td>100 centimes</td>
</tr>
<tr>
<td>United States</td>
<td>1 Dollar</td>
<td>100 cents</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1 Pound</td>
<td>100 pence</td>
</tr>
</tbody>
</table>
64. MID RATES

It can simply be defined as the average of the bid and ask prices being quoted.
For example: The offer price is 1.5 and the bid price is 1.0. Using the average, the middle rate would be 1.25. This rate can also be called the mid-rate, mid-price, etc.

65. INTER BANK RATES & MERCHANT RATES

Merchant Rates, Inter-Bank Market Rates and RBI Rates:
The rate quoted by banks to their non bank customers are called "Merchant Rates".
The rate which are quoted among the authorised dealers i.e from one bank to another is called "Inter Bank Rates"
The rates quoted between RBI and Authorized Dealers are called "RBI Rates".

66. NOSTRO ACCOUNT/VOSTRO ACCOUNT/LORO ACCOUNT

NOSTRO ACCOUNT: Nostro account is an account of Indian Bank maintained by a bank abroad. For example, Indian bank may maintain an account with City Bank, London. Obviously, the account would be in pound-sterling. While corresponding with the foreign bank, Indian bank would refer its account with the former as nostro account, meaning ‘our account with you’.
VOSTRO ACCOUNT: A foreign bank may open rupee account with an Indian Bank. While corresponding with the foreign bank maintaining an account with it, the Indian bank would refer to the account as ‘vostro account’ meaning ‘your account with us’.
LORO ACCOUNT: An expression used, by one bank when telling another bank to transfer money to the account of a third bank “i.e. their account with you”

67. FOREIGN EXCHANGE ACCOUNTS

Note: Exchange position Account: All purchases and sales whether spot or forward are recorded in this account.
Note: Cash Position (Nostro Account): All the items related to Spot (Cash) transaction are recorded in this account
68. **CALCULATION OF GAIN OR LOSS DUE TO BANK STRIKE**

Amount paid or received before bank's strike       \( \text{xxx} \)
Amount paid or received after bank's strike       \( \text{xxx} \)
Gain or Loss due to bank strike                  \( \text{xxx} \)

69. **WHEN UPFRONT PREMIUM IS CHARGED UNDER FORWARD CONTRACT**

Sometimes Bank Charges a premium for entering Forward Contract with the party. This premium represent the cost for the customer.

70. **CALCULATION OF NET EXPOSURE USING FORWARD RATE AND SPOT RATE**

- 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

- **Decision:** A positive Net Exposure indicates benefit of Forward Rate over Spot Rate.

71. **RULE OF WEAKER AND STRONGER CURRENCY**

- In an exchange rate, the currency whose value is lower will always be stronger.

- **Example:**

<table>
<thead>
<tr>
<th>Currency</th>
<th>Rate</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Dollar</td>
<td>Rs. 63.7375</td>
<td>USD is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>Euro</td>
<td>Rs. 69.894507</td>
<td>EUR is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>British Pound</td>
<td>Rs. 98.770817</td>
<td>GBP is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>Australian Dollar</td>
<td>Rs. 47.293225</td>
<td>AUD is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>Canadian Dollar</td>
<td>Rs. 48.519393</td>
<td>CAD is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>Singapore Dollar</td>
<td>Rs. 46.030823</td>
<td>SGD is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td>Swiss Franc</td>
<td>Rs. 64.810437</td>
<td>Franc is stronger; Rupee is Weaker</td>
</tr>
<tr>
<td><strong>Japanese Yen</strong></td>
<td><strong>Rs. 0.513164</strong></td>
<td>YEN is Weaker; Rupee is stronger</td>
</tr>
<tr>
<td>Chinese Yuan</td>
<td>Rs. 10.268483</td>
<td>Yuan is stronger; Rupee is Weaker</td>
</tr>
</tbody>
</table>

72. **MYTH: HIGHER THE INTEREST RATE, BETTER THE INVESTMENT**
A Country with higher interest rate is better only when exchange rate of that country is also better otherwise investment is such country should always be avoided.

For Example:
Few country whose interest rate is higher but they are not at all a good investment destination due to unfavourable exchange rate—
Ukraine Interest Rate is 30.00% ; Iraq Interest Rate is 15 %
Few country with lower interest rate but are largely preferred for investment due to good exchange rate—they are Switzerland with -0.75 interest rate; United States 0.25% interest rate and Japan 0.1 % interest rate.

Note: Complete coverage with explanation already given in class

73. APPLICATION OF TRANSFER PRICING / NOTIONAL PRICE / FAIR PRICE

Question: You are told that spot rate is $1.65/£. The expected inflation rate in UK and the USA for the next three years are given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>UK Inflation (%)</th>
<th>US Inflation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2</td>
<td>3.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>3.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Calculate the expected $/£ spot rate after three years.

Solution:

\[
\frac{FR(\$/£)}{SR(\$/£)} = \frac{(1 + \text{Inflation}_1)(1 + \text{Inflation}_2)(1 + \text{Inflation}_3)}{(1 + \text{Inflation}_1)(1 + \text{Inflation}_2)(1 + \text{Inflation}_3)}
\]

\[
\Rightarrow \frac{\text{Forward Rate} (\$/£)}{1.65} = \frac{1.02 \times 1.025 \times 1.020}{1.03 \times 1.035 \times 1.030} \Rightarrow \text{FR (\$/£)} = 1.603
\]

73. EXTENSION OF FORWARD CONTRACT ON DUE DATE

Extension involves two steps:
(i) Cancellation Of Original Contract at rate prevailing on due date.
(ii) Entering into a new contract.
FOREIGN EXCHANGE-122

74. CANCELLATION AFTER 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 the Date when customer came for cancellation.

75. DECISION ON THE BASIS OF FORWARD & EXPECTED SPOT RATE

**Case Of Exporter**:
If Expected Spot Rate < Forward Rate : Enter Into Forward Rate
If Expected Spot Rate > Forward Rate : Donot Enter Into Forward Rate

**Case Of Importer**:
If Expected Spot Rate < Forward Rate : Donot Enter Into Forward Rate
If Expected Spot Rate > Forward Rate : Enter Into Forward Rate

76. DELIVERY ON DUE DATE

**QUESTION** On 1st June 2015 the bank enters into a forward contract for 2 months for selling US$ 1,00,000 at Rs. 65.5000. On 1st July 2015 the spot rate was Rs. 65.7500/65.2500. Calculate the amount to be debited in the customer’s account.

**SOLUTION**: The bank will apply rate originally agreed upon i.e. Rs. 65.5000 and will debit the account of the customer with Rs. 65,50,000.

77. COVERED INTEREST RATE VS UNCOVERED INTEREST ARBITRAGE

- Covered interest arbitrage is a trading strategy in which an investor uses a forward currency contract to hedge against exchange rate risk
- Uncovered interest arbitrage is an arbitrage trading strategy whereby an investor capitalizes on the interest rate differential between two countries. Unlike covered interest arbitrage, uncovered interest arbitrage involves no hedging of foreign exchange risk with the use of forward contracts or any other contract.

**EXTRA COVERAGE**
NOTE: NAME OF COUNTRIES WHERE EURO IS NOW APPLICABLE 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: The bold part can be remembered

NOTE: LIBOR : London Inter Bank Offering Rate ; MIBOR : Mumbai Inter Bank Offering Rate ; PLR : Prime Lending Rate

EXTRA COVERAGE:

<table>
<thead>
<tr>
<th>Hindi</th>
<th>International</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hazar</td>
<td>1 thousand</td>
<td>1,000</td>
</tr>
<tr>
<td>10 hazar</td>
<td>10 thousand</td>
<td>10,000</td>
</tr>
<tr>
<td>1 lakh</td>
<td>100 thousand</td>
<td>1,00,000</td>
</tr>
<tr>
<td>10 lakhs</td>
<td>1 million</td>
<td>10,00,000</td>
</tr>
<tr>
<td>1 crore</td>
<td>10 million</td>
<td>1,00,00,000</td>
</tr>
<tr>
<td>10 crores</td>
<td>100 million</td>
<td>10,00,00,000</td>
</tr>
<tr>
<td>1 arab</td>
<td>1 billion</td>
<td>1,00,00,00,000</td>
</tr>
<tr>
<td>10 arabs</td>
<td>10 billion</td>
<td>10,00,00,00,000</td>
</tr>
<tr>
<td>1 kharab</td>
<td>100 billion</td>
<td>1,00,00,00,00,000</td>
</tr>
<tr>
<td>10 kharabs</td>
<td>1 trillion</td>
<td>10,00,00,00,00,000</td>
</tr>
<tr>
<td>1 neel</td>
<td>10 trillion</td>
<td>1,00,00,00,00,00,000</td>
</tr>
<tr>
<td>10 neel</td>
<td>100 trillion</td>
<td>10,00,00,00,00,00,000</td>
</tr>
<tr>
<td>1 padam</td>
<td>1 quadrillion</td>
<td>1,00,00,00,00,00,00,000</td>
</tr>
<tr>
<td>10 padams</td>
<td>10 quadrillion</td>
<td>10,00,00,00,00,00,00,00,000</td>
</tr>
<tr>
<td>1 Shankh</td>
<td>100 quadrillion</td>
<td>1,00,00,00,00,00,00,00,00,000</td>
</tr>
<tr>
<td>10 Shankhs</td>
<td>1 quintillion</td>
<td>10,00,00,00,00,00,00,00,00,00,000</td>
</tr>
</tbody>
</table>
1. FUTURE CONTRACT-AN INTRODUCTION

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

2. TYPES OF FUTURE TRADING (CONTRACTS)

- Stock Futures (RIL, SBI, etc)
- Currency Futures (Dollar, YEN, etc)
- Commodity Futures (Gold, Silver, etc)
- Index Futures (NSE Nifty Index, Sensex, etc)

3. 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.

4. GAIN OR LOSS UNDER FUTURE CONTRACT-LONG POSITION

<table>
<thead>
<tr>
<th>Position</th>
<th>Actual Price On Expiration</th>
<th>Profit/Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
<td>Increase</td>
<td>Profit</td>
</tr>
<tr>
<td>Long</td>
<td>Decrease</td>
<td>Loss</td>
</tr>
</tbody>
</table>

5. GAIN OR LOSS UNDER FUTURE CONTRACT-SHORT POSITION

<table>
<thead>
<tr>
<th>Position</th>
<th>Actual Price On Expiration</th>
<th>Profit/Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>Increase</td>
<td>Loss</td>
</tr>
<tr>
<td>Short</td>
<td>Decrease</td>
<td>Profit</td>
</tr>
</tbody>
</table>

From the above analysis we can conclude that

**If Price rises** then the Buyer of the Future Contract Gains and Seller Of the Future Contract Losses.

**If Price falls** then the Buyer of the Future Contract losses and Seller Of the Future Contract Gains.
6. HOW SETTLEMENT IS DONE UNDER LONG POSITION

Long Position is settled by taking Short Position at the time of settlement

7. HOW SETTLEMENT IS DONE UNDER SHORT POSITION

Short Position is settled by taking Long position at the time of settlement

8. INITIAL MARGIN

- Initial Margin is the minimum amount which the buyer and seller has to maintain with their respective broker if they want to enter into a future contract.
- The Initial Margin is only a security provided by the client to the exchange. It can be withdrawn in full after the position is closed i.e after the contract expires.
- Initial Margin deposited is not an expense it is just like security deposit .
- Sometimes when initial margin is not given in question it can be calculated by using following equation:
  
  Initial Margin = Daily Absolute Changes + 3 x Standard Deviation

9. MARK TO MARKET MARGIN

It is like a profit and loss account.

10. MAINTENANCE MARGIN

- Maintenance Margin is not any account which is to be maintained. It is just a limit or deadline below which balance should not drop.
- This is lower than the initial margin. This is to ensure that if balance in the margin account falls below the maintenance margin, the investor receives a margin call and is expected to top up the margin account to the initial margin level. In other words Whenever balance fell below Maintenance Margin, we have to bring back the balance to Initial Margin. The extra fund which is deposited is known as Variation Margin or Margin Call.

Example: Initial Margin: Rs. 10,000; Maintenance Margin: Rs. 4000; Mark To Market: (i) - 2000 (ii) - 7000 (iii) + 2000 (iv) Nil
Calculate the amount (if any) which is to be deposited or which can be withdrawn by the investor?

**Solution:**

(i) **When MTM = - 2000**
Amount Of Deposit = Nil ; Amount of Withdrawl = Nil

(ii) **When MTM = - 7000**
Amount Of Deposit = 7000 ; Amount of Withdrawl = Nil

(iii) **When MTM = + 2000**
Amount Of Deposit = Nil ; Amount of Withdrawl = 2000

(iv) **When MTM = Nil**
Amount Of Deposit = Nil ; Amount of Withdrawl = Nil

**11. RULE OF WITHDRAWING**

- Investor can withdraw any amount during the period of contract from his account over and above the Initial Margin amount
- In other words, Maximum Drawing = Closing Balance - Initial Margin Amount
- Drawing must be done only if specified in question

**12. HOW TO CALCULATION A TO THE POWER B FROM CALCULATOR**

**Note:** How to solve \( a^b \) in calculator?

**Step 1:** 12 times \( \sqrt[12]{a} \)

**Step 2:** - 1

**Step 3:** \( \times b \)

**Step 4:** + 1

**Step 5:** \( \times = \) for 12 times

**Note:** Value of \( e = 2.71828 \); **Note:** Value of Log \( e = .4343 \)

**13. COST OF CARRY**

- The cost to carry, or carrying cost, are costs (or loss of income) associated with a holding a position
Cost of carry for different underlying assets

- **Underlying = physical commodity**:
  - financing interest cost
  - warehousing cost
  - insurance
  - spoilage
  - transportation charges
  - convenience yield

- **Underlying = stock (or stock index)**
  - financing interest cost
  - dividends received by stockholder

- **Underlying = bond**
  - financing interest cost
  - interest received by bondholder

**Question**: Value of Future Contract = Rs. 1005.21; Spot Price = Rs. 1000; Calculate Cost to Carry?

**Solution**: Cost to Carry = Rs. 5.21

14. **Calculation of Net Index Position in Case of More Than One Stock Hedging**

**Question (CA Final Nov., 2004)** Which net position on the index futures gives a speculator a complete hedge against the following transactions.

(i) He has a long position on the cash market of Rs. 50 lacs on the Right Ltd. The beta of the Right Ltd. is 1.25.

(ii) He has a short position on the cash market of Rs. 25 lacs on the Wrong Ltd. The beta of the Wrong Ltd. is 0.9.

(iii) He has a short position on the cash market of Rs. 20 lacs of Fair Ltd. The beta of the Fair Ltd. is 0.75.

**Solution**:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Company</th>
<th>Amount (Rs.)</th>
<th>Beta</th>
<th>Index Value (Rs.)</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Right Ltd.</td>
<td>50 lakh</td>
<td>1.25</td>
<td>62,50,000</td>
<td>Short</td>
</tr>
<tr>
<td>(ii)</td>
<td>Wrong Ltd.</td>
<td>25 lakh</td>
<td>0.90</td>
<td>22,50,000</td>
<td>Long</td>
</tr>
<tr>
<td>(iii)</td>
<td>Fair Ltd.</td>
<td>20 lakh</td>
<td>0.75</td>
<td>15,00,000</td>
<td>Long</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>25,00,000</strong></td>
<td>Short</td>
</tr>
</tbody>
</table>
15. HEDGE RATIO UNDER FUTURE CONTRACT

Hedge Ratio i.e Existing Beta for complete hedge purpose = \( r_s, f \times \frac{\sigma_s}{\sigma_f} \)

\( \sigma_s = \) Standard Deviation of the Spot Price ; \( \sigma_f = \) Standard Deviation of the Future Price

\( r_s, f = \) Correlation Coefficient between the two

16. CALCULATION OF FAIR FUTURE PRICE WHEN MORE THAN ONE DIVIDEND PAYMENT IS RECEIVED DURING CONTRACTED PERIOD

**Question:** Consider a 10 month future contract on a stock selling currently with a price of $50. Assume that the risk-free rate of interest continuously compounded for all maturities is 8% p.a.c.c, also assume that dividends of $0.75 per share are expected after three months, six months and nine months. Calculate future contract.

**Solution:**

Fair Future Price = \((\text{Spot Price} - \text{Present Value Of Dividend Income}) \times e^{r \times t} \)

\[ = (50 - 2.162) \times e^{0.08 \times 0.833} = 51.14 \]

**Working Notes:** PV of dividends

\[ = 0.75 \times e^{-0.08 \times 3/12} + 0.75 \times e^{-0.08 \times 6/12} + 0.75 \times e^{-0.08 \times 9/12} = 2.162 \]

17. INDEX TRADING

- Index futures are contracts to buy and sell a stock market index at a fixed time in the future at a price agreed upon today. So if the underlying index is the Sensex, then the futures are known as Sensex futures and if the underlying index is Nifty, then they are known as Nifty futures.
- No delivery, 100% cash settled

18. DIFFERENCE BETWEEN CONTINUOUS COMPOUNDING & NORMAL COMPOUNDING

**Example:** Present Value = Rs.100; Life-1 year; \( r = 10\% \) p.a.; What is Future Value?
Case 1- When interest is compounded annually
Future Value = 100 \times (1+.10)^1 = 110

Case 1- When interest is compounded continuously
Future Value = 100 \times e^{r \times t} = 100 \times e^{10 \times 1} = 100 \times 1.10517 = 110.517

Note: From above we can conclude that whether we use cc or nc, the answer will approximately be same.

19. WHEN TO USE CONTINUOUS COMPOUNDING & WHEN TO USE NORMAL COMPOUNDING IF QUESTION IS SILENT

If values of e is given in question in such case we should use Continuous Compounding. If values of e is not given in question in such case we should use Normal Compounding.

20. FAIR FUTURE PRICE OF SECURITIES PROVIDING NO INCOME:

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(\( \text{Number of Days} / 365 \) or Number of Months / 12)

21. FAIR FUTURE PRICE OF SECURITIES PROVIDING A KNOWN CASH INCOME IN AMOUNT (RS.)

Fair Future Value = (Spot Price – Present Value Of Expected Dividend) \times e^{rt}
Where
Where \( r \) = risk free interest rate p.a with continuous compounding;
\( t \) = time to maturity expressed in years(\( \text{Number of Days} / 365 \) or Number of Months / 12)
Present Value of Expected Dividend = Dividend \times e^{-rt}
Where
\( r \) = risk free interest rate p.a with continuous compounding;
\( t \) = period of dividend payments
22. FAIR FUTURE PRICE OF SECURITIES PROVIDING INCOME IN % OR KNOWN YIELD

Fair Future Value \( = \text{Spot Price} \times e^{(r-y) t} \)

Where \( y \) = dividend yield expressed in percentage p.a

Note: Dividend Yield is always given or calculated on a per annum basis

23. FAIR FUTURE PRICE OF SECURITIES WITH STORAGE COST EXPRESSED IN AMOUNT (RS.)

Fair Future Value = \([\text{Spot Price} + \text{Present Value Storage Cost}] \times e^{rt}\)

Note: Storage Cost are generally incurred when we are computing the future value of any commodity such as Gold.

24. FAIR FUTURE PRICE OF SECURITY WITH STORAGE COST IN %

Fair Future Value = \( \text{Spot Price} \times e^{(r+s) t} \) [ Where \( s \) = storage cost p.a expressed in % ]

25. FAIR FUTURE PRICE OF SECURITIES WITH CONVENIENCE YIELD EXPRESSED IN %

Fair Future Price = \( \text{Spot Price} \times e^{(r-c) t} \)

What is Convenience Yield:

- The benefit or premium associated with holding an underlying product or physical good.
- The extra gain that an investor receives for holding a commodity.
- For example, if one holds so many barrels of oil and there is a sudden disruption in a major pipeline, the value of the physical barrel will increase.
- It may be compared with Dividend Yield which we receive in case of shares.

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

Fair Futures Price = \([\text{Spot Price} - \text{Present Value Of Convenience Yield}] \times e^{rt}\)
27. LOT SIZE

In Futures and Option contract we buy a lot and not one or two shares. The lot size is set for each future/option contract and the lot size differs from company to company. Each deal has a market lot. Thus, if you want to enter into a futures contract in Reliance stock, you will have to buy 100 reliance shares or in multiples thereof. i.e you cannot enter a future contract for 1 or 10 reliance share.

As per current regulation Lot size is 100 shares for Infosys, 1,000 shares for SBI, 1,300 shares for HPCL, 1,100 shares for BPCL, 1,800 shares for Tata Steel, etc. The permitted lot size of S&P CNX NIFTY contracts is 100 and Sensex is 50. So if Nifty Futures is traded at 3750 then the value of one Nifty contract is Rs. 375000.

Lot size will always be given in question.

28. WHAT IS ARBITRAGE

Arbitrage means simultaneous purchase and sale of the same commodity in two different market in order to make profit from price differences between the markets.

29. HOW TO DECIDE POSITION TO BE TAKEN ON THE BASIS OF AFP AND FFP

WHEN-ACTUAL FUTURE VALUE > FAIR FUTURE VALUE

Overvalued Future Market: Take Short Position

WHEN-ACTUAL FUTURE VALUE < FAIR FUTURE VALUE

Undervalued Future Market: Take Long Position

30. WHO IS AN ARBITRAGEUR

Arbitrageur never use money from his/her own pocket
Arbitrageur always take two opposite position for any transaction
Arbitrageur never takes risk.
Arbitrageur involves buy at one end and sell at the other
On expiration date he squares both the position
Arbitrageur make money from the demand and supply mismatch of the stock market.
Arbitrageur will sell what is expensive (overvalued) and buy what is cheap (undervalued)
31. HOW TO CALCULATE ARBITRAGE PROFIT?
WHEN-ACTUAL FUTURE VALUE > FAIR FUTURE VALUE

The Actual Future price is the price that is prevailing in the market. The Theoretical Fair Future Price is the price which is calculated by using compounding technique. If Actual Future Price (AFP) is not equal to the Fair Future Price (FFP) arbitrage opportunity will emerge.

**Decision:**

<table>
<thead>
<tr>
<th>Case</th>
<th>Valuation</th>
<th>Borrow/Invest</th>
<th>Cash Market</th>
<th>Future Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Future Value &gt; Fair Future Value</td>
<td>Overvalued</td>
<td>Borrow</td>
<td>Buy</td>
<td>Sell</td>
</tr>
</tbody>
</table>

32. PRINCIPLE OF CONVERGENCE

→ The process by which the futures price and the cash price of an underlying asset approach one another as delivery date nears. The futures and cash prices should be equal on the delivery date.

33. HOW TO CALCULATE ARBITRAGE PROFIT?
WHEN-ACTUAL FUTURE VALUE < FAIR FUTURE VALUE

<table>
<thead>
<tr>
<th>Case</th>
<th>Valuation</th>
<th>Borrow/Invest</th>
<th>Cash Market</th>
<th>Future Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Future Value &lt; Fair Future Value</td>
<td>Undervalued</td>
<td>Invest</td>
<td>Sell*</td>
<td>Buy</td>
</tr>
</tbody>
</table>

* here we are assuming that arbitrageur holds one share in cash market.

34. 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.

35. WHAT IS HEDGING

Hedging is a method of reducing the risk of loss caused by price fluctuations. Hedging is taking an opposite position in two markets so that loss that may arise in one market would be compensated by a gain in another market.
36. REQUIREMENT OF HEDGING

For hedging two things are required:
(i) First Decide on Position to be taken
(ii) Decide on Value to be Hedged

37. POSITION TO BE TAKEN FOR HEDGING

If you are Short on any Security  You should go Long in Index [Sensex or Nifty]
If you are Long on any Security  You should go Short in Index [Sensex or Nifty]

38. VALUE OF INDEX TO BE HEDGED FOR COMPLETE HEDGING

The extent or value of hedging (hedge ratio) is determined by the beta of a security and value of current portfolio.
Extent Of Hedging or Total Value to be hedged or Value of Perfect Hedge = Existing Beta Of The Stock × Value Of Transaction or Value Of Exposure or Current Value Of Portfolio which requires hedging

Note: If Question is silent always assume Complete Hedging

39. OBTAINING PARTIAL HEDGE WITH THE HELP OF INDEX FUTURES AND BETA

We just learn that how to create full perfect hedge. But sometimes we may not be interested in full hedge. For instance, we may be interested only in hedging say to the extent of 75% then what should we do? Simple. We will just multiply by 75%.

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

40. VALUE OF HEDGING FOR INCREASING & REDUCING BETA TO A DESIRED LEVEL (ASSUMING LONG POSITION)

When Existing beta > Desired beta
**Objective**: Reducing Risk  
**Position To Be Taken**: Take Short Position  
Amount Of hedging Required = Value of Existing Portfolio x (Existing Beta - Desired Beta)

**When Existing beta < Desired beta**  
**Objective**: Increasing Risk  
**Position To Be Taken**: Take Long Position  
Amount Of hedging Required = Value of Existing Portfolio x (Desired Beta - Existing Beta)

41. DETERMINATION OF NUMBER OF FUTURE CONTRACTS TO BE TAKEN

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

\[
\text{Value Of Total Index Future Position} \div \text{Value Of One Index Future Contract}
\]

42. BETA OF CASH & CASH EQUIVALENT

Beta of Cash & Cash equivalent is always assumed to be zero.

43. WHEN INTEREST RATE IS COMPOUNDED ANNUALLY

Future Value = Present Value \((1 + r)^1\)

44. WHEN INTEREST RATE IS COMPOUNDED HALF YEARLY

Future Value = Present Value \(\left(1 + \frac{r}{2}\right)^2\)

45. WHEN INTEREST RATE IS COMPOUNDED QUARTERLY

Future Value = Present Value \(\left(1 + \frac{r}{4}\right)^4\)
46. WHEN INTEREST RATE IS COMPOUNDED MONTHLY

Future Value = Present Value \( \left(1 + \frac{r}{12}\right)^{12} \)

47. WHEN INTEREST IS COMPOUNDED DAILY

Future Value = Present Value \( \left(1 + \frac{r}{365}\right)^{365} \)

48. WHEN INTEREST RATE IS COMPOUNDED CONTINUOUSLY OR INFINITY

Future Value = Present Value \( \left(1 + \frac{r}{\alpha}\right)^{\alpha} = \text{Future Value} \times e^{r \times t} \)

Hence in case of Continuous Compounding we have,

Future Value = Present Value \( \times e^{r \times t} \)

Present Value = \( \frac{\text{Future Value}}{e^{r \times t}} = \text{Future Value} \times e^{-r \times t} \)

49. HOW TO SOLVE \( e^{r \times t} \) AND \( e^{-r \times t} \) BY USING TABLE

(i) Example \( e^{-0.025} \)

Solution: \( e^{-0.025} = \frac{e^{-0.02} + e^{-0.03}}{2} = \frac{.98020 + .97045}{2} = .975325 \)

(ii) Example \( e^{0} \)

Solution: \( e^{0} = 1 \)

(iii) Example \( e^{0.005} \)
Solution: \(e^{0.005} = \frac{e^0 + e^{0.01}}{2} = \frac{1 + 1.01005}{2} = 1.005025\)

(iv) Example \(e^{0.02}\)
Solution: \(e^{0.02} = 1.02020\)

(v) Example \(e^{0.0996}\)
Solution:
\[e^{0.09} = 1.09417;\]
\[e^{1.10} = 1.10517\]
For .01 increase in e's power, RHS increases by .011
For 1 increase in e's power, RHS increases by \(\frac{.011}{.01}\)
For .0096 increase in e's power, RHS increases by \(\frac{.011}{.01} \times .0096 = .01056\)
Therefore we have \(e^{0.0996}\)
\[= e^{(.09 + .0096)} = e^{0.09} + e^{0.0096} = 1.09417 + .01056 = 1.10473\text{ OR}\]
\[e^{0.0996} = 1.09417 + \frac{.011}{.01} \times .0096 = 1.10473\]

(vi) Example \(e^{-0.0166}\)
Solution:
\[e^{-0.01} = .99005;\]
\[e^{-0.02} = .98020\]
For .01 decrease in e's power, RHS decreases by .00985
For 1 decrease in e's power, RHS increases by $\frac{0.00985}{.01}$

For .0066 decrease in e's power, RHS decreases by $\frac{0.00985}{.01} \times .0066 = .006501$

Therefore we have $e^{-0.0166}$

$= e^{-0.01} - e^{0.0066} = .99005 - .006501 = .983549 \text{ OR }$

$e^{-0.0166} = .99005 - \frac{0.00985}{.01} \times .0066 = .983549$

(vii) **Example** $e^{-0.033}$

**Solution:** $e^{-0.033} = .97045 - \frac{.003}{.01} \times .00966 = .967552$

(viii) **Example** $e^{-0.09}$

**Solution:** $e^{-0.09} = .91393$

50. **DIFFERENCE BETWEEN CASH NET SETTLEMENT AND DELIVERY BASED TRANSACTIONS**

There are two types of settlements for futures contract: cash settlement and physical delivery.

Cash settlement is a settlement method where you don't have to make or take delivery of the underlying asset at the expiration of the futures contract. The parties settle by paying/receiving the loss/gain related to the contract in cash when the contract expires.

Physical delivery is a settlement method where you have to make or take delivery of the underlying asset at the expiration of the futures contract. In physically settled, the full purchase price is paid by the buyer, and the actual asset is delivered by the seller.

For example:
Company A enters into a forward contract to buy 1 million barrels of oil at $70/barrel from company B on a future date. On that future date, Company A would have to pay $70 million to company B and in exchange receive 1 million barrels of oil.

However, if the contract was cash-settled, the buyer and the seller would simply exchange the difference in the associated cash positions. Continuing from the example above, if on the settlement date the price of oil was $50 per barrel, the buyer, instead of paying the seller $70 million, would pay him $20 million and the seller would not deliver any oil to the buyer.

If, on the other hand, the price of oil was $80 per barrel, the seller would pay the buyer $10 million in cash and deliver no oil.
1. OPTION - AN UNDERSTANDING

- **In Forward Contract**: Both parties are obliged to perform
- **In Future Contract**: Both the parties are obliged to perform
- **In Option Contract**: Only one party is obliged to perform

2. TYPES OF OPTION-CALL & PUT

(i) Call Option Contract
(ii) Put Options Contract

3. PARTIES OF OPTION CONTRACT

(i) Call Option
   (i) Call Writer / Call Seller
   (ii) Call Holder/Call Buyer

(ii) Put Option
   (i) Put Writer / Put Seller
   (ii) Put Holder/Put Buyer

4. MEANING OF BUYERS AND SELLERS IN OPTION CONTRACT

- Buyer and Seller is determined from the viewpoint 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 an obligation to perform their contract if buyer decides to exercise their right.

5. 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 seller a price. This is called Option Premium.
- The premium payable by the buyer to the seller is a one-time deposit non-refundable non-adjustable amount.
- Option Premium is cost from the viewpoint of holders (buyers) and income from the viewpoint of writers (sellers)
6. TYPES OF RIGHT

Right To Buy Shares - Call Buyer
Right To Sell Shares - Put Buyer

7. RULE OF EXERCISING - FOR CALL BUYER

IF Cash Market Price as on expiry > Exercise Price  Call Buyer Will Exercise
IF Cash Market Price as on expiry < Exercise Price  Call Buyer Will Not Exercise

8. RULE OF EXERCISING :- FOR CALL SELLER

It may be noted that under Option Chapter, Call Seller has no right to exercise. It is the buyer who has a right whether he wants to exercise or not.

9. PAY OFF/PROFIT & LOSS OF A CALL BUYER

Pay off means Profit and Loss.

**Call Option** :

**Profit : When Cash Market Price As On Expiry > Strike Price**
In such case Call Buyer will exercise the Option.
Net Profit = Cash Market Price As On Expiry - Strike Price - Option Premium

**Loss : When Cash Market Price As On Expiry < Strike Price**
In such case Call Buyer will not exercise the option.
His loss is limited to the amount of Call Premium. i.e Loss = Amount Of Premium Paid

10. PAY OFF/PROFIT & LOSS OF A CALL SELLER

The position of Call Seller will just be opposite of Call Buyer.

11. IN / OUT / AT THE MONEY OPTION - FOR CALL BUYER

<table>
<thead>
<tr>
<th>Market Scenario</th>
<th>IN / OUT / AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Market Price as on expiry</td>
<td>In the Money</td>
</tr>
<tr>
<td>&gt; Strike Price</td>
<td></td>
</tr>
<tr>
<td>Cash Market Price as on expiry</td>
<td>Out Of The Money</td>
</tr>
<tr>
<td>&lt; Strike Price</td>
<td></td>
</tr>
<tr>
<td>Cash Market Price as on expiry</td>
<td>At The Money</td>
</tr>
<tr>
<td>= Strike Price</td>
<td></td>
</tr>
</tbody>
</table>
Note: The above position is reversed for the Writer of the Option.

12. PRESENTATION OF PAY-OFF GRAPH FOR CALL BUYER & SELLER

13. BREAK EVEN PRICE OF CALL 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 Call Option:
  Exercise Price + Option Premium

14. POINT OF MAXIMUM PROFIT & LOSS- FOR CALL BUYER & SELLER

Call Buyer maximum loss--the amount of premium paid
Call Seller maximum profit will be equal to the amount of premium received
Call Buyer maximum profit will be unlimited
Call Seller maximum loss will be unlimited

15. RULE OF EXERCISING-FOR PUT BUYER

IF Cash Market Price as on expiry > Exercise Price Put Buyer Will Not Exercise
IF Cash Market Price as on expiry < Exercise Price Put Buyer Will Exercise

16. RULE OF EXERCISING :- PUT SELLER

It may be noted that under Option Chapter, Put Seller has no right to exercise. It is the buyer who has a right whether he wants to exercise or not.
17. PAY OFF/PROFIT & LOSS OF A PUT BUYER

Pay off means Profit and Loss.

**Put Option:**

**Profit:** When Cash Market Price As On Expiry < Strike Price

In such case Put Buyer will exercise the option.

Net Profit = Strike Price - Cash Market Price as on expiry - Option Premium

**Loss:** When Cash Market Price As On Expiry > Strike Price

In such case Put Buyer will not exercise the Option.

His Loss will be limited to the amount of premium.

18. PAY OFF/PROFIT & LOSS OF A PUT SELLER

The position of Put Seller will just be opposite of Put Buyer.

19. IN / OUT /AT THE MONEY OPTION-FOR PUT BUYER

<table>
<thead>
<tr>
<th>Market Scenario</th>
<th>IN/OUT/AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Market Price as on expiry &gt; Strike Price</td>
<td>Out Of The Money</td>
</tr>
<tr>
<td>Cash Market Price as on expiry &lt; Strike Price</td>
<td>In the Money</td>
</tr>
<tr>
<td>Cash Market Price as on expiry = Strike Price</td>
<td>At The Money</td>
</tr>
</tbody>
</table>

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

20. BREAK EVEN PRICE OF PUT OPTION

Break-even 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 – Option Premium

21. POINT OF MAXIMUM PROFIT & LOSS- FOR PUT BUYER & SELLER

- Put Buyer **maximum loss** is the amount of premium paid
- Put Seller **maximum profit** will be equal to the amount of premium received
- Put Buyer **maximum profit** will be equal to Strike Price - Premium Paid
- Put Seller **maximum loss** will be Strike Price - Premium Received
22. PRESENTATION OF PAY-OFF GRAPH FOR PUT BUYER & SELLER

PUT BUYER

PUT SELLER

23. POSITION TO BE TAKEN IN OPTION MARKET - AS PER INVESTOR’S EXPECTATION - CALL

<table>
<thead>
<tr>
<th>Expectation</th>
<th>Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Expected Market Price As On Expiry &gt; EP or If Market will go up</td>
<td>Buy Call</td>
</tr>
<tr>
<td>If Expected Market Price As On Expiry &lt; EP or If Market will go down</td>
<td>Sell Call</td>
</tr>
<tr>
<td>If Expected Market Price As On Expiry = EP or If Market will remain same</td>
<td>No action</td>
</tr>
</tbody>
</table>
24. POSITION TO BE TAKEN IN OPTION MARKET-
AS PER INVESTOR'S EXPECTATION-PUT

<table>
<thead>
<tr>
<th>Expectation</th>
<th>Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Expected Market Price As On Expiry &gt; EP or If Market will go up</td>
<td>Sell Put</td>
</tr>
<tr>
<td>If Expected Market Price As On Expiry &lt; EP or If Market will go down</td>
<td>Buy Put</td>
</tr>
<tr>
<td>If Expected Market Price As On Expiry = EP or If Market will remain same</td>
<td>No action</td>
</tr>
</tbody>
</table>

25. OPTION STRATEGIES

- An Option Strategy can be developed by anyone keeping in view risk and return.
- Combinations of Option Contracts are called Option Strategies.
- The combination could be multiple puts, multiple calls or mix of puts and calls.
- Some of the popular Option Strategies are as follows:

26. STRADDLES

- Straddle can be of two types:
  1. **Long Straddle**
     - Buying a Call and 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 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.
     - If question is silent always assume Long Straddle.

27. STRIPS

- A strips involves buying one call and 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.

28. STRAPS
A **strap** involves buying the two calls and 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.

### 29. MEANING OF LONG & SHORT POSITION UNDER OPTION CHAPTER

- **Long Call** means Call Buyer
- **Long Put** means Put Buyer
- **Short Call** means Call Seller
- **Short Put** means Put Seller

### 30. CASH VS DERIVATIVE CONTRACTS-PROFIT & LOSS FLUCTUATION

By Futures and Option we can have huge profits with low initial investment. But at the same time we can also have huge losses. Therefore Future and Option can be termed as attractive as well as dangerous. Hence it should be treated with great caution and only investors who understand this attributes should speculate with futures and options.

### 31. 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

**Note**: The concept of EUROPEAN & AMERICAN OPTION is only Theoretical and no practical relevance.

**Note**: PE means European Put; CE means European Call; PA means American Put; CA means American Call

### 32. BUTTERFLY SPREAD - HOW TO CONSTRUCT

- 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 i.e at Average EP, all the options have same expiry date.

**GRAPH OF BUTTERFLY SPREAD**

![Butterfly Spread Options Strategy](image)

**MAXIMUM LOSS UNDER BUTTERFLY SPREAD**
The formula for calculating maximum loss is given below: Max Loss = Net Premium Paid

**MAXIMUM PROFIT UNDER BUTTERFLY SPREAD**
The formula for calculating **maximum profit** is given below:
Max Profit = Strike Price of Short Call - Strike Price of Lower Strike Long Call - Net Premium Paid
Max Profit Achieved When Actual Market Price As On Expiry = Strike Price of Short Calls OR Avg EP

**BREAK-EVEN POINT OR BREAK-EVEN MARKET PRICE UNDER BUTTERFLY SPREAD**
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

**33. EXPIRATION DATE CASH FLOW**
Whenever Question ask us to calculate Expiration Date Cash Flow then in such case our answer will be:
Exercise Price if contract is exercised and
Zero if contract is not exercised

34. DETERMINATION OF FAIR OP

Fair OP may be calculated
ON EXPIRY : For Call & For Put
BEFORE EXPIRY : For Call & For Put

35. FAIR VALUE/PREMIUM/PRICE OF CALL OPTION AS ON EXPIRY

Value(Premium) of Call Option at expiration
= Maximum of ( Cash Market Price As On Expiry - Strike Price , 0)

36. FAIR VALUE/PREMIUM/PRICE OF PUT OPTION AS ON EXPIRY

Value(Premium) of Put Option at expiration
= Maximum of ( Strike Price - Cash Market Price As On Expiry , 0)

37. FAIR VALUE OF CALL OPTION BEFORE EXPIRY DATE
MINIMUM THEORETICAL PRICE OF CALL OPTION

Theoretical Minimum Value of Call Option :
= Spot Price – Present Value of Strike Price =Spot Price – Strike Price \times e^{-rt}

38. FAIR VALUE OF PUT OPTION BEFORE EXPIRY DATE:
MINIMUM THEORETICAL PRICE OF PUT OPTION

Theoretical Minimum Value of Put Option :
= Present Value of Strike Price – Current Market Price
=Strike Price \times e^{-rt} – Current Market Price

39. ARBITRAGE IN OPTION CONTRACT-BASIC UNDERSTANDING
ARBITRAGE OPPORTUNITY
Arbitrage may be calculated

ON EXPIRY: For Call & For Put
BEFORE EXPIRY: For Call & For Put

40. ARBITRAGE OPPORTUNITY UNDER OPTION MARKET - BEFORE EXPIRY-ON CALL

Actual Premium < Fair Premium
Undervalued
Buy Call Option
Sell Share in Cash Market * [assuming already holding shares]
Invest

41. ARBITRAGE OPPORTUNITY UNDER OPTION MARKET - BEFORE EXPIRY-ON PUT

Actual Premium < Fair Premium
Undervalued
Buy Put Option
Buy Share in Cash Market
Borrow

42. ARBITRAGE OPPORTUNITY UNDER OPTION MARKET - ON EXPIRY-ON CALL

Actual Premium < Fair Premium
Undervalued
Buy Call Option
Sell in Cash Market * [assuming already holding shares]
Actual Premium > Fair Premium
Overvalued
Sell Call Option
Buy in Cash Market

43. 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

**44. RISK NEUTRAL METHOD-FOR CALL**

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

**45. HOW TO CALCULATE PROBABILITY**

Alt 1 : \( p = \frac{\text{Spot Price} \times (1 + \text{Interest Rate}) - \text{Lower Price}}{\text{Higher Price} - \text{Lower Price}} \)

Alt 2 : \( p = \left[ \frac{1 + r - d}{u - d} \right] \)

Where \( u = 1 + \% \text{ change in asset price if prices go up} \) i.e. \( S_1 \div S \)
Where \( d = 1 - \% \text{ change in asset price if prices go down} \) i.e. \( S_2 \div S \)
\( r = \text{rate of interest adjusted as per option period}. \) 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 \( P_1 \) and \( P_2 \) are the probability of price increase and price decrease.

\( S = \text{Current Market Price}; S_1 = \text{Higher Price}; S_2 = \text{Lower Price} \)

\( C_1 = \text{Fair/Value/Premium of Call Option as on expiry at Higher Price} \) i.e. \( \text{Max} \left[ S_1 - \text{Exercise Price}, 0 \right] \)

\( C_2 = \text{Fair/Value/Premium of Call Option as on expiry at Lower Price} \) i.e. \( \text{Max} \left[ S_2 - \text{Exercise Price}, 0 \right] \)

**Note:** In place of nc (normal compounding) we could have used cc (continuous compounding) as per the requirement of question.
46. RISK NEUTRAL APPROACH :- FOR PUT

~ Same as Call

47. EXPECTED GAIN APPROACH - FOR CALL

~ This concept is similar to Risk Neutral Approach For Call. However in this case
   1. More than two CMP as on expiry will be given
   2. Probability of each CMP as on expiry will be given

48. EXPECTED GAIN APPROACH - FOR PUT

~ This concept is similar to Risk Neutral Approach For Put. However in this case
   1. More than two CMP as on expiry will be given
   2. Probability of each CMP as on expiry will be given

49. CONSTRUCTION OF BIONOMIAL TREE & CALCULATION OF OPTION PREMIUM AT EACH NODES

~ Under this concept, a Bionomial Tree is constructed by taking each increase and decrease outcome.
~ Also Option Premium is calculated at each node by taking probability or Joint Probability as the case may be.

50. DIFFERENCE BETWEEN FUTURES AND OPTIONS

Futures and options are two basic types of derivatives. Both can be used as hedging instruments. However, the two differ as follows:
   (i) The futures involve obligation while the options involve right. In futures, the obligation must be fulfilled by both the parties, but in case of options only one party has obligation to perform the contract.
   (ii) In the futures, there is no premium payable. But in case of options, the option buyer has to pay a premium to buy the option.

51. PUT CALL PARITY THEORY (PCPT)
This is a general relationship between Premium of Call and Premium of Put.
Both Call and Put Option should have same exercise price and same maturity
Symbolically: As per PCPT we have:
OP Of Call As On Today + Present Value of Strike Price = OP of Put As On Today + Current Market Price
If Put Call Parity theory do not hold then arbitrage opportunity is possible.
i.e If LHS ≠ RHS Arbitrage Opportunity is possible.

52. PCPT ARBITRAGE

As per PCPT we have:
OP of Call As On Today + Present Value of Strike Price = OP of Put As On Today + Current Market Price
If Put Call Parity theory do not hold good then arbitrage opportunity is possible. i.e If LHS ≠ RHS Arbitrage Opportunity is possible.
How to do Arbitrage:
If LHS = RHS No Arbitrage
If LHS > RHS Arbitrage Opportunity is possible
Value: Call Premium is Overvalued & Put Premium is Undervalued
Option Market: Sell Call Option and receive Option Premium & Buy Put Option and pay Option Premium
Cash Market: Buy one share in Cash Market as on today.
Borrow/Invest: Borrow the net amount required
If LHS < RHS Arbitrage Opportunity is possible
Value: Call Option is Undervalued & Put Option is Overvalued
Option Market: Buy Call Premium and Pay Option Premium & Sell Put Premium and receive Option Premium
Cash Market: Sell one share in Cash Market as on today. [Assuming we hold the required shares]
Borrow/Invest: Invest the net amount available.

53. FACTORS AFFECTING DETERMINATION OF PREMIUM OF OPTION-
FOR CALL
Current Market Value/Spot Value:

<table>
<thead>
<tr>
<th>Type of Option</th>
<th>IF Market Price Increases</th>
<th>IF Market Price Decreases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Option</td>
<td>OP Increases</td>
<td>OP Decreases</td>
</tr>
</tbody>
</table>

Exercise / Strike Price (EP):

<table>
<thead>
<tr>
<th>Type of Option</th>
<th>IF Exercise Price Increases</th>
<th>IF Exercise Price Decreases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Option</td>
<td>OP Decreases</td>
<td>OP Increases</td>
</tr>
</tbody>
</table>

54. FACTORS AFFECTING DETERMINATION OF VALUE OF OPTION - FOR PUT

Current Market Value/Spot Value:

<table>
<thead>
<tr>
<th>Type of Option</th>
<th>Market Price Increases</th>
<th>Market Price Decreases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put Option</td>
<td>OP Decreases</td>
<td>OP Increases</td>
</tr>
</tbody>
</table>

Exercise / Strike Price (EP):

<table>
<thead>
<tr>
<th>Type of Option</th>
<th>Exercise Price Increases</th>
<th>Exercise Price Decreases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put Option</td>
<td>OP Increases</td>
<td>OP Decreases</td>
</tr>
</tbody>
</table>

Below is a table summarising the factors that have an impact on the price of options:-

<table>
<thead>
<tr>
<th>Factor (higher value)</th>
<th>Call Option Price</th>
<th>Put Option Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Price</td>
<td>Up</td>
<td>Down</td>
</tr>
<tr>
<td>Strike Price</td>
<td>Down</td>
<td>Up</td>
</tr>
<tr>
<td>Time to Expiration</td>
<td>Up</td>
<td>Up</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>Up</td>
<td>Down</td>
</tr>
<tr>
<td>Volatility</td>
<td>Up</td>
<td>Up</td>
</tr>
<tr>
<td>Expected Dividend Rate</td>
<td>Down</td>
<td>Up</td>
</tr>
</tbody>
</table>

55. INTRINSIC VALUE AND TIME VALUE OF OPTION-CALL

Option Premium is the component of two parts: Intrinsic Value + Time Value of Money

**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 As On Today-Exercise Price);

**Time Value of Option:**

- Time Value of Option is the amount by which the option price exceeds the Intrinsic Value.
- On the expiration date, the time value of option is zero and the premium is entirely
represented by the Intrinsic Value.

\[ \text{Time Value of Option} = \text{Option Premium} - \text{Intrinsic Value} \]

56. **INTRINSIC VALUE AND TIME VALUE OF OPTION - PUT**

\[ \text{Intrinsic Value of Put Option} = \max(0, \text{Exercise Price} - \text{Current Market Price}) \]

\[ \text{Time Value of Option} = \text{Option Premium} - \text{Intrinsic Value} \]

**Example:** If Wipro stock is selling at Rs 105, and Call Option on Wipro stock is Rs 100, then Intrinsic Value of Wipro stock is Rs 5 (Rs 105-100). Again if Wipro stock is selling at Rs 105 and Put Option on Wipro is Rs 100 then Intrinsic Value will be zero (Rs 100-Rs 105=-5) as it cannot be negative.

**Example:** If Wipro stock’s current market price is Rs. 20 Exercise Price is Rs. 100. Call Option Premium on wipro stock is Rs 25. Then the time value of option in such case will be Rs 5 (Option Premium Rs 25-Intrinsic Value Rs 20=Time Value Rs 5)

57. **BLACK & SCHOLES MODEL-FOR CALL**

\[ \text{Value or Premium Of Call Option} = \text{Spot Price} \times N(d_1) - \text{Exercise Price} \times e^{-rt} \times N(d_2) \]

58. **STEPS FOR CALCULATING N(D1) & N(D2)**

1. First Calculate d1 & d2
2. Then calculate N(d1) & N(d2) using N(d1) and N(d2) tables or Z-tables

59. **HOW TO CALCULATE D1 & D2**

\[ d_2 = \frac{\ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) + [r + 0.5\sigma^2] \times t}{\sigma \times \sqrt{t}} \]

\[ d_2 = d_1 - \sigma \sqrt{t} \]

\( \sigma \) = Standard Deviation

\( t \) = remaining life to expiration of the option in terms of year for example for a call option
of 6 months \( t = 0.5 \), for a call option of 73 days \( t = \frac{73}{365} \)

\( r \) = continuous compounded risk free annual rate of return

\( \ln \) = Natural Log

### 60. BLACK & SCHOLES MODEL - FOR PUT

Value/Premium Of Put

\[
= \text{Strike Price} \times \left[ 1 - N(d_2) \times e^{-r \times t} \right] - \text{Current Market Price} \times \left[ 1 - N(d_1) \right]
\]

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

### 61. BLACK & SCHOLES MODEL - WHEN DIVIDEND AMOUNT IS GIVEN

As per BSM Model: Value of Call Option

\[
= \text{Adjusted Current Price} \times N(d_1) - \text{Exercise Price} \times e^{-r \times t} \times N(d_2)
\]

Where

\[
d_1 = \frac{\ln \left( \frac{\text{Adjusted Current Market Price}}{\text{Exercise Price}} \right) + [r + 0.50 \sigma^2] \times t}{\sigma \times \sqrt{t}}
\]

\[
d_2 = d_1 - \sigma \sqrt{t}
\]

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

### 62. DIFFERENCE BETWEEN CALL BUYER AND CALL SELLER

<table>
<thead>
<tr>
<th>CALL BUYER</th>
<th>CALL SELLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay Premium</td>
<td>Receive Premium</td>
</tr>
<tr>
<td>Purchase Right</td>
<td>Sell Right</td>
</tr>
<tr>
<td>Buy Share</td>
<td>Sell Share</td>
</tr>
</tbody>
</table>

### 63. DIFFERENCE BETWEEN PUT BUYER AND PUT SELLER
64. HEDGE RATIO OR DELTA

\[ \Delta = \frac{\text{Change in Option Premium}}{\text{Change in Price of Underlying Asset}} = \frac{C_1 - C_2}{S_1 - S_2} \]

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

65. CALCULATION OF OPTION PREMIUM FOR CALL UNDER BINOMIAL MODEL - HEDGE RATIO TECHNIQUE

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

Where,

\[ \Delta / \text{Hedge Ratio/Option Delta} = \]

\[ \frac{\text{Value of Call On Expiry At High Price} - \text{Value of Call On Expiry At Low Price}}{\text{High Price} - \text{Low Price}} \]

\[ = \frac{C_1 - C_2}{S_1 - S_2} \]

**Amount Of Borrowings:**

\[ B = \frac{1}{1 + r} (\Delta S_2 - C_2) \]

66. WHAT IS PERFECTLY HEDGED SITUATION OR HOW TO ACHIEVE A PERFECTLY HEDGED POSITION

Perfectly Hedged situation [i.e No Profit No Loss] can be achieved by selling a call option and purchasing a few number of equity shares and borrow the required amount.

**Note:** Delta is the number of shares which makes the portfolio perfectly hedged i.e
whether the stock price on maturity goes up or decline the value of portfolio does not vary i.e our profit n loss position will be zero.

67. VALUE OF HOLDING OR CASH FLOW POSITION AS ON EXPIRY UNDER HEDGE RATIO TECHNIQUE

If Share Price as on expiry is $S_1$ [ i.e Higher Price ] Call will be exercised

Loss on Call Option sold : $S_1 - \text{Strike Price }$ xxx

Amount Received by Selling $\Delta$ Shares : $\Delta \times S_1$ xxx

Cash Inflow xxx

If Share Price as on expiry is $S_2$ [ i.e Lower Price ] [ Call will not be exercised ]

Loss on Call Option sold : Nil

Amount Received by Selling $\Delta$ Shares : $\Delta \times S_2$ xxx

Cash Inflow xxx

In both the cases our Cash Flows will be same.

68. CALCULATION OF AMOUNT OF BORROWING UNDER HEDGE RATIO TECHNIQUE

\[ \text{Amount Of Borrowings} : B = \frac{1}{1 + r} (\Delta S_2 - C_2) \text{ or } \frac{1}{1 + r} (\Delta S_1 - C_1) \]

Where \( r \) = rate of interest adjusted for periods for example if rate of interest is 10% pa and we are asked to calculate 6 month option premium, then we have to adjust 10% pa for 6 month i.e we will take 5%.

OPTIONS GREEKS

69. THETA

\( \Theta \) 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 \( \text{Theta} = \frac{\text{Change in Option Premium}}{\text{Change in Time to Expiry}} \)

70. RHO

\( \text{Rho (Sensitivity to Change in Interest Rate)} \): It is the rate of change in option price with respect to change in interest rate.

It is calculated as:\( \text{Rho} = \frac{\text{Change in Option Premium}}{\text{Change in Rate of Interest}} \)

71. GAMMA

\( \text{Gamma (Sensitivity to Change in Delta)} \): 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:\( \text{Gamma} = \frac{\text{Change in Delta}}{\text{Change in Price of Underlying Asset}} \)

72. VEGA

\( \text{Vega (Sensitivity to Change in Volatility of Asset Price)} \): It is a measure of rate of change in option price with respect to the percentage change in volatility.

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

73. HOW TO CALCULATE \( N(d_1) \) AND \( N(d_2) \) BY USING \( N(D1) \) AND \( N(D2) \) TABLE

Example: \( d_1 = .76 \) and \( d_2 = .55 \)

Solution: \( N(d_1) = N(.76) = .776373 \) and \( N(d_2) = N(.55) = .708804 \)

Example: \( d_1 = -.49 \) and \( d_2 = -.42 \)

Solution: \( N(d_1) = N(-.49) = .312067 \) and \( N(d_2) = N(-.42) = .337243 \)
Example: \( d_1 = .4539 \) and \( d_2 = .4744 \)

Solution: \( d_1 = .4539 \)

This cannot be calculated directly by looking at the table. In such case we will use interpolation method.

For \( d_1 = .45 \) \( N(.45) = .673645 \)

For \( d_1 = .46 \) \( N(.46) = .677242 \)

When LHS increases by .01, RHS increases by .003597

When LHS increases by 1, RHS increases by \( \frac{.003597}{.01} \)

When LHS increases by .0039, RHS increases by \( \frac{.003597}{.01} \times .0039 = .001403 \)

Hence for \( d_1 = .4539 \), \( N(.4539) = N(.45) + N(.0039) = .673645 + .001403 = .675048 \)

\( d_2 = .4744 \)

This cannot be calculated directly by looking at the table. In such case we will use interpolation method.

For \( d_1 = .47 \) \( N(.47) = .680822 \)

For \( d_1 = .48 \) \( N(.48) = .684386 \)

When LHS increases by .01, RHS increases by .003564

When LHS increases by 1, RHS increases by \( \frac{.003564}{.01} \)

When LHS increases by .0044, RHS increases by \( \frac{.003564}{.01} \times .0044 = .001568 \)

Hence for \( d_1 = .4744 \), \( N(.4744) = N(.47) + N(.0044) = .680822 + .001568 = .682390 \)

74. HOW TO CALCULATE \( N(d1) \) & \( N(d2) \)-BY USING Z-TABLE

Example: Using \( N(d1) \) and \( N(d2) \) Table

(i) \( d_1 = .70 \) ; \( d_2 = .50 \) \( N(d1) = N(.70) = .758036 \); \( N(d2) = N(.50) = .691462 \)

(ii) \( d_1 = -1.31 \) ; \( d_2 = -1.49 \) \( N(d1) = N(-1.31) = .095098 \); \( N(d2) = N(-1.49) = .068112 \)
Example: Using Normal Distribution Curve or Z-Table:
(i) \( d_1 = .70 \); \( d_2 = .50 \)
\[
N(d_1) = N(.70) = .50 + .258036 = .758036; N(d_2) = N(.50) = .50 + .191462 = .691462
\]
(ii) \( d_1 = -1.31 \); \( d_2 = -1.49 \)
\[
N(d_1) = N(-1.31) = .50 - .404902 = .095098; N(d_2) = N(-1.49) = .50 - .431888 = .068112
\]

75. HOW TO CALCULATE \( \ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) \)

Example: Current Market Price is Rs. 60 and Exercise Price is Rs. 50.

Calculate \( \ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) \)?

Solution: It can be calculated by using \( \ln \) [Natural Log] table [whose base is e], just in the same manner as we used to calculate value of e or \( N(d_1) \)

\[
\ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) = \ln \left( \frac{60}{50} \right) = \ln [1.071] = .06862
\]

Note: Option Value can never be negative. The reason being Option cannot impose a liability on the holder Option will be exercised only in a profitable position and hence will command only a positive price.

76. GAIN OR LOSS - IN CASE OF INCREASE AND DECREASE IN OP

When OP Increases- Call Buyer/Put Buyer Gains
When OP Decreases- Call Seller/Put Seller Gains

77. CALCULATE DIFFERENCE IN OP OF CALL AND OP OF PUT

OP Of Call As On Today - OP of Put As On Today = Current Market Price - Present Value of Strike Price
CURRENCY FUTURES & OPTIONS

1. CURRENCY FUTURES

- It is a contractual agreement between a buyer and a seller for the purchase and sale of a particular currency at a specified future date at a predetermined price.
- It is same as Stock Futures. The only difference is that in this case in place of Stock, here we use to take currency.

2. 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
- It is same as Stock Options. The only difference is that in this case in place of Stock, here we use to take currency.

3. STRADDLE STRATEGY UNDER FOREX

- Straddle can be of two types: 1. Long Straddle 2. Short Straddle
- If question is silent always assume Long Straddle.
- Refer Option Chapter for more detail.

4. WHEN OPPORTUNITY COST OF PREMIUM PAID IS CONSIDERED

- In such case OP inclusive of Opportunity Cost should be considered i.e Option Premium + Opportunity Cost Of Option Premium

5. BREAKEVEN MARKET PRICE FOR CALL - TAKING OPPORTUNITY COST OF PREMIUM PAID

- Breakeven Position For Call is:
  = EP + OP Paid Today + Opportunity Cost Of Premium Paid

6. DIFFERENCE BETWEEN FORWARD FUTURE OPTIONS
### Features
<table>
<thead>
<tr>
<th></th>
<th>Forward</th>
<th>Future</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardization (lot size)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquidity</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Obligation to perform</td>
<td>Both Parties</td>
<td>Both Parties</td>
<td>Writer</td>
</tr>
<tr>
<td>Profit Settlement</td>
<td>End of Contract</td>
<td>MTM</td>
<td>MTM</td>
</tr>
<tr>
<td></td>
<td>No MTM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation</td>
<td>RBI Regulation</td>
<td>Stock Exchange/SEBI</td>
<td>Stock Exchange /SEBI</td>
</tr>
<tr>
<td>OTC or Exchange Traded</td>
<td>OTC</td>
<td>Exchange Traded</td>
<td>Exchange Traded</td>
</tr>
<tr>
<td>Settlement</td>
<td>On Maturity</td>
<td>On or Before Maturity</td>
<td>On or Before Maturity</td>
</tr>
</tbody>
</table>

#### 7. ADJUSTMENT OF EXPOSURE UNCOVERED DUE TO ROUNDDING OFF

- Sometimes due to rounding off some foreign exchange exposure remains uncovered.
- Such exposure arises due to lot size requirement.
- Such treatment is normally done in case of Option Contract.
- It is normally advisable to take Forward Contract for the uncovered part as there is no lot size requirement in Forward Contract.

#### 8. HOW TO DECIDE POSITION TO BE TAKEN IN CASE OF CURRENCY FUTURE & OPTION

**Question** XYZ Ltd. is an export oriented business house based in Mumbai. The Company invoices in customer's currency. Its receipt of US $1,00,000 is due on September 1, 2005. Market information as at June, 1, 2005.

**Currency Futures**

US$/Rs. 0.02118  
Contract Size Rs. 4,72,000  

Decide position to be taken?

**Solution:**  
LONG Position must be taken in Rs.

**Question** XYZ Ltd. a US firm will need £ 3,00,000 in 180 days. In this relation, the following information is available:

A option on £ that expires in 180 days has an exercise price of $ 1.97 and a premium of $ 0.04.
Determine position to be taken under Option Contract?

**Solution:**
Call Option position must be taken in Pound

### 9. EFFECTIVE RATE OF REALIZATION

**Question:**
Amount Received in Dollar = $1,00,000
Amount Received in Rs. when Future Contract is taken = Rs. 50,00,000
What is effective rate of realization?

**Solution:**
$1,00,000 = Rs. 50,00,000 or $1 = Rs. 50
1. INTRODUCTION

Leasing is a process of financing the cost of an asset. It is the method of financing where huge Capital Outlays are substituted by periodical rental payments. In other words, a lease is an agreement whereby one party (i.e., the owner of an asset) grants the other party, the right to use the asset, in return for a periodic payment.

Leasing all over the world is becoming an important source of financing assets.

2. 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.

3. TREATMENT OF DEPRECIATION

Depreciation can be calculated in the following manner:
(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.

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

4. TREATMENT OF SALVAGE VALUE - WDV - IN CASE OF PROFIT

Adjusted Salvage Value = Salvage Value - Profit On Sale x Tax Rate
5. TREATMENT OF SALVAGE VALUE-WDV -IN CASE OF LOSS

Adjusted Salvage Value = Salvage Value + Loss On Sale x Tax Rate

6. TREATMENT OF SALVAGE VALUE-SLM

Salvage Value is not adjusted for tax under SLM unless otherwise stated.

7. TREATMENT OF TAXATION

All cash inflows and outflows which are a part of Profit and Loss account should be taken after tax.

8. 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
Alt 1: Either at the end of each year [Normally preferred in case of Leasing Chapter]
Alt 2: At the beginning of each year

9. PARTIES UNDER LOAN AGREEMENT

There are two parties under loan agreement
1. Borrower:
   Borrower will take loan
   Borrower will be the user as well as the owner of the assets
   Borrower will be entitled to Charge depreciation and will receive Salvage value
2. Bank
   Bank will give loan
   Bank will be neither be a user or nor the owner of the assets
   Bank will be not Charge depreciation and will not receive Salvage value

10. LESSEE VS BORROWER

Calculate Present Value Of Outflow under both the option separately by using the discount rate and choose such option which involves least outflow.
11. EVALUATION FOR LESSEE

Lessee should choose such option which will minimize its Outflow and maximize its Inflow. He should generally undertake the following steps for taking decision:

**Step 1:** He should first evaluate its inflow and outflow under both the option given in question.

**Major Outflow Under Leasing Option:**
(i) Lease Rent Paid Net Of Tax

**Major Inflow Under Leasing Option:**
No major inflow for lessee

There may be other inflow and outflow which, if given in question, must be also taken into account.

**Step 2:** Discount Rate: \( K_d = \text{Interest Rate} \times (1 - \text{Tax}) \)

**Step 3:** Calculate [Present Value Of Cash Outflow (PVCO)](PVCO) by using the discount rate.

---

12. EVALUATION FOR BORROWER

Borrower should choose such option which will minimize its Outflow and maximize its Inflow. He should generally undertake the following steps for taking decision:

**Step 1:** He should first evaluate its inflow and outflow under both the option given in question.

**Major Outflow Under Borrowing Option:**
(i) Interest Paid Net Of Tax
(ii) Principal Repayment

**Major Inflow Under Borrowing Option:**
(i) Tax Saving On Depreciation
(ii) Salvage Value Adjusted for Tax on Capital Gain/Loss
Step 2: Discount Rate: \( K_d = \text{Interest Rate} \times (1 - \text{tax}) \)

Step 3: Calculate Present Value Of Cash Outflow (PVCO) by using the discount rate.

13. BREAKEVEN LEASE RENTALS
FROM THE VIEWPOINT OF LESSEE:

⇒ The break even lease rental is the rental at which the lessee is indifferent to a choice between lease financing and borrowing option.
⇒ At Breakeven Lease Rental:
PV Of Cash Outflow Under Loan Option = PV Of Cash Outflow Under Lease Option

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

⇒ While deciding whether to give asset on Lease or not, Lessor should undertake following steps

Step 1: He should first evaluate the inflows and outflows

**Major Outflow**: Cost Of Asset

**Major Inflow**: Lease Rental Received Net Of Tax, Tax Saving on Depreciation, Salvage Value adjusted for tax.

Step 2: Discount Rate: \( K_o = \text{Cost Of Capital} \)

Step 3: Calculate NPV

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

15. INTERNAL RATE OF RETURN FOR LESSOR

⇒ 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

\[
K_o = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in rates}
\]
16. **CALCULATION OF ANNUAL LEASE RENT TO BE CHARGED BY LESSOR PROVIDED DISCOUNT RATE IS GIVEN**

In the given case following equation should be used for calculating Annual Lease Rent:

\[
\text{Present Value Of Cash Outflow For Lessor} = \text{Present Value Of Cash Inflow For Lessor}
\]

17. **EQUAL ANNUAL PLAN:**

In this plan, equal amount of lease rental is paid every year.

18. **STEPPED UP PLAN:**

In this plan, lease rental is increased by a particular percentage every year.

19. **DEFERRED PLAN:**

In this plan, lease rentals for few year is deferred i.e not paid and thereafter it is paid accordingly to the terms of contract.

20. **BALLOONED PLAN:**

Under Ballooned Plan, lease rentals are fixed in such a manner that there will be small receipt in initial years and later on lumpsum big receipt ( huge amount ) is received.

21. **CALCULATION OF DIMINISHING LEASE RENTAL/REDUCING LEASE RENTAL PLAN**

In the given case Lease Rent will be reduced every year according to the requirement given in the question.

**Example** Lease Rentals are payable at the end of each year but in a diminishing (reducing)manner such that they are in the ratio of 3:2:1. Calculate lease rental to be quoted at the end of year 1 and 2, if lease rental at the end of third year is Rs. 63.86 lacs.

**Solution:**
Annual Lease rents will be Rs. 191.5 lacs, Rs. 127.72 lacs, and Rs. 63.86 lacs in the year 1, 2 and 3 respectively.
22. TREATMENT OF SUBSIDY FOR CALCULATING DEPRECIATION

Example: Cost Of Asset : Rs. 5,00,000; Subsidy given by government: 50,000. Now in such case Amount of Depreciation can either be charged at full 5,00,000 or Rs. 4,50,00. Both the options are correct.

Note: Preference-Charge depreciation on full amount of Rs. 5,00,000

23. BLOCK OF ASSET

Whenever Block Of Asset is used, Depreciation is not charged in the last year in which machine is sold.

24. BREAKEVEN LEASE RENTALS FROM THE VIEWPOINT OF LESSOR:

The breakeven Lease rental represents the minimum lease rental that he can accept at the level where Lessor's NPV is zero.

25. EQUAL ANNUAL LOAN INCLUSIVE OF INTEREST :- WHEN INSTALMENT IS PAID AT 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 \( r \) = interest rate charged by bank before tax i.e. \( K_d \) before tax.

26. 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 \( r \) = interest rate charged by bank before tax i.e. \( K_d \) before tax.
27. **PRESENT VALUE OF INTEREST NET OF TAX & PRINCIPAL REPAYMENT MUST BE EQUAL TO THE AMOUNT OF LOAN PROVIDED**

**DISCOUNT RATE IS KD**

When discount rate is Kd then-

PV of Interest Net Of Tax + Present Value Of Principal Repayment = Amount Of Loan

28. **NET ADVANTAGE OF LEASING (NAL)**

NAL = Outflow Under Loan Option - Outflow Under Lease Option

**Decision** : If NAL is positive, Lease Option is preferred, otherwise select Loan Option.

29. **CHOICE OF APPROPRIATE DISCOUNT RATE-LESSOR**

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

It is also known as (i) Target Rate Of Return; (ii) Desired Rate Of Return.

All the terms stated above are already after tax unless otherwise stated.

30. **CHOICE OF APPROPRIATE DISCOUNT RATE-LESSEE & BORROWER**

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 : Kd = Interest Net Of Tax i.e Interest ( 1 - Tax )

Discount Rate For Borrower : Kd = Interest Net Of Tax i.e Interest ( 1 - Tax )

However

If Cost Of Capital is given in question along with its PVF table then in such case we should use Cost Of Capital.

If Discount Rate word is used with any rate then such rate will be treated as discount rate.

31. **EVALUATION OF QUOTATIONS FROM TWO LESSOR**

In such case, that quotation should be selected, which involve least outflow
32. CALCULATION OF COST OF ASSET

**Example:** Equated Annual Instalment - Rs. 178858; Life: 5 Years; Interest Rate - 14%; Payment starting from the beginning of each year. Calculate Cost Of asset?

**Solution:**

**Calculation of Cost of Machine:**

\[
\text{Years) } \quad 4 \\
\text{PVAF (14%, 4 years)} \\
\text{Cost of Machine} = \frac{178858}{1 + \text{PVAF (14%, 4 years)}} \\
\Rightarrow \text{Cost of Machine} = 178858 \times 3.9137 = \text{Rs. 7,00,000 (approx)}
\]

33. SUM OF YEARS DIGIT METHOD OF DEPRECIATION

**Question** Cost Of Assets = Rs. 160; Life: 5 Years; Salvage Value = Rs. 10. Calculate Depreciation as per Sum of Years Digit Method?

**Solution:**

Amount to be depreciated = 160 - 10 = 150; Life = 5 Years; Sum = 1+2+3+4+5 = 15

<table>
<thead>
<tr>
<th>Year</th>
<th>Depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150 x 5/15 = 50</td>
</tr>
<tr>
<td>2</td>
<td>150 x 4/15 = 40</td>
</tr>
<tr>
<td>3</td>
<td>150 x 3/15 = 30</td>
</tr>
<tr>
<td>4</td>
<td>150 x 2/15 = 20</td>
</tr>
<tr>
<td>5</td>
<td>150 x 1/15 = 10</td>
</tr>
</tbody>
</table>

34. CONFUSION OF TAX TREATMENT ON SALVAGE VALUE

❖ Whenever Question specified that "Profit & Loss On Sale Of Machine is to be ignored" then in such case Salvage Value should not be adjusted for tax.
❖ When no Salvage value is given in question then in such case Salvage Value can be ignored completely for profit and loss on sale of asset. Students may assume otherwise.

35. TREATMENT OF COMMON ITEMS:

❖ Items of income and expense which are common to both the alternative 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.
if under two options period of payments are different i.e one payable from beginning of each year and one at the end of each year then in such case also, common Items are to be considered.

36. LESSEE VS PURCHASER OPTION

The concept is similar to "Lessee vs Borrower Option". The only difference is that in the given case Purchaser will not borrow money from bank and will not pay Interest & Principal Repayment. He will buy asset by using his own money.

37. CALCULATION OF LEASE RENTAL BY USING DESIRED RETURN OF LESSOR ON THE BASIS OF GROSS VALUE OF ASSET

Example: Suppose the leasing company desires a return of 10% on the gross value of the asset. Lease Rental from beginning of each year. Cost Of Asset is 126965. Life 5 years. Compute Annual Lease Rentals?

Solution:

Computation of Annual lease rentals: \[
\frac{\text{Cost Of Asset}}{1 + \text{PVAF}(10\%, 5 \text{ Years})} = \frac{126,965}{1 + 3.170} = \text{Rs. 30,447}
\]

38. CONFUSION REGARDING LOAN REPAYMENT METHOD

Whenever "Equated Instalment " word is used- Always Prefer Annual Instalment inclusive of Interest Method.
Whenever "Equal Principal Instalment" word is used- Principal & Interest are calculated separately.
Whenever "Equal Instalment" word is used - In this case students can either use any one of the above option by giving a proper note. Students should prefer equated instalment method.

39. EQUAL MONTHLY INSTALMENT - WHEN INSTALMENT IS PAID AT THE END OF EACH MONTH
Cost Of Asset ( or Loan Taken If It Differs) 
\[ EMI = \frac{\text{Cost Of Asset ( or Loan Taken If It Differs)}}{PVAF \left[ r \% \text{ p.m, } (n \times 12 \text{ periods}) \right]} \]

Where \( r \) = interest rate charged by bank before tax i.e Kd before tax.

**40. EQUAL MONTHLY INSTALMENT - WHEN INSTALMENT IS PAID AT THE BEGINNING OF EACH MONTH**

\[ EMI = \frac{\text{Cost Of Asset ( or Loan Taken If It Differs)}}{1 + PVAF \left[ r \% \text{ p.m, } (n \times 12 \text{ periods} - 1) \right]} \]

Where \( r \) = interest rate charged by bank before tax i.e Kd before tax.

**41. SALE AND LEASE BACK AGREEMENT**

**Meaning:** Under this arrangement an asset which already exists and in use by the lessee is first sold to the lessor for consideration in cash. The same asset is then acquired for use under financial lease agreement from the lessor.

**Necessity/Purpose:** This is a method of raising funds immediately required by lessee for working capital or other purposes. Sometimes it is also used as Tax Saving Mechanism.

**42. EVALUATION WHEN HOUSING LOAN IS SWAPPED**

- When there is an offer from two banks, we will select that Housing Bank for loan where effective cost of interest is lower.

**43. HOW TO START LEASING QUESTION**

1. Identify Party whether the question is based on Lessee, Lessor & Borrower.
2. Determine Cash Inflow & Cash Outflow of each party.
3. Determine a suitable Discount Rate.

**44. COMPARISON BETWEEN LESSOR, LESSEE AND BORROWER**
<table>
<thead>
<tr>
<th>LESSEE</th>
<th>BORROWER</th>
<th>LESSOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Depreciation Is Charged</td>
<td>Charge Depreciation</td>
<td>Charge Depreciation</td>
</tr>
<tr>
<td>User</td>
<td>User &amp; Owner</td>
<td>Owner</td>
</tr>
<tr>
<td>Not Entitled To Salvage Value</td>
<td>Entitled To Salvage Value</td>
<td>Entitled To Salvage Value</td>
</tr>
<tr>
<td>Pay Lease Rent</td>
<td>No Lease Rent Is Paid</td>
<td>Lease Rent Received</td>
</tr>
<tr>
<td>No Principal Repayment</td>
<td>Principal Repayment</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>No Payment Of Interest</td>
<td>Interest Payment</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
1. INTRODUCTION/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

2. NET PRESENT VALUE (NPV)

Formula:
Net Present Value (NPV) = Present Value Of Cash Inflows - Present Value Of Cash 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.

3. 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:
\[(1 + \text{Risk Adjusted Discount Rate} ) = (1 + \text{Risk Free Discount Rate} ) ( 1 + \text{Risk Premium} )\]

Alternative 2: It can also be calculated by using CAPM:
Discount Rate = Rf + Beta x (Rm - Rf)

Note: The Net Present Value computed by using Risk Adjusted Discount Rate is known as Risk Adjusted Net Present Value.

Note: Higher Risk should be discounted by higher rate.

4. CERTAINTY EQUIVALENT APPROACH (CEC)
Certainty Equivalent Approach involves discounting of Certain Cash Flows instead of the Total Cash Flows.

Steps In Certainty Equivalent Approach

**Step 1** : Estimate the total future cash flows from the proposal. These cash flows 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 Cash Flows (Step 1) x CEC (Step 2) = Certainty Equivalent Cash Flows

**Step 4** : Certainty Equivalent Cash Flows are discounted at Risk Free Rate to find out the NPV of the proposal.

5. **EXPECTED NET PRESENT VALUE OR EXPECTED CASH FLOWS OR EXPECTED VALUE**

Expected NPV or Expected CF or Expected Value

\[ \sum \text{Estimated Value} \times \text{Probability} \]

**Example** :

<table>
<thead>
<tr>
<th>Estimated Value</th>
<th>Probability</th>
<th>Estimated Value \times Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>.1</td>
<td>100</td>
</tr>
<tr>
<td>2000</td>
<td>.3</td>
<td>600</td>
</tr>
<tr>
<td>4000</td>
<td>.3</td>
<td>1200</td>
</tr>
<tr>
<td>3000</td>
<td>.2</td>
<td>600</td>
</tr>
<tr>
<td>5000</td>
<td>.1</td>
<td>500</td>
</tr>
</tbody>
</table>

\[ \text{Expected Value/NPV/Cash Flow} = 3000 \]

*Note:* Probability Of All Outcomes will always be equal to 1

6. **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 graphical presentation that shows a sequence of strategic decisions and expected consequences under each possible set of circumstances.
7. DECISION BASED ON IRR

IRR > Cost Of Capital  Accept
IRR < Cost Of Capital  Reject
IRR = Cost Of Capital  Indifferent

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

Formula: 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

9. STANDARD DEVIATION OF THE PROJECT

Standard Deviation

= \sqrt{\sum \text{Probability} \times (\text{Given NPV or Cash Flow} - \text{Expected NPV or Cash Flow})^2}

Note: Variance = (Standard Deviation)^2

10. COEFFICIENT OF VARIATION OF PROJECT

Coefficient Of Variation = \frac{\text{Standard Deviation}}{\text{Expected Value/NPV/Cash Flow}}

Decision: The lower the CV, lower the risk.

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
11. EFFECT ON CASH FLOW DUE TO INFLATION

- The future cash flows can be either expressed as
  (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:
  Money Cash flows = Real Cash Flows \((1 + \text{Inflation Rate})\) or
  \[
  \text{Real Cash Flows} = \frac{\text{Money Cash Flows}}{(1 + \text{Inflation Rate})}
  \]

12. EFFECT OF INFLATION ON DISCOUNT RATE

- 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:
  \[(1 + \text{Money Discount Rate}) = (1 + \text{Real Discount Rate}) \cdot (1 + \text{Inflation Rate})\]

13. CALCULATION OF NPV WHEN INFLATION RATE IS GIVEN

- 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
- In both cases resultant NPV would be same

**Note:** If question said that the value are given at "Current Prices" it means that these prices are given without taking the effect of inflation.

14. CONFUSION REGARDING NATURE OF DISCOUNT RATE WHEN QUESTION IS SILENT IN CASE OF INFLATION

- When nature of Discount Rate is silent in the question, then while solving Inflation Related question following assumption should be taken by students:
  (i) **If Cash Flow is Real Cash Flow**, then assume discount rate to be Money Discount Rate
(i) **If Cash Flow is Money Cash Flow**, then assume discount rate to be Real Discount Rate

### 15. HILLER 'S MODEL

**When Cash Flows are Dependent or correlated:**

Standard Deviation of the project as a whole:

$$(SD_1 \times PVF_1) + (SD_2 \times PVF_2) + \ldots + (SD_n \times PVF_n)$$

**When Cash Flows are Independent or uncorrelated:**

Standard Deviation of the Project as a whole:

$$\sqrt{(SD_1 \times PVF_1)^2 + (SD_2 \times PVF_2)^2 + \ldots + (SD_n \times PVF_n)^2}$$

### 16. EFFECT OF INFLATION ON DEPRECIATION

- **Depreciation charges** are based on historical costs.
- **Depreciation** is not effected by Inflation rate as depreciation is charged on the book value of the asset & not market value.

### 17. ADJUSTED PRESENT VALUE

- Adjusted Net Present Value is the project's NPV after considering the effect of financing.
- **How to Calculate Adjusted NPV:**
  
  **Step 1**: Compute NPV of the project on the assumption that it is fully financed by Equity Shareholders. This would mean that you would discount the cash flows at cost of equity. This is called Base Case NPV.
  
  **Step 2**: Compute the issue cost of both Equity & Debt issues. Issue costs are the costs that the firm has to incur to raise the money. It is incurred in Year 0 and it represents an Outflow.
  
  **Step 3**: Compute the present value of the tax shield / saving on interest. Discount Rate to be used is Interest Rate Before Tax i.e Kd before tax.
  
  **Step 4**: Adjusted Net Present Value = Base Case NPV - Issue Costs + Present Value of Interest Tax Shield/Saving
18. 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 Initial Investment than to Cash Inflows.

**Symbolically** : Sensitivity (%) = \( \frac{\text{Change}}{\text{Base}} \times 100 \)

Some factors to be used under Sensitivity Analysis are Size of the project, Cash flows, Life of the project, Discount rate.

Under this analysis adverse effect of each input variable (parameters) is considered separately and all other variables are held constant.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adverse Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflow</td>
<td>Decrease</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>Increase</td>
</tr>
<tr>
<td>Outflow</td>
<td>Increase</td>
</tr>
<tr>
<td>Life</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

Sensitivity Analysis is a technique of dealing with risk and uncertainty in Capital Budgeting problems.

The analysis is done by "What If" type of analysis such as:

What if the project cost rises?
What if the Cost of Capital rises?
What if Annual Cash Inflows falls?
What if the project life falls?

19. SENSITIVITY ANALYSIS USING % ADVERSE VARIATION IN FACTORS

Under this method Sensitivity is calculated by taking adverse changes by a specific % which will be indicated in question

The adverse factor for which % Fall In NPV is maximum is considered to be most sensitive.
\[ \% \text{ Fall In NPV} = \frac{\text{Revised NPV} - \text{Original NPV}}{\text{Original NPV}} \times 100 \]

**EQUITY NPV & PROJECT NPV**

Before evaluating an investment we must decide as to whose perspective the evaluation is being done. Evaluation can be done either from the

(i) Equity Shareholder's perspective

(ii) Overall Firm Perspective which include Capital contributed by Equity, Debenture and Preference Capital. Also known as Total Fund Approach

**20. EQUITY 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 Share 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

-Interest on Short Term Loan

-Interest on Long Term Loan

-Depreciation

-Amortization

EBT

-Tax

EAT

+Depreciation

+Amortization

-Preference Dividend

-Increase in Working Capital

+Decrease in Working Capital

-Repayment of Loan/Debenture [Short Term & Long Term Both]
- Repayment to Preference Shareholders
- Cash Inflow for Equity

\[ \text{Discount Rate} : \text{Cost Of Equity or } K_e. \]

### 21. PROJECT NPV

**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.

\[ \text{Initial Cash Outflows} : \text{Equity Capital + Debenture Capital + Preference Share Capital} + \text{Long Term Loan or Total Funds invested by all Investors} \]

\[ \text{Annual Cash Inflows} : \text{Inflows available for all investors. It can be calculated in the following manner:} \]

\[ \text{Cash Inflow For Overall Project:} \]
- EBDITA
- Interest on Short Term Loan
- Depreciation
- Amortization
- EBT
- Tax
- EAT
+ Depreciation
+ Amortization
- Increase in Working Capital
+ Decrease in Working Capital
- Repayment of Loan/Debenture [Only Short Term]

\[ \text{Cash Inflow for Overall Project} \]

\[ \text{Discount Rate} : \]
Overall Cost Of Capital or Weighted Average Cost Of Capital (WACC) or
\[ K_o = K_e W_e + K_d W_d + K_p W_p. \]

### 22. EQUITY IRR
Equity IRR: Equity IRR is the discount rate at which Equity NPV is zero.

Short Cut Formula:

\[
\text{Equity IRR} = \text{Project IRR} + (\text{Project IRR} - \text{Interest Rate}) \times \frac{\text{Debt}}{\text{Equity}}
\]

23. PROJECT IRR

Project IRR: Project IRR is the discount rate at which Project NPV is zero.

24. UPGRADED VS NEW MACHINE VS OLD MACHINE

We can either upgrade the old machine or we can buy new machine to run our business effectively or we can even use old asset without any changes. Whatever is the case we will select that option which involve least outflow or which gives more NPV.

25. REPLACEMENT DECISION

Under Replacement Decision we will decide:
Whether to Replace the existing machine & Buy new machine OR
Whether to Repair Existing Machine

26. VALUE OF ABANDONMENT IN CASE OF SHUT DOWN

In Business there are no sentiments. The firm should conduct periodic evaluation to decide whether the project be abandoned or continued. The point at which losses are maximum should be shut down point.

27. 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

\[
= \text{Equity Beta} \times \frac{\text{Equity}}{\text{Debt} + \text{Equity}} + \text{Debt Beta} \times \frac{\text{Debt}}{\text{Debt} + \text{Equity}}
\]
28. 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

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

29. 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 an **Levered Firm**

30. COST OF CAPITAL FOR UNLEVERED FIRM

\[\text{Cost Of Capital} = \text{Cost Of Equity}\]

31. OVERALL BETA FOR UNLEVERED FIRM

\[\text{Overall Beta For Unlevered Firm} = \text{Equity Beta}\]

32. DEBT EQUITY RATIO

\[
\text{Debt Equity Ratio} = \frac{\text{Debt}}{\text{Equity}}
\]

33. DEBT RATIO

\[
\text{Debt Ratio} = \frac{\text{Debt}}{\text{Equity} + \text{Debt}}
\]

34. 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. Overall Beta of a firm will be same as other company belonging to the same industry (sector) and it will also be not affected by the Change in Capital Structure.

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

Equity Beta and Debt Beta Changes with the change in Capital Structure

For example: Overall Beta of Idea Company will be same as Overall Beta of Airtel Company as both the company belong to the same industry. But there Equity Beta and Debt Beta may be different at different Capital Structure.

36. OVERALL COST OF CAPITAL (KO)-IF TAX IS NIL

Alt 1 : \( K_O = \text{Risk Free Rate} + \beta_{\text{Overall}} [\text{Market Return} - \text{Risk Free Return}] \)

Alt 2 : \( K_O = \text{Cost Of Equity} \times \text{Weight Of Equity} + \text{Cost Of Debt} \times \text{Weight Of Debt} \)

\( = K_e \times W_e + K_d \times W_d \)

Where,

\( K_e = \text{Risk Free Rate} + \text{Equity Beta} \times (\text{Market Return} - \text{Risk Free Rate}) \)

\( = R_f + B_{\text{Equity}} ( R_m - R_f ) \)

\( K_d = \text{Risk Free Rate} + \text{Debt Beta} \times (\text{Market Return} - \text{Risk Free Rate}) \)

37. OVERALL COST OF CAPITAL (KO)-IF TAX 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, \( K_e = \text{Risk Free Rate} + \text{Equity Beta} \times (\text{Market Return} - \text{Risk Free Rate}) \)

\( = R_f + B_{\text{Equity}} ( R_m - R_f ) \)
K<sub>d</sub> = Interest (1 – Tax)

### 38. OVERALL RETURN OF COMPANY

- Overall return of asset will always remain same at every capital structure changes.
- Sometimes Return Of Asset is also known as Cost Of Capital i.e Ko

### 39. 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.

### 40. CAPITAL RATIONING-IDENTIFICATION

- Capital rationing refers to a situation where a company cannot undertake all positive NPV projects it has identified because of shortage of capital.
- Whenever Amount Available is less than Amount Required To Undertake Positive NPV Projects : Capital Rationing Exists.
- **QUESTION**: A company with Rs. 50 million on hand has to take one of the following project which it wishes to undertake. Given the money constraint which should it select?

<table>
<thead>
<tr>
<th>Project</th>
<th>Investment (in million)</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>50</td>
<td>12</td>
</tr>
<tr>
<td>B</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

- **SOLUTION**:
  - **Step 1**: Identify projects with positive NPV : All the projects have positive NPV.
  - **Step 2**: Determine Money Required = Rs. 100 Million;
  - **Step 3**: Determine Money Available = Rs. 50 Million
  - **Step 4**: Determine whether Capital Rationing exits : Capital Rationing exits since money available is less than money required

### 41. PROBABILITY OF OCCURRENCE IF THE CASH FLOWS ARE (A) PERFECTLY DEPENDENT OVER TIME (B) INDEPENDENT OVER TIME

- 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)\(n\)
Where \(n\) = Life Of The Project

42. PAY BACK PERIOD / PAY OFF PERIOD / CAPITAL RECOVERY PERIOD
: IN CASE OF EVEN CASH FLOWS

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

**Formula**: Payback Period = \(\frac{\text{Initial Investment}}{\text{Annual Cash Inflows}}\)

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

43. PAY BACK PERIOD / PAY OFF PERIOD / CAPITAL RECOVERY PERIOD
: IN CASE OF UNEVEN CASH FLOWS

**Formula**: Payback Period = Completed Years + \(\frac{\text{Remaining Amount}}{\text{Available Amount}}\)

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

44. 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.

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

45. HARD CAPITAL RATIONING AND SOFT CAPITAL RATIONING

Capital Rationing can be divided into following two categories:
(a) Hard Capital Rationing (b) Soft Capital Rationing

(a) **Hard Capital Rationing**: Hard capital rationing is a situation related to external sources. Agencies like capital market may supply only limited amount of capital in spite of
fact that the projects with positive NPVs have been identified.

(b) **Soft Capital Rationing**: Soft Capital Rationing is due to internal forces such as limits imposed by management on capital expenditure.

### 46. TREATMENT OF WORKING CAPITAL

- In the absence of information the students are advised to assume:
  - Introduction Of Working Capital at the beginning. This should be treated as Outflow.
  - Release Of Working Capital at the end. This should be treated as Inflow.
- **Note**: Changes in items such as Working Capital do not affect taxes.
- **Note**: Any Increase in Working Capital should be treated as Outflow.
- **Note**: Any Decrease in Working Capital should be treated as Inflow.

### 47. COMPARISIN IN CASE OF UNEQUAL LIFE / EQUATED ANNUAL VALUE

- If two projects have unequal life, then the two projects are not comparable. To make them comparable we will use Equivalent Annual Value Concept for each project by applying the following formula:
- **Equation:**

\[
\frac{NPV \text{ or Present Value Of Cash Outflow or Present Value Of Cash Inflow}}{PVAF(K\%, n \text{ years})}
\]

Where \( K\% = \) Discount Rate and \( n = \) Total Life of the project

### 48. CALCULATION OF WORST CASE, MOST LIKELY & BEST CASE PROBABILITY & NPV

- Option at which NPV is highest is known as Best NPV, and the probability of this option is known as Best Case Probability.
- Option at which NPV is lowest is known as Worst NPV, and the probability of this option is known as Worst Case Probability.
- In between the above two, lies Most Likely NPV, and the probability of this option is known as Most Likely Probability.

### 49. CALCULATION OF NPV IN CASE OF SHARE INVESTMENT
If NPV Of Share Investment is Positive, we should purchase share otherwise we should ignore such share.

50. TREATMENT OF ISSUE COST UNDER APV

Issue cost may be treated in any one of the following manner-

**Alternative 1 (Preferred)** - It can be capitalized (Balance Sheet Item). Issue Cost should not be taken after tax.

**Alternative 2** - Issue Cost must be taken after tax.

51. CALCULATION OF UNGEARED OR UNLEVERED KE

**Example**: Rf = 10%; Rm = 15%; Equity Beta [at 80% Equity & 20% Debt] is 2; Calculate Unlevered Ke?

**Solution**: Unlevered Ke is such Ke where we assume 100% Equity.

At 100% Equity, Equity Beta = Overall Beta

Now Overall Beta =

\[
\text{Equity Beta} \times \frac{\text{Equity}}{\text{Debt} + \text{Equity}} + \text{Debt Beta} \times \frac{\text{Debt}}{\text{Debt} + \text{Equity}}
\]

\[
= 2 \times \frac{.80}{.80 + .20} + 0 = 1.60
\]

Therefore Unlevered Ke = Rf + Beta Equity at 100% Equity (Rm - Rf)

\[
= 10 + 1.6 \times (15 - 10) = 18\%
\]

52. CALCULATION OF NET COST OF BORROWING IN CASE OF SUBSIDY

**Example**: Amount Of Loan = Rs. 10,000

Interest Charged By Bank = 10%

Government Subsidy = 1%

Calculated Net Cost Of Borrowing?

**Solution**: Net Cost Of Borrowing = 10% - 1% = 9%

53. CALCULATION OF INFLATION
Inflation(%) = \left( \frac{\text{Future Price} - \text{Current Price}}{\text{Current Price}} \right) \times 100

54. CONFUSION REGARDING FIXED COST AND FIXED ASSET

<table>
<thead>
<tr>
<th>Fixed Cost</th>
<th>Fixed Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shown in Profit &amp; Loss Account</td>
<td>1. Shown in Balance Sheet</td>
</tr>
<tr>
<td>2. Example-Rent, Salary etc</td>
<td>2. Example-Land, Buildings etc</td>
</tr>
<tr>
<td>3. Annual Cost</td>
<td>3. One Time Cost normally in Year 0</td>
</tr>
<tr>
<td>4. Taken Net Of Tax</td>
<td>4. Not Taken Net Of Tax</td>
</tr>
<tr>
<td>5. Not Subject To Depreciation</td>
<td>5. Subject To Depreciation</td>
</tr>
</tbody>
</table>

55. VENTURE CAPITAL FUNDING

Wealthy investors like to invest their capital in such businesses with a long-term growth perspective. This capital is known as venture capital and the investors are called venture capitalists.

Such investments are risky as they are illiquid, but are capable of giving impressive returns if invested in the right venture. The returns to the venture capitalists depend upon the growth of the company. Venture capitalists have the power to influence major decisions of the companies they are investing in as it is their money at stake.

These investments are generally characterized as high-risk/high-return opportunities.

56. CALCULATION OF PV OF CASH INFLOW

Finding out PV of Cash Inflow when NPV and PV Cash Outflow is given

\[ \text{NPV} = \text{PV of CI} - \text{PV of CO} \text{ or } \text{PV of CI} = \text{NPV} + \text{PV of CO} \]

57. BOND REFUNDING DECISION

The act or practice in which a company repays an old bond by making a new issue of another bond.

When future interest rates are anticipated to decline, a call provision in the bond issue is recommended. Such a provision enables the firm to buy back the higher-interest bond and issue a lower-interest one.
58. OVERLAPPING INTEREST

- Overlapping Interest is the situation where company pays interest on both Old and New Bond.
- The effect of Overlapping Interest will be applicable in case of Old Bond.

**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 x 14% x 2/12 = 7,00,000
- Tax Saving: Benefit @ 40% = 2,80,000
- Overlapping Interest = 4,20,000

59. MODIFIED NPV

- The Net Present Value calculated so far was based on an assumption that the cash inflow that is generated over the years is invested at the same rate at which our cash flows are discounted. But this may not be true in all cases. It may so happen that the cash inflows of the project may be invested at different rates. In such case we should compute Modified NPV as follows:

- Find the Future Value of cash inflows at the given rate of investment for the remaining years. So if the project is for 5 years, the cash inflow generated in first year end shall be compounded for 4 years. Similarly the cash inflow generated in second year end shall be compounded for 3 years and so on.

- Take the total of future values which may be termed as Future Value or Terminal Value

- Find the Present Value Of Cash Inflows in the following manner:

  \[
  \text{Terminal Value} = \frac{\text{Future Value}}{(1 + \text{Cost Of Capital})^n}
  \]
60. **MODIFIED IRR**

Modified IRR is the rate at which Modified NPV is zero.

61. **TYPES OF CAPITAL BUDGETING PROPOSAL**

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.

62. **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,

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

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

63. **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 \text{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.
  (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.

Note: Any one Option can be preferred in exam.

64. **SELECTION OF PROJECT SITUATED IN TWO DIFFERENT LOCATION [BACKWARD AREA VS FORWARD AREA]**

- Area where NPV is maximum should be selected.

65. **PILOT PROJECT**

- A pilot project is a small scale preliminary study conducted in order to evaluate a full scale project.
- It is an attempt to avoid time and money being wasted on an inadequate designed project.

66. **REAL OPTION IN CAPITAL BUDGETING: OPTION TO DELAY**

- Traditional NPV analysis assumes that a project may be accepted or rejected, implying that it can be undertaken now or never.
- However, delaying the Investment may help in resolving some uncertainty. We can call it “WAIT and WATCH” policy.
67. **BREAKEVEN UNITS**

BEP refers to that volume of sales where the profit or loss is zero.

\[
\text{Break Even Units} = \frac{\text{Fixed Cost}}{\text{Contribution Per Unit}} \times 100
\]

68. **CAPITAL RATIONING TYPES: DIVISIBLE PROJECTS**

**Step 1:** Identify projects with positive NPV
**Step 2:** Identify that Capital Rationing exists.
**Step 3:** Rank projects in the order of PI.
Where PI = PV Of Cash Inflow/PV Of Cash Outflow
**Step 4:** Assign money to projects on the basis of Rank. If money is not adequate to fully cover a project, part of the project would be undertaken.
**Step 5:** Aggregate the NPV of selected projects.

69. **CAPITAL RATIONING TYPES: INDIVISIBLE PROJECTS**

**Step 1:** Identify projects with positive NPV
**Step 2:** Identify that Capital Rationing exists.
**Step 3:** Identify various feasible combinations. If money is available but cannot be allocated to any project, it will be dealt with surplus cash if stated in question.
**Step 4:** Compute NPV of the feasible combinations and select the one with the highest aggregate NPV.

**Note:** If question is silent always assume project to be indivisible.

**Additional Points**

1. Equity Beta will always be greater than Debt Beta as risk of Equity Shareholder are higher than Risk of Debenture holders

2. If Debt Beta is not given in question, it is assumed to be zero.

3. If question is silent Risk Free Rate and Debenture Rate of Interest are assumed to be same i.e If rate of interest on debenture is not given in question then it is assumed to be...
(4) Market Value should be given preference rather than Book Value for calculating Weights in determination of Overall Beta OR Overall Cost Of Capital

(5) If question ask us to calculate " Beta" without indicating that whether we should calculate Equity Beta or Overall Beta , we should calculate " Equity Beta " giving note to this effect .

(6) Beta of Equity will always be higher than Overall Asset Beta or Project Beta.

(7) **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 , Internal Rate Of Return

(8) **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

(iii) Given the same trial balance ten accountants can come out with eleven profits.
### 1. RIGHT SHARE - MEANING

Right Shares are those shares which are issued to existing equity shareholders at a price which is normally less than Current Market Price.

### 2. 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

### 3. EFFECT IN SHAREHOLDER'S WEALTH

<table>
<thead>
<tr>
<th>Choice Before Shareholder</th>
<th>Effect in Shareholders Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscribe to the rights issue in full</td>
<td>no change in the wealth of the shareholders</td>
</tr>
<tr>
<td>Ignore your rights/Take No Action</td>
<td>decrease in wealth</td>
</tr>
<tr>
<td>Sell the rights to someone else</td>
<td>no change in the wealth of the shareholders</td>
</tr>
<tr>
<td>Subscribe to the rights issue in part &amp; for balance Sell the right</td>
<td>no change in the wealth of the shareholders</td>
</tr>
</tbody>
</table>

### 4. THEORETICAL POST-RIGHTS (EX-RIGHT) PRICE PER SHARE

Theoretical Post-Rights (ex-right) or After Right Price Per Share =

\[
\text{MPS Cum Right} \times \text{Existing No. Of Share + Right Share Price} \times \text{No. of Right Shares} \div \text{Existing No. Of Share + New Number Of Right Share Issued}
\]

### 5. THEORETICAL VALUE OF THE RIGHTS ALONE

**Alt 1:** Value Of Right Per Share
MPS Before Right - MPS After Right

Alt 2: Value Of Right Per Share

\[
\text{MPS Ex Right - Offer Price} = \frac{\text{No. Of Shares In Respect Of Which One Right Shares Are Issued}}{\text{Issued Share Right Of Number New Share Of No. Existing Share Right Price Share Right Share Existing MPS Existing No. Of Share + New Number Of Right Share Issued}}.
\]

6. 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.
- The provisions regulating buy back of shares are contained in Section 77A, 77AA and 77B of the Companies Act, 1956.
- FMCG major Hindustan Unilever (HUL) recently approved buying back shares worth Rs 630 crore from the market at a price of Rs 280 per share, to utilise its surplus cash

7. MPS AFTER RIGHT ISSUE IN CASE OF SYNERGY (NPV)

MPS of the Project After Right Issue

\[
= \text{Existing MPS} \times \text{Existing Share} + \text{Right Share Price} \times \text{Right Shares} + \text{Synergy or NPV}
\]

Existing No. Of Share + New Number Of Right Share Issued
FACTORING

1. MEANING OF FACTORING

Factoring is a new concept in financing of accounts receivables. This refers to sale of accounts receivables to a factor or a financial agency. 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.

2. BENEFIT OF FACTORING

(i) Reduction in Administration Cost
(ii) Bad Debt Saved/Reduced
(iii) Opportunity Cost of Interest Earned on Account of Reduction in Debtors Collection Period
(iv) If company is dependent on overdraft, then it can save interest if company receive advance from factor.

3. COST OF FACTORING

(i) Commission: This is charged for the services provided by the factor
(ii) Interest on Advance: This is charged for 'advance payment'.

4. NET BENEFIT UNDER FACTORING

Net Benefit can be calculated in the following manner:
Benefit of Factoring \[ xxx \] [Concept No. 2]
Cost of Factoring \[ xxx \] [Concept No. 3]
Net Benefit \[ xxx \]

Decision: If it is positive, factoring should be accepted; otherwise, not.

5. CALCULATION OF AMOUNT OF DEBTORS PROVIDED SALES FIGURE IS GIVEN IN QUESTION

Average Debtors = \[ \frac{\text{Credit Sales For The Year} \times \text{Debtors Collection Period}}{365 \text{ or } 360} \]
Example - Total sales - Rs. 200,00,000; 50% Credit Sales; Debtor Collection Period: 80 Days;
Calculate Amount Of Debtors? Assume 365 days in a year
Solution - Amount Of Debtors = 200,00,000 x 50% / 365 x 80 = Rs. 2191780.82

6. EFFECTIVE COST OF INTEREST UNDER FACTORING

Effective Cost Of Factoring p.a = \[
\frac{\text{Net Cost Under Factoring}}{\text{Net Advance Received Under Factoring}}
\]

7. CALCULATION OF NET ADVANCE PAYABLE BY FACTOR OR RECEIVED BY COMPANY

Debtors Amount Paid As Advance
(-) Reserve Requirement
(-) Commission Charge
Amount Of Advance
(-) Interest To Be Received On Advance
Net Advance Paid By Factor / Net Advance Received By Company

8. NON RECIROCSE FACTORING & RECOURSE 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.

When question is silent always assume Non Recourse Factoring

9. OVERDRAFT ISSUE: WHEN COMPANY IS DEPENDENT ON OVERDRAFT

Example - Advance taken from factor is Rs.24,59,178 @ 7% who is dependent on overdraft @ 5%. Calculate Net Cost.
Interest Paid On Advance Taken from Factor Rs.24,59,178 @ 7% Rs. 1,72,142
Overdraft Interest Saved on Rs.24,59,178 @ 5% Rs. 1,22,958.9
RS.49183.1
1. WHAT IS MONEY MARKET OPERATIONS

- The money market is a market for short term financial assets.

2. REGULATOR OF MONEY MARKET

- The Reserve Bank of India (RBI) has been playing the key role of regulator and controller of such money markets.

3. DIFFERENCE BETWEEN CAPITAL MARKET AND MONEY MARKET

**Money Market:** It is a market for lending and borrowing of short term funds, up to one year.

**Capital Market:** Capital markets deals in long term securities for a period beyond one year.

4. NAME SOME OF THE FEW MONEY MARKET INSTRUMENTS

Some of the few Money Market Instruments are as follows:

- CALL/NOTICE MONEY
- MONEY MARKET MUTUAL FUNDS
- COMMERCIAL PAPER
- CERTIFICATE OF DEPOSITS (CDS)
- REPO [ REPURCHASE OPTION ]
- TREASURY BILL
- AGREEMENT

5. CALL/NOTICE MONEY

- **Meaning:** Call money or inter-bank call money is the medium through which the scheduled commercial banks lend, borrow or call at short notice to manage the day-to-day surpluses and deficits in the cash flow.
- The money that is lent for one day in this market is known as ‘call money’ and if it exceeds one day (but less than 15 days), it is referred as ‘notice money’.

6. MONEY MARKET MUTUAL FUNDS (MMMFS)

- **Meaning:** MMMF pools the resources from the investors and invests them in a basket
of money market instruments to generate the desired income.

7. TREASURY BILLS (TBs)

- **Meaning**: T-Bills are short term instruments issued by RBI on behalf of the Government of India to tide over short term liquidity shortfalls.

8. CERTIFICATE OF DEPOSITS (CDs)

- **Meaning**: Certificate of Deposit (CD) is a negotiable instrument, issued at a discount and the face value is payable at maturity by the issuing bank.

9. COMMERCIAL PAPER (CP)

- **Meaning**: CP is an unsecured debt instrument in the form of a promissory note issued by highly rated companies (borrowers) for tenures ranging between 15 days to one year for meeting working capital requirement directly from the market instead of borrowing from banks.

10. REPO [REPURCHASE OPTION] AGREEMENT

- A Repurchase Agreement (or repo) is an agreement of sale of a security with a commitment to repurchase or buy the security back at a specified price and on a specified date. The rate at which it is done is known as Repo Rate.
- In other words Repo (Repurchase) rate is the rate at which the RBI lends short-term money to the banks.
- **Reverse repo** is a term used to describe the opposite side of a repo transaction. Reverse Repo is a purchase of security with a commitment to sell at a pre-determined price and date. The rate at which it is done is known as Reverse Repo Rate.
- In other words The rate at which RBI borrows money from the banks (or banks lend money to the RBI) is termed the reverse repo rate.

11. WHAT IS CRR

- CRR means Cash Reserve Ratio.
- All scheduled commercial banks are required to maintain daily cash reserve and deposit
it with Reserve Bank of India (RBI).

12. WHAT IS SLR

⇒ SLR stands for Statutory Liquidity Ratio.
⇒ This term is used by bankers and indicates the minimum percentage of deposits that the bank has to maintain in form of gold, cash or other approved securities.

13. EFFECTIVE INTEREST/YIELD FOR MONEY MARKET INSTRUMENTS

Effective Interest /Yield p.a

\[
\text{Effective Interest /Yield p.a} = \frac{\text{Face Value} - \text{Selling or Issue Price}}{\text{Selling or Issue Price}} \times \frac{12 \text{ or } 360 \text{ or } 365}{\text{Maturity Months or Days}} \times 100
\]

14. CALCULATION OF ISSUE PRICE

**Question:** A money market instrument with face value of Rs. 100 and discount yield of 6% will mature in 45 days. You are required to calculate: Current Price of the Instrument

**Solution:** Current Price of the Instrument:

\[
\text{Annual Cost of Finance or Interest Yield } = \frac{\text{Face Value} - \text{Selling Price}}{\text{Selling Price}} \times \frac{360}{\text{Maturity Period}}
\]

\[.06 = \frac{100 - \text{SP}}{\text{SP}} \times \frac{360}{45} \Rightarrow 2.7 \text{ SP} = 36000 - 360 \text{ SP} \Rightarrow 362.7 \text{ SP} = 36000 \Rightarrow \text{SP} = \text{Rs. 99.25 [ approx]} \]

\[\Rightarrow \text{Selling Price or Current Price of the Bond } = \text{Rs. 99.25 [ approx]} \]

15. CALCULATION OF VALUE OF MONEY MARKET INSTRUMENTS IN BETWEEN ISSUE DATE AND MATURITY DATE

**Question:** Somu holds a 90 days commercial paper, issued at Rs. 92.72, redeeming at Rs. 100, 45 days later. What is the value of the instrument on its books?

**Solution:**

Total Interest over 90 days = Rs. 100 – Rs. 92.72 = Rs. 7.28

Value of Investment now (45 days to maturity) = Issue Price + Accrued Interest of 45 days

= Rs. 92.72 + Rs. 7.28 x 45/90 = Rs. 92.72 + Rs. 3.64 = Rs. 96.36 (approx.)
1. CAPS OPTION STRATEGY

- **Caps**: Caps means setting the upper limit.
- **Floor**: Floor means setting the lower limit.
- **Collar**: Combination of Caps and Floor is known as Collars.

2. FLOOR OPTION STRATEGY

- **Floor**: Floor means setting the lower limit.
- **Caps**: Caps means setting the upper limit.

3. COLLAR OPTION STRATEGY

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

4. FORWARD RATE AGREEMENT-ADVANCED

- **Meaning**: In finance, a *forward rate agreement* (FRA) is a forward contract in which one party pays a fixed interest rate, and receives a floating interest rate and vice versa.
- **Objective**: The aim of a FRAs is to safeguard the interest charges for a future period.
- **How It Is Quoted**: FRAs are quoted in the format AxB, with (A) representing the number of months until the loan is set to begin, and (B) representing the number of months until the loan ends. To find the length of the loan, subtract A from B.
- **For Example**:
  - A t1 X t2 FRA: The start date, is t1 months hence. The end of the forward period is t2 months hence. The loan period is t1-t2 months long.
  - A 1 x 4 quote would mean a 3 month loan, set to begin 1 month in the future.
  - A 9 x 12 FRA has a contract period beginning nine months hence, ending 12 months hence and loan period here is 3 month
\[
\frac{\text{Days in underlying rate}}{\text{360 or 365}}
\]

\[
1 + \text{Rate at expiration} \times \frac{\text{Days in underlying rate}}{\text{360 or 365}}
\]

5. **SWAPTION**

An interest rate swaption is simply an option on an interest rate swap.
ECONOMIC VALUE ADDED

1. ECONOMIC VALUE ADDED METHOD (EVA)

The concept of EVA was developed by Stern Stewart & Co. EVA is defined in terms of returns earned by the company in excess of the minimum expected return required by Investors.

Symbolically: \[ \text{EVA} = \text{Net Operating Profit After Taxes} - \text{Cost Of Capital Employed} \]

Where Net Operating Profit After Taxes \([\text{NOPAT}] = \text{EBIT}(1 - \text{Tax})\)

Cost Of Capital Employed = \text{Cost Of Capital} \times \text{Capital Employed}

Cost Of Capital (Ko) or Weighted Average Cost of Capital (WACC)

\[ = K_e \times W_e + K_r \times W_r + K_d \times W_d + K_p \times W_p \]

Note: In Calculating Operating Profit, interest is not deducted as interest is a non-operating item.

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

Note: Financial Leverage = \[ \frac{\text{Earning or Profit Before Interest and Tax [EBIT]}}{\text{Earning or Profit Before Tax [EBT]}} \]

Note: EBT = EBIT - Interest

Note: In India EVA has emerged as a popular measure to understand and evaluate financial performance of a company. Several companies have started showing the EVA during a year as a part of the Annual Report. BPL Ltd., Infosys Technologies Ltd., and Balrampur Chini Mills Ltd. are a few of them.

2. EFFECT ON VALUE OF FIRM WHEN DIVIDEND IS PAID ACCORDING TO EVA VALUE
When Dividend is paid according to EVA Value, the Value of Firm will decrease as the Company could have invested the same amount for future investment which will increase growth rate of Company as well as EBIT.

4. PRESENT VALUE OF COMPANY BY USING EVA METHOD

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

5. MARKET VALUE ADDED (MVA)

➔ MVA is yet another concept which is used to measure the performance and value of the firm.

➔ **Symbolically** :

**From Equity Point Of View**

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

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

**From Overall Company's Point Of View**

MVA = Value of the Company Based On Free Cash Flows - Total Capital Employed or Amount Invested
**RATIO ANALYSIS**

1. **PROFIT VOLUME (P/V RATIO) RATIO/BREAK-EVEN POINT AND REQUIRED TURNOVER TO ACHIEVE A TARGET PROFIT**

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: xxx
- Contribution: xxx
- Less Fixed Cost: xxx
- Profit: xxx

2. **RETURN ON INVESTMENT (ROI) OR RETURN ON CAPITAL EMPLOYED (ROCE)**

\(~\text{Return On Investment } [\text{ ROI }] = \frac{\text{EBIT}}{\text{Total Investment}} \text{ or } \frac{\text{EBIT}(1 - \text{Tax})}{\text{Total Investment}}~\)

**Decision**: Higher the better

**Note**: Here Investment refers to Total Capital Employed

3. **CURRENT RATIO**

\(~\text{Current Ratio} = \frac{\text{Current Asset}}{\text{Current Liabilities}}~\)

**Decision**: Higher the better

4. **DIVIDEND COVER**

Preference Dividend Coverage Ratio/Fixed Dividend Cover

\[ = \frac{\text{Profit After Tax}}{\text{Preference Dividend}} \]
Equity Dividend Coverage Ratio = \frac{\text{Profit After Tax - Preference Dividend}}{\text{Dividend Payable To Equity Shareholder}}

5. DIVIDEND COVER
Equity Dividend Coverage Ratio

\begin{align*}
\text{Profit After Tax - Preference Dividend} \\
\text{Dividend Payable To Equity Shareholder}
\end{align*}

6. INTEREST AND FIXED DIVIDEND COVERAGE
Interest and Fixed Dividend Coverage = \frac{\text{PAT + Debenture Interest}}{\text{Debenture Interest + Preference Dividend}}

\textbf{Decision:} Higher the better

7. LEVERAGE

Degree Of Operating Leverage = \frac{\text{\% Change in EBIT}}{\text{\% Change in Sales}} \quad \text{or} \quad \frac{\text{Contribution}}{\text{EBIT}}

Degree Of Financial Leverage

\begin{align*}
\text{\% Change in EPS} & \quad \text{EBIT} \\
\text{\% Change in EBIT} & \quad \text{EBIT - Interest} - \frac{\text{Preference Dividend}}{1 - t}
\end{align*}

Degree Of Combined Leverage

\begin{align*}
\text{\% Change in EBIT} & \quad \text{\% Change in EPS} \\
\text{\% Change in Sales} & \quad \text{EBIT} \quad \text{EBIT - Interest} - \frac{\text{Preference Dividend}}{1 - t}
\end{align*}

or

\begin{align*}
\text{\% Change in EPS} & \quad \text{EBIT} \\
\text{Contribution} & \quad \text{EBIT - Interest} - \frac{\text{Preference Dividend}}{1 - t}
\end{align*}

8. FORMAT OF COST SHEET
Opening stock of Raw Materials \quad \text{XX}
+ Purchases \( XX \)
- Closing stock \( (XX) \)
+ Direct wages \( XX \)
+ Direct expenses \( XX \)
**Prime cost** \( XX \)
+ Factory overheads \( XX \)
**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 \( XX \)
**Cost of goods sold** \( XX \)
+ Administration overheads \( XX \)
+ Selling & Distribution overheads \( XX \)
**Cost of Sales** \( XX \)
+ Profit \( XX \)
**Sales** \( XX \)

### 9. INTEREST COVERAGE RATIO (ICR)

- A ratio used to determine how easily a company can pay interest on outstanding debt.

\[
\text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Expense}}
\]

- The lower the ratio, the more the company is burdened by debt expense. An interest coverage ratio below 1 indicates the company is not generating sufficient revenues to satisfy interest expenses.

### 10. CAPITAL GEARING RATIO (CGR)

- **Formula:** Capital Gearing Ratio = \( \frac{\text{Fixed Income Bearing Funds}}{\text{Equity Shareholders' Fund}} \)

\[
= \frac{(\text{Preference Share Capital} + \text{Debentures} + \text{Long Term Loan})}{(\text{Equity Share Capital} + \text{Reserves & Surplus} - \text{Losses})}
\]

- **Decision:** Lower the better
1. INTEREST RATE FUTURES

Like any other financial product, the price of IRF is determined by demand and supply, which in turn are determined by the individual investor’s views on interest rate movements in the future.

If your view is that interest rates are going up, “Short” Interest rate futures (you profit because when interest rates go up, Bond prices come down).

If your view is that interest rates are going down, “Buy” Interest rate futures (you profit because when interest rates go down, Bond prices go up).

2. 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).

3. 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.

4. CONSTANT MIX RATIO POLICY

In this case Ratio of Equity & Debt is to be maintained at each interval and hence portfolio is rebalanced.

5. CONSTANT PROPORTION PORTFOLIO INSURANCE POLICY (CPPI)

Investment in stocks or equity is to be maintained in the following manner

\[ m \text{ (Portfolio value – Floor value)} \]

where \( m \) stands for multiplier

Floor Value & \( m \) will be given in question.
The Simple Moving Average is arguably the most popular technical analysis tool used by traders. The Simple Moving Average (SMA) is used mainly to identify trend direction, but is commonly used to generate buy and sell signals. The SMA is an average, or in statistical speak - the mean.

**Example:**
Calculate the Simple moving average, when time period is 3 and the closing prices are 25, 85, 65, 45, 95, 75, 15, 35

Given : Closing Prices = 25, 85, 65, 45, 95, 75, 15, 35  Time Period = 3 days
Calculation of SMA from 3rd day to 8th day, in time period of 3 days.

Average A3 = \( \frac{25 + 85 + 65}{3} \) = 58.3333

A4 = \( \frac{85 + 65 + 45}{3} \) = 65

A5 = \( \frac{65 + 45 + 95}{3} \) = 68.3333

A6 = \( \frac{45 + 95 + 75}{3} \) = 71.6667

A7 = \( \frac{95 + 75 + 15}{3} \) = 61.6667

A8 = \( \frac{75 + 15 + 35}{3} \) = 41.6667

**Example:**
Enter Datas = 3,4,5,6 Simple moving average day = 2
Average A2 = \( \frac{3+4}{2} \) = 3.5
Average A3 = \( \frac{4+5}{2} \) = 4.5
Average A4 = \( \frac{5+6}{2} \) = 5.5
7. EXPONENTIAL MOVING AVERAGE (EMA)

Formula: $EMA = EMA \text{ yesterday } + a \times [ \text{ Price Today } - EMA \text{ Yesterday }]$ Where $a =$ Smoothing Constant / Multiplier. It will be normally given in question. If not given than it can be calculated by using $a = \frac{2}{(N+1)}$ 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. The starting EMA will be given in question directly.

8. 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.

Short Cut Formula: Effective Interest Rate When Flat Rate is given in question:

If Instalment is payable at the end of every month: $\left( \frac{n}{n+1} \right) \times 2F$

If Instalment is payable at the beginning of every month: $\left( \frac{n}{n-1} \right) \times 2F$

9. GRAHAM & DODD MODEL OR TRADITIONAL MODEL

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

Where, $Po =$ Current Market Price Per Share, $m =$ multiplier, $D =$ Dividend Per Share, $E =$ Earning Per Share

10. TEST OF HYPOTHESIS/RUN TEST/DEGREE OF FREEDOM

Step-1: First Calculate Mean Value of $r$ & Standard Deviation in the following manner
MISCELLANEOUS LEVEL-212

Mean Value Of $r = \frac{2n_1n_2}{n_1 + n_2} + 1$ ; 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 $n_1$ refers to total number of positive changes ; $n_2$ refers to total number of negative changes.

**Step-2:** Calculate Standard Lower & Upper Limit in the following manner:

- 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 : $n_1 + n_2 - 1$

11. **Calculation of BO by Using Forward Rate or When Discount Rate is Different for Each Year**

If Forward Rate are $FR_1$, $FR_2$, $FR_3$, $FR_4$ ......... $FR_n$ for year 1, 2, 3, 4 ......... $n$ then Value of Bond will be equal to:

$$\frac{\text{Interest}}{(1 + FR_1)} + \frac{\text{Interest}}{(1 + FR_1)(1 + FR_2)} + \frac{\text{Interest}}{(1 + FR_1)(1 + FR_2)(1 + FR_3)} + \frac{\text{Interest}}{(1 + FR_1)(1 + FR_2)(1 + FR_3)(1 + FR_4)} + \ldots \ldots + \frac{\text{Interest}}{(1 + FR_1)(1 + FR_2)(1 + FR_3)(1 + FR_4)\ldots(1 + FR_n)} + \frac{\text{Maturity Value}}{(1 + FR_1)(1 + FR_2)(1 + FR_3)(1 + FR_4)\ldots(1 + FR_n)}$$

12. **Calculation of Forward Rate using YTM or Discount Rate /Expectation Theory**
Forward Rate Of Year 1 is the YTM of Year 1
Forward Rate of Year 2 It can be calculated in the following manner: \( \frac{1}{(1+\text{YTM of year 2})^2} = \frac{1}{(1+\text{Forward Rate Year 1})(1+\text{Forward Rate Year 2})} \)
Forward Rate of Year 3 It can be calculated in the following manner: \( \frac{1}{(1+\text{YTM of year 3})^3} = \frac{1}{(1+\text{Forward Rate Year 1})(1+\text{Forward Rate Year 2})(1+\text{Forward Rate Year 3})} \)

13. SIMULATION

The use of a mathematical model to imitate a situation many times in order to estimate the likelihood of various possible outcomes. A simulation is run many times (often thousands) in order to find the most likely outcome. Running simulations is important for analysts who, for example, wish to predict a security's future price movements.

14. 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 (\( C_i \)) for all the stocks according to the ranked order using the following formula:

\[
C_i = \frac{\sigma^2_m \sum_{i=1}^{N} \frac{(R_i - R_f) \times \beta_i}{\sigma^2_{ei}}}{1 + \sigma^2_m \sum_{i=1}^{N} \frac{\beta_i^2}{\sigma^2_{ei}}}
\]

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

The highest \( C_i \) 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 \( Z_i \).

\[
Z_i = \frac{\beta_i}{\sigma^2_{ei}} \left[ \frac{R_i - R_f}{\beta_i} - C^* \right]
\]

By using \( Z_i \), weights are calculated.
\textbf{Note:} When question gives the information of unsystematic risk then calculate cut off point for determining the optimum portfolio.

15. \textbf{CALCULATION OF EXPECTED VALUE OF BOND USING BETA}

\textbf{Example:}
Fair Value of Bond = RS. 942.48; Beta Of Bond Of ABC Ltd. = 1.02
Calculate Expected Value Of BOND?

\textbf{Solution:}
Expected Value $= 942.48 \times 1.02 = \text{Rs. 961.33}$

16. \textbf{HEDGEING USING RISK FREE INVESTMENTS}

\textbf{If our objective is to reduce our existing Beta (Risk)}
We should Invest in Risk Free Security

\textbf{If our objective is to increase our existing Beta (Risk)}
We should borrow the additional amount from Risk Free Security to invest in risky security

17. \textbf{BOND IMMUNIZATION}

\begin{itemize}
  \item Immunization is a strategy that ensures that a change in interest rate will not affect the expected return from a bond – portfolio. Immunization means protecting a bond portfolio from damage due to fluctuations in market interest rates.
  \item Change in interest rates affects the return from the bonds investment in two ways (i) there is change in the value of the bond and (ii) change in the income from the reinvestment.
  \item Changes in interest rates have opposite effects of change in bond values and that in reinvestment incomes. For example, an increase in interest rates hurts the bond value but it helps by increasing the return from the reinvestments and vice-versa.
  \item Immunization aims at offsetting the effects of the two changes so that the investor’s total return remains constant regardless of whether there is rise or fall in the interest rates.
  \item A portfolio is immunized when its duration equals the investor’s time horizon. In other words, if the average duration of portfolio must be equals the investor’s planned investment period.
  \item A portfolio is immunized when it is “unaffected” by interest rate changes.
\end{itemize}

\textquoteleft Detailed Coverage of this concept is not required as Bond Immunization concept is not covered in our syllabus.\textquoteright
18. REAL OPTION UNDER CAPITAL BUDGETING USING BSM

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

\[ d_1 = \frac{\ln \left( \frac{\text{Value of Business}}{\text{Value of Debt}} \right)}{\sigma \sqrt{t}} + \left( r + \frac{1}{2} \sigma^2 \right) t \]

\[ d_2 = d_1 - \sigma \sqrt{t} \]

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.

19. CONCEPT OF OPPORTUNITY COST OF OPTION TO DELAY WITH BSM

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

\[ \ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) + \left[ r - dy + .50 \sigma^2 \right] \times t \]

Where \( d_1 = \frac{1}{\sigma \times \sqrt{t}} \) \( \ln \left( \frac{\text{Current Market Price}}{\text{Exercise Price}} \right) + \left[ r - dy + .50 \sigma^2 \right] \times t \)

\[ d_2 = d_1 - \sigma \sqrt{t} \]

Where \( dy = \) 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

20. USING ELASTICITY OF DEMAND FOR CALCULATING OPERATING EXPOSURE UNDER FOREX

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 (PEoD) is:

Price Elasticity Of Demand = \( (\% \text{ Change in Quantity Demanded})/(\% \text{ Change in Price}) \)

21. VALUE OF EQUITY AS PER RISK PREMIUM APPROACH

Value of Equity Share
Actual Yield Of The Company / 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

\textbf{22. CONVEXITY}

\textbf{Meaning:} Bond prices do not change in a linear fashion. Duration, however, assumes linearity. To correct duration, we must incorporate convexity or curvature into our calculations especially for large changes in YTM.

- Bond prices and yields move in opposite directions: A bond's yield rises when its price falls, and falls when its price rises.
- When the relationship between price and yield is graphed, it produces a line that is curved, or convex and not linear.
- Convexity is calculated as follows:

\[
\text{Convexity} = \frac{1}{B_0 \times (1 + \text{YTM})^2} \times \left[ \frac{\text{Interest}}{(1 + \text{YTM})^1} + \frac{\text{Interest}}{(1 + \text{YTM})^2} + \ldots + \frac{\text{Interest + Maturity Value}}{(1 + \text{YTM})^{n}} \right] (n^2 + n)
\]
The percentage change in a bond's price =

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

### 23. UNEQUAL LIFE CASE: WHEN PROJECT IS REPEATED OR NOT REPEATED IN FUTURE

**If investment opportunities are likely to be repeated in future:**
Take Decision On The Basis Of Equated Annual Amount

**If investment opportunities are not likely to be repeated in future:**
Take Decision On The Basis Of NPV

Note: If question is silent always assume "investment opportunities are likely to be repeated in future"

### 24. CALCULATION OF TAX RATE WHEN IT IS NOT DIRECTLY GIVEN IN QUESTION

**QUESTION:**
Net income = 17.2 lakh
EBIT = 245 lakh
Interest expenses = 218.125 lakh

**SOLUTION:**

\[
\begin{align*}
\text{EBIT} &= \text{Rs. 245 lakh} \\
\text{Interest} &= \text{Rs. 218.125 lakh} \\
\text{PBT} &= \text{Rs. 26.875 lakh} \\
\text{PAT} &= \text{Rs. 17.2 lakh} \\
\text{Tax paid} &= \text{Rs. 9.675 lakh} \\
\text{Tax rate} &= \frac{\text{Rs. 9.675}}{\text{Rs. 26.875}} = 0.36 = 36%
\end{align*}
\]

### 25. EARLY DELIVERY

The bank may accept the request of customer of delivery at the before due date of forward contract provided the customer is ready to bear the loss if any that may accrue to the bank as a result of this. In addition to some prescribed fixed charges bank may also charge additional charges comprising of:

(a) **Swap Difference:**

**RULE FOR EXPORTER GIVEN BY RBI:**
BANK WILL BUY AT SPOT RATE ON DATE CUSTOMER CONTACTED BANK
BANK WILL SELL AT FORWARD RATE OF DUE DATE
DIFFERENCE WILL BE SWAP LOSS TO EXPORTER

(b) **Interest on Outlay of Funds:**
DIFFERENCE BETWEEN THE TWO RATE
BANK SPOT BUYING RATE IF PAID TODAY XXX
BANK CONTRACT BUYING RATE THAT IS PAID TODAY XXX
EXCESS PAID TODAY BY BANK DUE TO EARLY DELIVERY ___
WILL GIVE RISE TO INTEREST XXX

26. **ADJUSTMENT IN CAPM RETURN WHEN INFLATION RATE IS GIVEN**

When Inflation Rate Increases it will increase Risk Free Rate (or Bank Deposit Rate) as investor needs to compensate for rising cost.

**EXTRA NOTES:**

**How to calculate Index Value:**

Index Value = \( \frac{\text{Today's Market Capitalisation}}{\text{Yesterday's Market Capitalisation}} \times \text{Yesterday's Index Point} \)

**Example:** If the market capitalization of 10 securities (considered to be the index) as at the beginning of 01.04.2008 amount to Rs. 5 crores is taken as base and equated to 100 and at day end market capitalization amounts to Rs. 5.50 crores, then the index at the end of 01.04.2008 will be 110

\[
\text{Opening Index} \times \frac{\text{Closing Market Capitalization}}{\text{Opening Market Capitalization}} = 100 \times \frac{5.50}{5.00} = 110
\]

If at the end 02.04.2008, the market capitalization is Rs. 6.30 crores, then the index value would be 126.

\[
\text{Opening Index} \times \frac{\text{Closing Market Capitalization}}{\text{Opening Market Capitalization}} = 110 \times \frac{6.30}{5.50} = 126
\]