CA FINAL MAY 2021

ONWARDS

SFM 2.0 COMPILER

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CA FINAL (NEW) SFM COMPILER

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CHAPTER-1 FINANCIAL POLICY AND CORPORATE STRATEGY

QUESTIONS FROM STUDY MATERIAL

1. Explain the Interface of Financial Policy and Strategic Management
[ALSO ASKED IN MAY 2018 EXAM FOR 4 MARKS]
Answer:

The interface of strategic management and financial policy will be clearly understood if we appreciate the fact that the starting point of an organization is money and the end point of that organization is also money. No organization can run an existing business and promote a new expansion project without a suitable internally mobilized financial base or both i.e. internally and externally mobilized financial base.

Sources of finance and capital structure are the most important dimensions of a strategic plan. The need for fund mobilization to support the expansion activity of firm is very vital for any organization.
The generation of funds may arise out of ownership capital and or borrowed capital. A company may issue equity shares and/or preference shares for mobilizing ownership capital and debentures to raise borrowed capital. Public deposits, for a fixed time period, have also become a major source of short and medium term finance. Organizations may offer higher rates of interest than banking institutions to attract investors and raise fund. The overdraft, cash credits, bill discounting, bank loan and trade credit are the other sources of short term finance.

Along with the mobilization of funds, policy makers should decide on the capital structure to indicate the desired mix of equity capital and debt capital. There are some norms for debt equity ratio which need to be followed for minimizing the risks of excessive loans. For instance, in case of public sector organizations, the norm is 1:1 ratio and for private sector firms, the norm is 2:1 ratio.

However this ratio in its ideal form varies from industry to industry. It also depends on the planning mode of the organization. For capital intensive industries, the proportion of debt to equity is much higher. Similar is the case for high cost projects in priority sectors and for projects in under developed regions.

Another important dimension of strategic management and financial policy interface is the investment and fund allocation decisions. A planner has to frame policies for regulating investments in fixed assets and for restraining of current assets. Investment proposals mooted by different business units may be divided into three groups. One type of proposal will be for addition of a new product by the firm. Another type of proposal will be to increase the level of operation of an existing product through either an increase in capacity in the existing plant or setting up of another plant for meeting additional capacity requirement. The last is for cost reduction and efficient utilization of resources through a new approach and/or closer monitoring of the different critical activities.

Now, given these three types of proposals a planner should evaluate each one of them by making within group comparison in the light of capital budgeting exercise. In fact, project evaluation and project selection are the

two most important jobs under fund allocation. Planner's task is to make the best possible allocation under resource constraints.

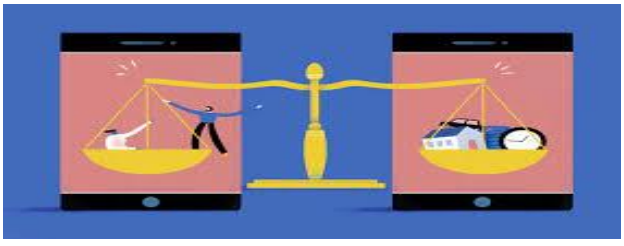
Dividend policy is yet another area for making financial policy decisions affecting the strategic performance of the company. A close interface is needed to frame the policy to be beneficial for all. Dividend policy decision deals with the extent of earnings to be distributed as dividend and the extent of earnings to be retained for future expansion scheme of the firm. From the point of view of long term funding of business growth, dividend can be considered as that part of total earnings, which cannot be profitably utilized by the company. Stability of the dividend payment is a desirable consideration that can have a positive impact on share prices.

The alternative policy of paying a constant percentage of the net earnings may be preferable from the point of view of both flexibility of the firm and ability of the firm. It also gives a message of lesser risk for the investors. Yet some other companies follow a different alternative. They pay a minimum dividend per share and additional dividend when earnings are higher than the normal earnings. In actual practice, investment opportunities and financial needs of the firm and the shareholders preference for dividend against capital gains resulting out of share are to be taken into consideration for arriving at the right dividend policy. Alternatives like cash dividend and stock dividend are also to be examined while working out an ideal dividend policy that supports and promotes the corporate strategy of the company.

Thus, the financial policy of a company cannot be worked out in isolation of other functional policies. It has a wider appeal and closer link with the overall organizational performance and direction of growth. These policies being related to external awareness about the firm, especially the awareness of the investors about the firm, in respect of its internal performance. There is always a process of evaluation active in the minds of the current and future stake holders of the company. As a result preference and patronage for the company depends significantly on the financial policy framework. Hence, attention of the corporate planners must be drawn while framing the financial policies not at a later stage but during the stage of corporate planning itself. The nature of interdependence is the crucial factor to be studied and modelled by using an in depth analytical approach. This is a very difficult task compared to usual cause and effect study because corporate strategy is the cause and financial policy is the effect and sometimes financial policy is the cause and corporate strategy is the effect.

2. Write a short note on Balancing Financial Goals vis-a-vis Sustainable Growth. [ALSO ASKED IN MTP AUGUST 2018 & APRIL 2019 - 4 MARKS]

Answer:



The concept of sustainable growth can be helpful for planning healthy corporate growth. This concept forces

managers to consider the financial consequences of sales increases and to set sales growth goals that are consistent with the operating and financial policies of the firm. Often, a conflict can arise if growth objectives are not consistent with the value of the organization's sustainable growth. Question concerning right distribution of resources may take a difficult shape if we take into consideration the rightness not for the current stakeholders but for the future stakeholders also. To take an illustration, let us refer to fuel industry where resources are limited in quantity and a judicial use of resources is needed to cater to the need of the future customers along with the need of the present customers. One may have noticed the save fuel campaign, a demarketing campaign that deviates from the usual approach of sales growth strategy and preaches for conservation of fuel for their use across generation. This is an example of stable growth strategy adopted by the oil industry as a whole under resource constraints and the long run objective of survival over years. Incremental growth strategy, profit strategy and pause strategy are other variants of stable growth strategy.

Sustainable growth is important to enterprise long-term development. Too fast or too slow growth will go against enterprise growth and development, so financial should play important role in enterprise development, adopt suitable financial policy initiative to make sure enterprise growth speed close to sustainable growth ratio and have sustainable healthy development.

The sustainable growth rate (SGR), concept by Robert C. Higgins, of a firm is the maximum rate of growth in sales that can be achieved, given the firm's profitability, asset utilization, and desired dividend payout and debt (financial leverage) ratios. The sustainable growth rate is a measure of how much a firm can grow without borrowing more money. After the firm has passed this rate, it must borrow funds from another source to facilitate growth. Variables typically include the net profit margin on new and existing revenues; the asset turnover ratio, which is the ratio of sales revenues to total assets; the assets to beginning of period equity ratio; and the retention rate, which is defined as the fraction of earnings retained in the business.

SGR = ROE x (1- Dividend payment ratio)

Sustainable growth models assume that the business wants to: 1) maintain a target capital structure without issuing new equity; 2) maintain a target dividend payment ratio; and 3) increase sales as rapidly as market conditions allow. Since the asset to beginning of period equity ratio is constant and the firm's only source of new equity is retained earnings, sales and assets cannot grow any faster than the retained earnings plus the additional debt that the retained earnings can support.

The sustainable growth rate is consistent with the observed evidence that most corporations are reluctant to issue new equity. If, however, the firm is willing to issue additional equity, there is in principle no financial constraint on its growth rate. Indeed, the sustainable growth rate formula is directly predicted on return on equity.

CHAPTER-2 RISK MANAGEMENT

QUESTIONS FROM STUDY MATERIAL

1. Explain the significance of VAR.

Answer:

VAR can be applied
(a) to measure the maximum possible loss on any portfolio or a trading position.
(b) as a benchmark for performance measurement of any operation or trading.
(c) to fix limits for individuals dealing in front office of a treasury department.
(d) to enable the management to decide the trading strategies.
(e) as a tool for Asset and Liability Management especially in banks.

2. The Financial Risk can be viewed from different perspective. Explain.

OR

Explain Financial Risk from the point of view of Stakeholder, Company and the Government.

[ALSO ASKED IN MTP MARCH 2018 & OCTOBER 2018- 4 MARKS]

Answer:

The financial risk can be evaluated from different point of views as follows:
(a) From stakeholder's point of view: Major stakeholders of a business are equity shareholders and they view financial gearing i.e. ratio of debt in capital structure of company as risk since in event of winding up of a company they will be least prioritized. Even for a lender, existing gearing is also a risk since company having high gearing faces more risk in default of payment of interest and principal repayment.
(b) From Company's point of view: From company's point of view if a company borrows excessively or lend to someone who defaults, then it can be forced to go into liquidation.
(c) From Government's point of view: From Government's point of view, the financial risk can be viewed as failure of any bank or (like Lehman Brothers) down grading of any financial institution leading to spread of distrust among society at large. Even this risk also includes willful defaulters. This can also be extended to sovereign debt crisis.

3. Consider a portfolio consisting of a Rs.20000000 investment in share XYZ and a Rs.20000000 investment in share ABC. The daily standard deviation of both shares is 1% and that the coefficient of correlation between them is 0.3. You are required to determine the 10-day 99% value at risk for the portfolio?

Answer:

The standard deviation of the daily change in the investment in each asset is Rs. 2,00,000 i.e. 2 lakhs. The variance of the portfolio's daily change is

V = 22 + 22 + 2 x 0.3 x 2 x 2 = 10.4

σ (Standard Deviation) = √3.22 lakhs 10.4

Alternatively, it can also be computed as follows:

= (1)2(0.50)2 + (1)2(0.50)2 + 2(1)(1)(0.3)(0.50)(0.50)

= 0.25 + 0.25 + 0.15 = 0.65%

σ (Standard Deviation) = 0.80623% =√0.65

σ (Standard Deviation) in Amount = Rs. 400 lakhs x 0.80623% = Rs. 3.22 lakhs

Accordingly, the standard deviation of the 10-day change is

Rs. 3.22 lakhs x = Rs.10.18 lakh

From the Normal Table we see that z score for 1% is 2.33. This means that 1% of a normal distribution lies more than 2.33 standard deviations below the mean. The 10-day 99 percent value at risk is therefore

2.33 × Rs. 10.18 lakh = Rs.23.72 lakh

PAST EXAMINATION, RTP, MTP QUESTIONS

1. **Neel holds Rs. 1 crore shares of XY Ltd. whose market price standard deviation is 2% per day. Assuming 252 trading days in a year, determine maximum loss level over the period of 1 trading day and 10 trading days with 99% confidence level. Assuming share prices are normally for level of 99%, the equivalent Z score from Normal table of Cumulative Area shall be 2.33. [MAY 2018- 4 MARKS]**

Answer:

Assuming share prices are normally distributed, for level of 99%, the equivalent Z score from Normal table of Cumulative Area is 2.33.

Volatility in terms of rupees is: 2% of Rs. 1 Crore = Rs. 2 lakh

The maximum loss for 1 day at 99% Confidence Level is Rs. 2 lakh x 2.33 = Rs. 4.66 lakh,

and expected maximum loss for 10 trading days shall be: SSSS√10 x Rs. 4.66 lakh = 14.73 lakhs or 14.74 lakhs

2. How different stakeholders view the financial risk? [NOV 2018 - 4 MARKS]

Answer:

The financial risk can be viewed by different stakeholders as follows:

(i) From shareholder's and lender's point of view: Major stakeholders of a business are equity shareholders and they view financial gearing i.e. ratio of debt in capital structure of company as risk since in the event of winding up of a company they will be least be given priority. Even for a lender, existing gearing is also a risk since company having high gearing faces more risk in default of payment of interest and principal repayment.

(ii) From Company's point of view: From company's point of view if a company borrows excessively or lend to someone who defaults, then it can be forced to go into liquidation.

(iii) From Government's point of view: From Government's point of view, the financial risk can be viewed as failure of any bank (like Lehman Brothers) or down grading of any financial institution leading to spread of distrust among society at large. Even this risk also includes willful defaulters. This can also be extended to sovereign debt crisis.

3. List the main applications of Value At Risk (VAR). [MAY 2019 -4 MARKS]

Answer:

Applications of Value at Risk (VAR)

VAR can be applied

(a) to measure the maximum possible loss on any portfolio or a trading position.

(b) as a benchmark for performance measurement of any operation or trading.

(c) to fix limits for individuals dealing in front office of a treasury department.

(d) to enable the management to decide the trading strategies.

(e) as a tool for Asset and Liability Management especially in banks.

4. Explain features of Value at Risk (VAR). [MTP APRIL 2018 & AUGUST 2018 4 MARKS]

Answer:

Explanation of four features of VAR are as below:

(i) Components of Calculations: VAR calculation is based on following three components:

(a) Time Period

(b) Confidence Level – Generally 95% and 99%

(c) Loss in percentage or in amount

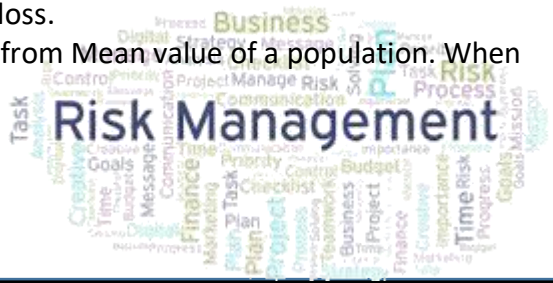
(ii) Statistical Method: It is a type of statistical tool based on Standard Deviation.

(iii) Time Horizon: VAR can be applied for different time horizons say one day, one week, one month and so on.

(iv) Probability: Assuming the values are normally attributed, probability of maximum loss can be predicted.

(v) Control Risk: Risk can be controlled by selling limits for maximum loss.

(vi) Z score: Z score indicates how many standard Deviations is away from Mean value of a population. When it is multiplied with Standard Deviation it provides VAR.



5. Briefly explain Counter Party Risk and the various techniques to manage this risk. [MTP OCTOBER 2019 -4 MARKS]

Answer:

The various hints that may provide counter party risk are as follows:
(a) Failure to obtain necessary resources to complete the project or transaction undertaken.
(b) Any regulatory restrictions from the Government.
(c) Hostile action of foreign government.
(d) Let down by third party.
(e) Have become insolvent.

The various techniques to manage this type of risk are as follows:

(1) Carrying out Due Diligence before dealing with any third party.
(2) Do not over commit to a single entity or group or connected entities.
(3) Know your exposure limits.
(4) Review the limits and procedure for credit approval regularly.
(5) Rapid action in the event of any likelihood of defaults.
(6) Use of performance guarantee, insurance or other instruments.

6. Explain some of the parameters to identify the currency risk.[MTP OCTOBER 2019 - 4 MARKS]

Answer:

Some of the parameters to identity the currency risk are as follows:
(1) Government Action: The Government action of any country has visual impact in its currency.
For example, the UK Govt. decision to divorce from European Union i.e. Brexit brought the pound to its lowest since 1980's.
(2) Nominal Interest Rate: As per interest rate parity (IRP) the currency exchange rate depends on the nominal interest of that country.
(3) Inflation Rate: Purchasing power parity theory impact the value of currency.
(4) Natural Calamities: Any natural calamity can have negative impact.
(5) War, Coup, Rebellion etc.: All these actions can have far reaching impact on currency's exchange rates.
(6) Change of Government: The change of government and its attitude towards foreign investment also helps to identify the currency risk.

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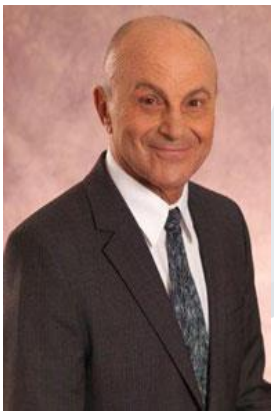
CHAPTER-3 SECURITY ANALYSIS

QUESTIONS FROM STUDY MATERIAL

1. Explain the Efficient Market Theory in and what are major misconceptions about this theory?
Answer:



Efficient Market Theory was developed by University of Chicago professor **Eugen Fama** in the 1960s. As per this theory, at any given time, all available price sensitive information is fully reflected in securities' prices. Thus this theory implies that no investor can consistently outperform the market as every stock is appropriately priced based on available information. Stating otherwise theory states that no none can "beat the market" hence making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices as stocks are always traded at their fair value on stock exchanges. Hence it is impossible to outperform the overall market through expert stock selection or market timing and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments.

Misconception about Efficient Market Theory:
Efficient Market Theory implies that market prices factor in all available information and as such it is not possible for any investor to earn consistent long term returns from market operations.
Although price tends to fluctuate they cannot reflect fair value. This is because the future is uncertain. The market springs surprises continually and as prices reflect the surprises they fluctuate.
Inability of institutional portfolio managers to achieve superior investment performance implies that they lack competence in an efficient market. It is not possible to achieve superior investment performance since market efficiency exists due to portfolio managers doing this job well in a competitive setting.
The random movement of stock prices suggests that stock market is irrational. Randomness and irrationality are two different things, if investors are rational and competitive, price changes are bound to be random.

2. Explain Dow Jones theory.
[ALSO ASKED IN MTP MARCH 2018 6 MARKS | MTP OCTOBER 2018 - 5 MARKS]
Answer:
The Dow Theory
is one of the oldest and most famous technical theories. It was originated by
Charles Dow, the founder of Dow Jones Company in late nineteenth century. It is a helpful tool for determining the relative strength of the stock market. It can also be used as a barometer of business.
The Dow Theory is based upon the movements of two indices, constructed by Charles Dow, Dow Jones Industrial Average (DJIA) and Dow Jones Transportation Average (DJTA). These averages reflect the aggregate impact of all kinds of information on the market. The movements of the market are divided into three classifications, all going at the same time; the primary movement, the secondary movement, and the daily

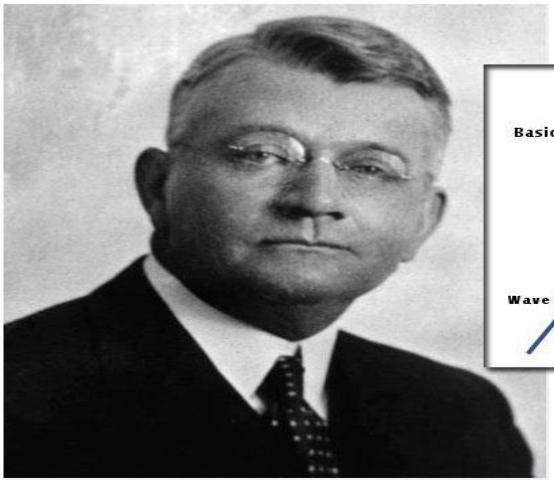
fluctuations. The primary movement is the main trend of the market, which lasts from one year to 36 months or longer. This trend is commonly called bear or bull market. The secondary movement of the market is shorter in duration than the primary movement, and is opposite in direction. It lasts from two weeks to a month or more. The daily fluctuations are the narrow movements from day-to-day. These fluctuations are not part of the Dow Theory interpretation of the stock market. However, daily movements must be carefully studied, along with primary and secondary movements, as they go to make up the longer movement in the market.
Thus, the Dow Theory's purpose is to determine where the market is and where is it going, although not how far or high. The theory, in practice, states that if the cyclical swings of the stock market averages are successively higher and the successive lows are higher, then the market trend is up and a bullish market exists. Contrarily, if the successive highs and successive lows are lower, then the direction of the market is down and a bearish market exists.

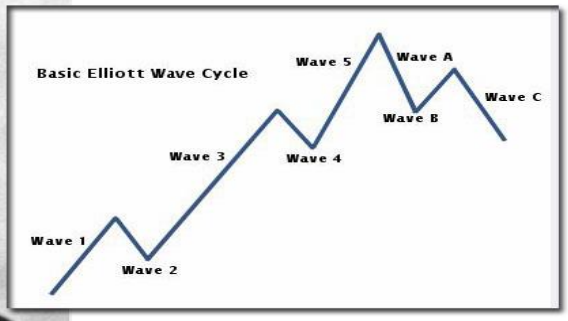
Charles Dow proposed that the primary uptrend would have three moves up, the first one being caused by accumulation of shares by the far-sighted, knowledgeable investors, the second move would be caused by the arrival of the first reports of good earnings by corporations, and the last move up would be caused by widespread report of financial well-being of corporations. The third stage would also see rampant speculation in the market. Towards the end of the third stage, the farsighted investors, realizing that the high earnings levels may not be sustained, would start selling, starting the first move down of a downtrend, and as the non-sustainability of high earnings is confirmed, the second move down would be initiated and then the third move down would result from distress selling in the market.

3. Explain the Elliot Theory of technical analysis.

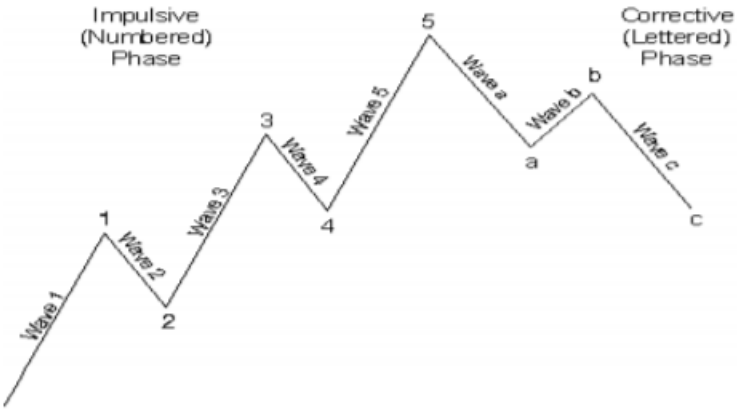
Answer:

Inspired by the Dow Theory and by observations found throughout nature, Ralph Elliot formulated Elliot Wave Theory in 1934. This theory was based on analysis of 75 years stock price movements and charts. From his studies, he defined price movements in terms of waves. Accordingly, this theory was named Elliot Wave Theory. Elliot found that the markets exhibited certain repeated patterns or waves. As per this theory wave is a movement of the market price from one change in the direction to the next change in the same direction. These waves are resulted from buying and selling impulses emerging from the demand and supply pressures on the market. Depending on the demand and supply pressures, waves are generated in the prices.
As per this theory, waves can be classified into two parts:-
(a) Impulsive Patterns-(Basic Waves) - In this pattern there will be 3 or 5 waves in a given direction (going upward or downward). These waves shall move in the direction of the basic movement.
This movement can indicate bull phase or bear phase.
(b) Corrective Patterns- (Reaction Waves) - These 3 waves are against the basic direction of the basic movement. Correction involves correcting the earlier rise in case of bull market and fall in case of bear market.
As shown in the following diagram waves 1, 3 and 5 are directional movements, which are separated or corrected by wave 2 & 4, termed as corrective movements.





Complete Cycle -As shown in following figure five-wave impulses is following by a three wave correction (a, b & c) to form a complete cycle of eight waves.



One complete cycle consists of waves made up of two distinct phases, bullish and bearish. On completion of full one cycle i.e. termination of 8 waves movement, the fresh cycle starts with similar impulses arising out of market trading.

4. Explain the various indicators that can be used to assess the performance of an economy.
OR
Discuss the various techniques used in economic analysis.
[ALSO ASKED IN MTP APRIL 2019 & OCTOBER 2019 -5 MARKS / 4 MARKS]
Answer:

Economic analysis is used to forecast national income with its various components that have a bearing on the concerned industry and the company in particular. Gross national product (GNP) is used to measure national income as it reflects the growth rate in economic activities and has been regarded as a forecasting tool for analyzing the overall economy along with its various components during a particular period.

Some of the techniques used for economic analysis are:

(a) Anticipatory Surveys: They help investors to form an opinion about the future state of the economy. It incorporates expert opinion on construction activities, expenditure on plant and machinery, levels of inventory – all having a definite bearing on economic activities. Also future spending habits of consumers are taken into account.

In spite of valuable inputs available through this method, it has certain drawbacks:

(i) Survey results do not guarantee that intentions surveyed would materialize.
(ii) They are not regarded as forecasts per se, as there can be a consensus approach by the investor for exercising his opinion. Continuous monitoring of this practice is called for to make this technique popular.

(b) Barometer/Indicator Approach: Various indicators are used to find out how the economy shall perform in the future. The indicators have been classified as under:

(i) *Leading Indicators*: They lead the economic activity in terms of their outcome. They relate to the time series data of the variables that reach high/low points in advance of economic activity.

(ii) *Roughly Coincidental Indicators*: They reach their peaks and troughs at approximately the same in the economy.

(iii) *Lagging Indicators*: They are time series data of variables that lag behind in their consequences vis-a- vis the economy. They reach their turning points after the economy has reached its own already. All these approaches suggest direction of change in the aggregate economic activity but nothing about its magnitude. The various measures obtained form such indicators may give conflicting signals about the future direction of the economy. To avoid this limitation, use of diffusion/composite index is suggested whereby combining several indicators into one index to measure the strength/weaknesses in the movement of a particular set of indicators. Computation of diffusion indices is no doubt difficult notwithstanding the fact it does not eliminate irregular movements.

Money supply in the economy also affects investment decisions. Rate of change in money supply in the economy affects GNP, corporate profits, interest rates and stock prices. Increase in money supply fuels inflation. As investment in stocks is considered as a hedge against inflation, stock prices go up during inflationary period.

(c) Economic Model Building Approach: In this approach, a precise and clear relationship between dependent and independent variables is determined. GNP model building or sectoral analysis is used in practice through the use of national accounting framework. The steps used are as follows:

(i) Hypothesize total economic demand by measuring total income (GNP) based on political stability, rate of inflation, changes in economic levels.

(ii) Forecasting the GNP by estimating levels of various components viz. consumption expenditure, gross private domestic investment, government purchases of goods/services, net exports.

(iii) After forecasting individual components of GNP, add them up to obtain the forecasted GNP.

(iv) Comparison is made of total GNP thus arrived at with that from an independent agency for the forecast of GNP and then the overall forecast is tested for consistency. This is carried out for ensuring that both the total forecast and the component wise forecast fit together in a reasonable manner.

5. Closing values of BSE Sensex from 6th to 17th day of the month of January of the year 2020 were as follows:

Days	Date	Day	Sensex
1	6	THU	14522
2	7	FRI	14925
3	8	SAT	No Trading
4	9	SUN	No Trading
5	10	MON	15222
6	11	TUE	16000
7	12	WED	16400
8	13	THU	17000
9	14	FRI	No Trading
10	15	SAT	No Trading
11	16	SUN	No Trading
12	17	MON	18000

Calculate Exponential Moving Average (EMA) of Sensex during the above period. The previous day exponential moving average of Sensex can be assumed as 15,000. The value of exponent for 31 days EMA is 0.062. Give detailed analysis on the basis of your calculations.
[ALSO ASKED IN MTP MARCH 2018- 7 MARKS]

Answer:

Date	1 Sensex	2 EMA for Previous day	3 1-2	4 3×0.062	5 EMA 2 ± 4
6	14522	15000	(478)	(29.636)	14970.364
7	14925	14970.364	(45.364)	(2.812)	14967.55
10	15222	14967.55	254.45	15.776	14983.32
11	16000	14983.32	1016.68	63.034	15046.354
12	16400	15046.354	1353.646	83.926	15130.28
13	17000	15130.28	1869.72	115.922	15246.202
17	18000	15246.202	2753.798	170.735	15416.937

Conclusion – The market is bullish. The market is likely to remain bullish for short term to medium term if other factors remain the same. On the basis of this indicator (EMA) the investors/brokers can take long position.

6. The closing value of Sensex for the month of October, 2007 is given below:

Date Closing	Sensex Value
1.10.07	2800
3.10.07	2780
4.10.07	2795
5.10.07	2830
8.10.07	2760
9.10.07	2790
10.10.07	2880
11.10.07	2960
12.10.07	2990
15.10.07	3200
16.10.07	3300
17.10.07	3450
19.10.07	3360
22.10.07	3290
23.10.07	3360
24.10.07	3340
25.10.07	3290
29.10.07	3240
30.10.07	3140
31.10.07	3260

You are required to test the weak form of efficient market hypothesis by applying the run test at 5% and 10% level of significance.
Following value can be used :
Value of t at 5% is 2.101 at 18 degrees of freedom
Value of t at 10% is 1.734 at 18 degrees of freedom

Answer:

Date	Closing Sensex	Sign of Price Charge
1.10.07	2800	
3.10.07	2780	-
4.10.07	2795	+
5.10.07	2830	+
8.10.07	2760	-
9.10.07	2790	+
10.10.07	2880	+
11.10.07	2960	+
12.10.07	2990	+
15.10.07	3200	+
16.10.07	3300	+
17.10.07	3450	+
19.10.07	3360	-
22.10.07	3290	-
23.10.07	3360	+
24.10.07	3340	-
25.10.07	3290	-
29.10.07	3240	-
30.10.07	3140	-
31.10.07	3260	+

Total of sign of price changes (r) = 8

No of Positive changes = $n_1 = 11$

No. of Negative changes = $n_2 = 8$

$$\mu_r = \frac{2n_1n_2}{n_1+n_2}+1$$

$$\mu = \frac{2\times11\times8}{11+8}+1 = 176/19 + 1 = 10.26$$

$$\hat{\sigma}_r = \sqrt{\frac{2n_1n_2(2n_1n_2-n_1-n_2)}{(n_1+n_2)^2(n_1+n_2-1)}}$$

$$\hat{\sigma}_r = \sqrt{\frac{(2\times11\times8)\,(2\times11\times8-11-8)}{(11+8)^2(11+8-1)}} = \sqrt{\frac{176\times157}{(19)^2(18)}} = \sqrt{4.252} = 2.06$$

Since too few runs in the case would indicate that the movement of prices is not random. We employ a two- tailed test the randomness of prices.
Test at 5% level of significance at 18 degrees of freedom using t- table

The lower limit

$= \mu - t \times \hat{\sigma}_r = 10.26 - 2.101 \times 2.06 = 5.932$

Upper limit

$= \mu + t \times \hat{\sigma}_r = 10.26 + 2.101 \times 2.06 = 14.588$

At 10% level of significance at 18 degrees of freedom

Lower limit

$= 10.26 - 1.734 \times 2.06 = 6.688$

Upper limit

$= 10.26 + 1.734 \times 2.06 = 13.832$

As seen r lies between these limits. Hence, the market exhibits weak form of efficiency.

*For a sample of size n, the t distribution will have n-1 degrees of freedom.

PAST EXAMINATION, RTP, MTP QUESTIONS

7. Closing values of BSE Sensex from 6th to 17th day of the month of January of the year 200 X were as follows:

Days	Date	Day	Sense x
1	6	THU	29522
2	7	FRI	29925
3	8	SAT	No Trading
4	9	SUN	No Trading
5	10	MON	30222
6	11	TUE	31000
7	12	WED	31400
8	13	THU	32000
9	14	FRI	No Trading
10	15	SAT	No Trading
11	16	SUN	No Trading
12	17	MON	33000

Compute Exponential Moving Average (EMA) of Sensex during the above period. The 30 days simple moving average of Sensex can be assumed as 30,000. The value of exponent for 30 days EMA is 0.062. Provide detailed analysis on the basis of your calculations.
[MAY 2018- - MARKS]
Answer:

Date	1 Sensex	2 EMA for Previous day	3 1-2	4 3×0.062	5 EMA 2 ± 4
6	29522	30000	(478)	(29.636)	**29970.364**
7	29925	29970.364	(45.364)	(2.812)	**29967.55**
10	30222	29967.55	254.45	15.776	**29983.32**
11	31000	29983.32	1016.68	63.034	**30046.354**
12	31400	30046.354	1353.646	83.926	**30130.28**
13	32000	30130.28	1869.72	115.922	**30246.202**
17	33000	30246.202	2753.798	170.735	**30416.937**

Conclusion – The market is bullish. The market is likely to remain bullish for short term to medium term if other factors remain the same. On the basis of this indicator (EMA) the investors/brokers can take long position.

8. Describe the concept of 'Evaluation of Technical Analysis
[MTP MARCH 2019- 4 MARKS]
Answer:

Evaluation of Technical Analysis

Technical Analysis has several supporters as well several critics. The advocates of technical analysis offer the following interrelated argument in their favour:

(a) Under influence of crowd psychology trend persist for some time. Tools of technical analysis help in identifying these trends early and help in investment decision making.

(b) Shift in demand and supply are gradual rather than instantaneous. Technical analysis helps in detecting this shift rather early and hence provides clues to future price movements.

(c) Fundamental information about a company is observed and assimilated by the market over a period of time. Hence price movement tends to continue more or less in same direction till the information is fully assimilated in the stock price. Detractors of technical analysis believe that it is an useless exercise; their arguments are as follows:

(a) Most technical analysts are not able to offer a convincing explanation for the tools employed by Them.

(b) Empirical evidence in support of random walk hypothesis cast its shadow over the usefulness of technical analysis.

(c) By the time an uptrend and down trend may have been signaled by technical analysis it may already have taken place.

(d) Ultimately technical analysis must be self-defeating proposition. With more and more people employing it, the value of such analysis tends to decline.

In a nutshell, it may be concluded that in a rational, well ordered and efficient market, technical analysis may not work very well. However with imperfection, inefficiency and irrationalities that characterizes the real world market, technical analysis may be helpful. If technical analysis is used in conjunction with fundamental analysis, it might be useful in providing proper guidance to investment decision makers.

9. Explain various Market Indicators- (MTP-OCT 2020)
Answer:

Following are major Market Indicators:
(i) Breadth Index: It is an index that covers all securities traded. It is computed by dividing the net advances or declines in the market by the number of issues traded. The breadth index either supports or contradicts the movement of the Dow Jones Averages. If it supports the movement of the Dow Jones Averages, this is considered sign of technical strength and if it does not support the averages, it is a sign of technical weakness i.e. a sign that the market will move in a direction opposite to the Dow Jones Averages. The breadth index is an addition to the Dow Theory and the movement of the Dow Jones Averages.
(ii) Volume of Transactions: The volume of shares traded in the market provides useful clues on how the market would behave in the near future. A rising index/price with increasing volume would signal buy behavior because the situation reflects an unsatisfied demand in the market. Similarly, a falling market with increasing volume signals a bear market and the prices would be expected to fall further. A rising market with decreasing volume indicates a bull market while a falling market with dwindling volume indicates a bear market. Thus, the volume concept is best used with another market indicator, such as the Dow Theory.
(iii) Confidence Index*:* It is supposed to reveal how willing the investors are to take a chance in the market. It is the ratio of high-grade bond yields to low-grade bond yields. It is used by market analysts as a method of trading or timing the purchase and sale of stock, and also, as a forecasting device to determine the turning points of the market. A rising confidence index is expected to precede a rising stock market, and a fall in the index is expected to precede a drop in stock prices. A fall in the confidence index represents the fact that low-grade bond yields are rising faster or falling more slowly than high grade yields. The confidence index is usually, but not always a leading indicator of the market. Therefore, it should be used in conjunction with other market indicators.
(iv) Relative Strength Analysis: The relative strength concept suggests that the prices of some securities rise relatively faster in a bull market or decline more slowly in a bear market than other securities i.e. some securities exhibit relative strength. Investors will earn higher returns by investing in securities which have demonstrated relative strength in the past because the relative strength of a security tends to remain undiminished over time. Relative strength can be measured in several ways. Calculating rates of return and classifying those securities with historically high average returns as securities with high relative strength is one

of them. Even ratios like security relative to its industry and security relative to the entire market can also be used to detect relative strength in a security or an industry.

(v) Odd - Lot Theory*:* This theory is a contrary - opinion theory. It assumes that the average person is usually wrong and that a wise course of action is to pursue strategies contrary to popular opinion. The odd-lot theory is used primarily to predict tops in bull markets, but also to predict reversals in individual securities.

CHAPTER-4 SECURITY VALUATION

QUESTIONS FROM STUDY MATERIAL

1. Why should the duration of a coupon carrying bond always be less than the time to its maturity?
Answer:
Duration is the weighted average time within which an investor gets back the promised principal and the promised YTM. Investment coupon bearing bond always has a duration which is lesser than its maturity. Higher the coupon rate, lesser would be the duration and higher the yield-to-maturity, lower will be the duration of a bond.
It measures how quickly a bond will repay its true cost. The longer the time it takes the greater exposure the bond has to changes in the interest rate environment and hence, higher interest rate risk. Duration is also a measure of interest rate risk – higher duration implies higher interest rate risk and lower duration means lower interest rate risk. Following are some of factors that affect bond's duration:
(i) Time to maturity: The shorter-maturity bond would have a lower duration and less interest rate risk and vice versa.
(ii) Coupon rate: Coupon payment is a key factor in calculation of duration of bonds. The higher the coupon, the lower is the duration and vice versa.
(iii) Yield-to-Maturity (YTM): Higher yield-to-maturity means lower duration and hence, lower interest rate risk and vice versa.

2. Write short notes on Zero coupon bonds.
Answer:
As name indicates these bonds do not pay interest during the life of the bonds. Instead, zero coupon bonds are issued at discounted price to their face value, which is the amount a bond will be worth when it matures or comes due. When a zero coupon bond matures, the investor will receive one lump sum (face value) equal to the initial investment plus interest that has been accrued on the investment made.

The maturity dates on zero coupon bonds are usually long term. These maturity dates allow an investor for a long range planning. Zero coupon bonds issued by banks, government and private sector companies. However, bonds issued by corporate sector carry a potentially higher degree of risk, depending on the financial strength of the issuer and longer maturity period, but they also provide an opportunity to achieve a higher return.

3. A company has a book value per share of Rs. 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, compute is the price of the share today using both Dividend Growth Model and Walter's Model.

Answer:

The company earnings and dividend per share after a year are expected to be:

EPS = ₹ 137.8 × 0.15 = ₹ 20.67

Dividend = 0.40 × 20.67 = ₹ 8.27

The growth in dividend would be:

g = 0.6 × 0.15 = 0.09

(a) As per Dividend Growth Model

$$\text{Perpetual growth model Formula}: P_0 = \frac{\text{Dividend}}{K_e - g}$$

$$P_0 = \frac{8.27}{0.18 - 0.09}$$

$$P_0 = ₹\ 91.89$$

(b) Walter's approach showing relationship between dividend and share price can be expressed by the following formula

$$V_c = \frac{D + \frac{R_a}{R_c}(E - D)}{R_c}$$

Where,

V_c = Market Price of the ordinary share of the company.

R_a = Return on internal retention i.e. the rate company earns on retained profits.

R_c = Capitalisation rate i.e. the rate expected by investors by way of return from particular category of shares.

E = Earnings per share.

D = Dividend per share.

Hence,

$$V_c = \frac{8.27 + \frac{.15}{.18}(20.67 - 8.27)}{.18} = \frac{18.60}{.18}$$

$$= ₹\ 103.35$$

4. ABC Limited's shares are currently selling at Rs. 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise Rs. 20 lakhs to Finance a new project.
Required:
What are the ex-right price of shares and the value of a right, if
(i) The firm offers one right share for every two shares held.
(ii) The firm offers one right share for every four shares held.
(iii) How does the shareholders' wealth (holding 100 shares) change from (i) to (ii)? How does right issue increases shareholders' wealth?
Answer:

(i) Number of shares to be issued : 5,00,000

Subscription price ₹ 20,00,000 / 5,00,000 = ₹ 4

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{15,00,000} = ₹\ 10$$

Value of a Right = ₹ 10 – ₹ 4 = ₹ 6

$$\text{Value of a Right Per Share Basis} = \frac{₹10 - ₹4}{2} = ₹3$$

(ii) Subscription price ₹ 20,00,000 / 2,50,000 = ₹ 8

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{12,50,000} = ₹\ 12$$

Value of a Right = ₹ 12 – ₹ 8 = ₹ 4

$$\text{Value of a Right Per Share} = \frac{₹12 - ₹8}{4} = ₹1$$

(iii) Calculation of effect of right issue on wealth of Shareholder's wealth who is holding 100 shares.

(a) When firm offers one share for two shares held.

Value of Shares after right issue (150 X ₹ 10)	₹ 1,500
Less: Amount paid to acquire right shares (50X₹4)	₹ 200
	₹ 1,300

(b) When firm offers one share for every four shares held.

Value of Shares after right issue (125 X ₹ 12)	₹ 1,500
Less: Amount paid to acquire right shares (25X₹8)	₹ 200
	₹ 1,300

(c) Wealth of Shareholders before Right Issue ₹ 1,300

Thus, there will be no change in the wealth of shareholders from (i) and (ii).

5. MNP Ltd. has declared and paid annual dividend of Rs. 4 per share. It is expected to grow @ 20% for the next two years and 10% thereafter. The required rate of return of equity investors is 15%. Compute the current price at which equity shares should sell.
Note: Present Value Interest Factor (PVIF) @ 15%:
For year 1 = 0.8696;
For year 2 = 0.7561

Answer:

D_0 = ₹ 4

D_1 = ₹ 4 (1.20) = ₹ 4.80

D_2 = ₹ 4 $(1.20)^2$ = ₹ 5.76

D_3 = ₹ 4 $(1.20)^2$ (1.10) = ₹ 6.336

$$P = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \frac{TV}{(1+k_e)^2}$$

$$TV = \frac{D_3}{k_e - g} = \frac{6.336}{0.15-0.10} = 126.72$$

$$P = \frac{4.80}{(1+0.15)} + \frac{5.76}{(1+0.15)^2} + \frac{126.72}{(1+0.15)^2}$$

= 4.80 x 0.8696 + 5.76 x 0.7561 + 126.72 x 0.7561 = 104.34

6.

On the basis of the following information:

Current dividend (Do)	=	₹ 2.50
Discount rate (k)	=	10.5%
Growth rate (g)	=	2%

(i) Calculate the present value of stock of ABC Ltd.

(ii) Is its stock overvalued if stock price is ₹ 35, ROE = 9% and EPS = ₹ 2.25? Show detailed calculation. Using PE Multiple Approach and Earning Growth Model.

Answer:

(i) Present Value of the stock of ABC Ltd. Is:-

$$Vo = \frac{2.50(1.02)}{0.105-0.02} = ₹30/-.$$

(ii) (A) **Value of stock under the PE Multiple Approach**

Particulars	
Actual Stock Price	₹ 35.00
Return on equity	9%
EPS	₹ 2.25
PE Multiple (1/Return on Equity) = 1/9%	11.11
Market Price per Share	₹ 25.00

Since, Actual Stock Price is higher, hence it is overvalued.

(B) **Value of the Stock under the Earnings Growth Model**

Particulars	
Actual Stock Price	₹ 35.00
Return on equity	9%
EPS	₹ 2.25
Growth Rate	2%
Market Price per Share [EPS ×(1+g)]/(K_e – g) = ₹ 2.25 × 1.02/0.07	₹ 32.79

Since, Actual Stock Price is higher, hence it is overvalued.

7. X Limited, just declared a dividend of Rs. 14.00 per share. Mr. B is planning to purchase the share of X Limited, anticipating increase in growth rate from 8% to 9%, which will continue for three years. He also expects the market price of this share to be Rs. 360.00 after three years.
You are required to determine:

i The maximum amount Mr. B should pay for shares, if he requires a rate of return of 13% per annum.

ii The maximum price Mr. B will be willing to pay for share, if he is of the opinion that the 9% growth can be maintained indefinitely and require 13% rate of return per annum.

iii The price of share at the end of three years, if 9% growth rate is achieved and assuming other conditions remaining same as in (ii) above.

Calculate rupee amount up to two decimal points.

	Year-1	Year-2	Year-3
FVIF @ 9%	1.090	1.188	1.295
FVIF @ 13%	1.130	1.277	1.443
PVIF @ 13%	0.885	0.783	0.693

Answer:

DIVIDEND

(i) Expected dividend for next 3 years.

Year 1 (D_1) ₹ 14.00 (1.09) = ₹ 15.26

Year 2 (D_2) ₹ 14.00 $(1.09)^2$ = ₹ 16.63

Year 3 (D_3) ₹ 14.00 $(1.09)^3$ = ₹ 18.13

Required rate of return = 13% (Ke)

Market price of share after 3 years = (P_3) = ₹ 360

The present value of share

$$P_0 = \frac{D_1}{(1+ke)} + \frac{D_2}{(1+ke)^2} + \frac{D_3}{(1+ke)^3} + \frac{P_3}{(1+ke)^3}$$

$$P_0 = \frac{15.26}{(1+0.13)} + \frac{16.63}{(1+0.13)^2} + \frac{18.13}{(1+0.13)^3} + \frac{360}{(1+0.13)^3}$$

P_0 = 15.26(0.885) + 16.63(0.783) +18.13(0.693)+360(0.693)

P_0 = 13.50 + 13.02 + 12.56 + 249.48

P_0 = ₹ 288.56

(ii) If growth rate 9% is achieved for indefinite period, then maximum price of share should Mr. A willing be to pay is

$$P_0 = \frac{D_1}{(ke-g)} = \frac{₹\ 15.26}{0.13\text{-}0.09} = \frac{₹15.26}{0.04} = ₹\ 381.50$$

(iii) Assuming that conditions mentioned above remain same, the price expected after 3 years will be:

$$P_3 = \frac{D_4}{k_e - g} = \frac{D_3(1.09)}{0.13-0.09} = \frac{18.13\times 1.09}{0.04} = \frac{19.76}{0.04} = ₹\ 494$$

8. Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has a share price of Rs. 20.00.
(i) If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend-discount model approach?
(ii) Instead of this situation in part (i), suppose that the dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter. Now what is the firm's expected, or required, return on equity?
Answer:
(i) Firm's Expected or Required Return on Equity
(Using a dividend discount model approach)
According to Dividend discount model approach the firm's expected or required return on equity is computed as follows:

$$K_e = \frac{D_1}{P_0} + g$$

Where,
Ke = Cost of equity share capital or (Firm's expected or required return on equity share capital)
D1 = Expected dividend at the end of year 1
P0 = Current market price of the share.
g = Expected growth rate of dividend.

Now, $D_1 = D_0 (1 + g)$ or ₹ 1 (1 + 0.12) or ₹ 1.12, P_0 = ₹ 20 and g = 12% per annum

Therefore, $K_e = \frac{₹ 1.12}{₹ 20} + 12\%$

Or, K_e = ₹ 17.6%

(ii) Firm's Expected or Required Return on Equity

(If dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter)

Since in this situation if dividends are expected to grow at a super normal growth rate g_s, for n years and thereafter, at a normal, perpetual growth rate of g_n beginning in the year n + 1, then the cost of equity can be determined by using the following formula:

$$P_0 = \sum_{t=1}^{n} \frac{Div_0 (1+ g_s)^t}{(1+ K_e)^t} + \frac{Div_{n+1}}{K_e - g_n}$$

Where,

g_s = Rate of growth in earlier years.

g_n = Rate of constant growth in later years.

P_0 = Discounted value of dividend stream.

K_e = Firm's expected, required return on equity (cost of equity capital).

Now,

g_s = 20% for 5 years, g_n = 10%

Therefore,

$$P_0 = \sum_{t=1}^{n} \frac{D_0 (1+ 0.20)^t}{(1+ K_e)^t} + \frac{Div_{5+1}}{K_e - 0.10} \times \frac{1}{(1+ K_e)^t}$$

$$_0 = \frac{1.20}{(1+)^1} + \frac{1.44}{(1+)^2} + \frac{1.73}{(1+)^3} + \frac{2.07}{(1+)^4} + \frac{2.49}{(1+)^5} + \frac{2.49(1+0.10)}{-0.10} \times \frac{1}{(1+)^5}$$

or P_0 = ₹ 1.20 (PVF_1, K_e) + ₹ 1.44 (PVF_2, K_e) + ₹ 1.73 (PVF_3, K_e) + ₹ 2.07

$$(PVF_4, K_e) + ₹\ 2.49\ (PVF_5, K_e) + \frac{Rs.2.74\,(PVF_5, K_e)}{K_e - 0.10}$$

By trial and error we are required to find out K_e

Now, assume K_e = 18% then we will have

P_0 = ₹ 1.20 (0.8475) + ₹ 1.44 (0.7182) + ₹ 1.73 (0.6086) + ₹ 2.07 (0.5158) + ₹ 2.49 (0.4371) + ₹ 2.74 (0.4371) $\times \frac{1}{0.18 - 0.10}$

= ₹ 1.017 + ₹ 1.034 + ₹ 1.053 + ₹ 1.068 + ₹ 1.09 + ₹ 14.97= ₹ 20.23

Since the present value of dividend stream is more than required it indicates that Ke is greater than 18%.

Now, assume K_e = 19% we will have

P_0 = ₹ 1.20 (0.8403) + ₹ 1.44 (0.7061) + ₹ 1.73 (0.5934) + ₹ 2.07 (0.4986) + ₹ 2.49 (0.4190) + ₹ 2.74 (0.4190) $\times \frac{1}{0.19 - 0.10}$

= ₹ 1.008 + ₹ 1.017 + ₹ 1.026+ ₹ 1.032 + ₹ 1.043 + ₹ 12.76

= ₹ 17.89

Since the market price of share (expected value of dividend stream) is ₹ 20. Therefore, the discount rate is closer to 18% than it is to 19%, we can get the exact rate by interpolation by using the following formula:

$$K_e = LR + \frac{NPV\ at\ LR}{NPV\ at\ LR - NPV\ at\ HR} \times \Delta r$$

Where,

LR = Lower Rate

NPV at LR = Present value of share at LR

NPV at HR = Present value of share at Higher Rate

Δr = Difference in rates

$$K = 18\% + \frac{(₹20.23 - ₹20)}{₹20.23 - ₹17.89} \times 1\%$$

$$= 18\% + \frac{₹0.23}{₹2.34} \times 1\%$$

$$= 18\% + 0.10\% = 18.10\%$$

Therefore, the firm's expected, or required, return on equity is 18.10%. At this rate the present discounted value of dividend stream is equal to the market price of the share.

9. Capital structure of Sun Ltd., as at 31.3.2003 was as under:

	(₹ in lakhs)
Equity share capital	80
8% Preference share capital	40
12% Debentures	64
Reserves	32

Sun Ltd., earns a profit of Rs. 32 lakhs annually on an average before deduction of income-tax, which works out to 35%, and interest on debentures.
Normal return on equity shares of companies similarly placed is 9.6% provided:
(a) Profit after tax covers fixed interest and fixed dividends at least 3 times.
(b) Capital gearing ratio is 0.75.
(c) Yield on share is calculated at 50% of profits distributed and at 5% on undistributed profits.
Sun Ltd., has been regularly paying equity dividend of 8%.
Compute the value per equity share of the company assuming:
(i) 1% for every one time of difference for Interest and Fixed Dividend Coverage.
(ii) 2% for every one time of difference for Capital Gearing Ratio.

Answer:

(a) Calculation of Profit after tax (PAT)

		₹
Profit before interest and tax (PBIT)		32,00,000
Less: Debenture interest (₹ 64,00,000 × 12/100)		7,68,000
Profit before tax (PBT)		24,32,000
Less: Tax @ 35%		8,51,200
Profit after tax (PAT)		15,80,800
Less: Preference Dividend		
(₹ 40,00,000 × 8/100)	3,20,000	
Equity Dividend (₹ 80,00,000 × 8/100)	6,40,000	9,60,000
Retained earnings (Undistributed profit)		6,20,800

Calculation of Interest and Fixed Dividend Coverage

$$= \frac{\text{PAT + Debenture interest}}{\text{Debenture interest + Preference dividend}} \text{ or } \frac{\text{PAT + Debenture Interest Net of Tax}}{\text{Debenture interest + Preference dividend}}$$

$$= \frac{15,80,800 + 7,68,000}{7,68,000 + 3,20,000} \text{ or } \frac{15,80,800 + 4,99,200}{7,68,000 + 3,20,000}$$

$$= \frac{23,48,800}{10,88,000} \text{ or } \frac{20,80,000}{10,88,000} = 2.16 \text{ times or } 1.91 \text{ times}$$

(b) Calculation of Capital Gearing Ratio

$$\text{Capital Gearing Ratio} = \frac{\text{Fixed interest bearing funds}}{\text{Equity shareholders' funds}}$$

$$= \frac{\text{Preference Share Capital + Debentures}}{\text{Equity Share Capital + Reserves}} = \frac{40,00,000 + 64,00,000}{80,00,000 + 32,00,000} = \frac{1,04,00,000}{1,12,00,000} = 0.93$$

(c) Calculation of Yield on Equity Shares:

Yield on equity shares is calculated at 50% of profits distributed and 5% on undistributed profits:

	(₹)
50% on distributed profits (₹ 6,40,000 × 50/100)	3,20,000
5% on undistributed profits (₹ 6,20,800 × 5/100)	31,040
Yield on equity shares	3,51,040

$$\text{Yield on equity shares \%} = \frac{\text{Yield on shares}}{\text{Equity share capital}} \times 100$$

$$= \frac{3,51,040}{80,00,000} \times 100 = 4.39\% \text{ or, } 4.388\%.$$

Calculation of Expected Yield on Equity shares

(a) Interest and fixed dividend coverage of Sun Ltd. is 2.16 times but the industry average is 3 times. Therefore, risk premium is added to Sun Ltd. Shares @ 1% for every 1 time of difference.

Risk Premium = 3.00 – 2.16 (1%) = 0.84 (1%) = 0.84%

(b) Capital Gearing ratio of Sun Ltd. is 0.93 but the industry average is 0.75 times. Therefore, risk premium is added to Sun Ltd. shares @ 2% for every 1 time of difference.

Risk Premium = (0.75 – 0.93) (2%)

= 0.18 (2%) = 0.36%

	(%)
Normal return expected	9.60
Add: Risk premium for low interest and fixed dividend coverage	0.84
Add: Risk premium for high interest gearing ratio	0.36
	10.80

Value of Equity Share

$$= \frac{\text{Actual yield}}{\text{Expected yield}} \times \text{Paid-up value of share} = \frac{4.39}{10.80} \times 100 = ₹\ 40.65$$

10. ABC Ltd. has been maintaining a growth rate of 10 percent in dividends. The company has paid dividend @ Rs. 3 per share. The rate of return on market portfolio is 12 percent and the risk free rate of return in the market has been observed as 8 percent. The Beta co-efficient of company's share is 1.5.
You are required to calculate the expected rate of return on company's shares as per CAPM model and equilibrium price per share by dividend growth model.
Answer:

CAPM formula for calculation of Expected Rate of Return is :

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

$= 8 + 1.5 (12 - 8)$

$= 8 + 1.5 (4)$

$= 8 + 6$

$=14\%$ or 0.14

Applying Dividend Growth Model for the calculation of per share equilibrium price:

$$ER = \frac{D_1}{P_0} + g$$

$$0.14 = \frac{3(1.10)}{P_0} + 0.10$$

$$0.14 - 0.10 = \frac{3.30}{P_0}$$

$$0.04\ P_0 = 3.30$$

$$P_0 = \frac{3.30}{0.04} = ₹\ 82.50$$

Per share equilibrium price will be ₹ 82.50.

11. A Company pays a dividend of Rs. 2.00 per share with a growth rate of 7%. The risk free rate is 9% and the market rate of return is 13%. The Company has a beta factor of 1.50. However, due to a decision of the Finance Manager, beta is likely to increase to 1.75. Find out the present as well as the likely value of the share after the decision.

Answer:

In order to find out the value of a share with constant growth model, the value of K_e should be ascertained with the help of 'CAPM' model as follows:

$K_e = R_f + \beta (K_m - R_f)$

Where,

K_e = Cost of equity

R_f = Risk free rate of return

β = Portfolio Beta i.e. market sensitivity index

K_m = Expected return on market portfolio

By substituting the figures, we get

$K_e = 0.09 + 1.5 (0.13 - 0.09) = 0.15$ or 15%

and the value of the share as per constant growth model is

$$P_0 = \frac{D_1}{(k_e - g)}$$

Where,

P_0 = Price of a share

D1 = Dividend at the end of the year 1

Ke = Cost of equity

g = growth

$$P_0 = \frac{2.00}{(k_e - g)}$$

$$P_0 = \frac{2.00}{0.15 - 0.07} = ₹\ 25.00$$

12. Calculate the value of share from the following information:

Profit after tax of the company	Rs. 290 crores
Equity capital of company	Rs. 1,300 crores
Par value of share	Rs. 40 each
Debt ratio of company (Debt/ Debt + Equity)	27%
Long run growth rate of the company	8%
Beta 0.1; risk free interest rate	8.7%
Market returns	10.3%
Capital expenditure per share	Rs. 47
Depreciation per share	Rs. 39
Change in Working capital	Rs. 3.45 per share

Answer:

$$\text{No. of Shares} = \frac{₹\ 1{,}300\ \text{crores}}{₹\ 40} = 32.5\ \text{Crores}$$

$$\text{EPS} = \frac{\text{PAT}}{\text{No.of shares}}$$

$$\text{EPS} = \frac{₹\ 290\ \text{crores}}{32.5\ \text{crores}} = ₹\ 8.923$$

FCFE = Net income – [(1-b) (capex – dep) + (1-b) (ΔWC)]

FCFE = 8.923 – [(1-0.27) (47-39) + (1-0.27) (3.45)]

= 8.923 – [5.84 + 2.5185] = 0.5645

Cost of Equity = R_f + ß (R_m – R_f)

= 8.7 + 0.1 (10.3 – 8.7) = 8.86%

$$P_o = \frac{FCFE(1+g)}{K_e - g} = \frac{0.5645(1.08)}{0.0886 - .08} = \frac{0.60966}{0.0086} = ₹\ 70.89$$

13. Shares of Voyage Ltd. are being quoted at a price-earning ratio of 8 times. The company retains Rs. 5 per share which is 45% of its Earning Per Share.

You are required to compute

(i) The cost of equity to the company if the market expects a growth rate of 15% p.a.

(ii) If the anticipated growth rate is 16% per annum, calculate the indicative market price with the same cost of capital.

(iii) If the company's cost of capital is 20% p.a. & the anticipated growth rate is 19% p.a., calculate the market price per share.

Answer:

(i) **Cost of Capital**

Retained earnings (45%)	₹ 5 per share
Dividend (55%)	₹ 6.11 per share
EPS (100%)	₹ 11.11 per share
P/E Ratio	8 times
Market price	₹ 11.11 × 8 = ₹ 88.88

Cost of equity capital

$$= \left(\frac{\text{Div}}{\text{Price}} \times 100\right) + \text{Growth \%} = \frac{₹\ 6.11}{₹\ 88.88} \times 100 + 15\% = 21.87\%$$

(ii) **Market Price** $= \left(\frac{\text{Dividend}}{\text{Cost of Capital(\%) - Growth Rate(\%)}}\right)$

$$= \frac{₹\ 6.11}{(21.87\text{-}16)\%} = ₹\ 104.08 \text{ per share}$$

(iii) **Market Price** $= \frac{₹6.11}{(20\text{-}19)\%} = ₹\ 611.00$ per share

14. Following Financial data are available for PQR Ltd. for the year 2008:

	(₹ in lakh)
8% debentures	125
10% bonds (2007)	50
Equity shares (₹ 10 each)	100
Reserves and Surplus	300
Total Assets	600
Assets Turnovers ratio	1.1
Effective interest rate	8%
Effective tax rate	40%
Operating margin	10%
Dividend payout ratio	16.67%
Current market Price of Share	₹ 14
Required rate of return of investors	15%

You are required to:
(i) Draw income statement for the year
(ii) Calculate its sustainable growth rate of earnings
(iii) Calculate the fair price of the Company's share using dividend discount model, and
(iv) What is your opinion on investment in the company's share at current price?
Answer:

Workings:

Asset turnover ratio	= 1.1
Total Assets	= ₹ 600
Turnover ₹ 600 lakhs × 1.1	= ₹ 660 lakhs
Effective interest rate	$= \frac{\text{Interest}}{\text{Libilities}} = 8\%$
Liabilities	= ₹ 125 lakhs + 50 lakhs = 175 lakh
Interest	= ₹ 175 lakhs × 0.08 = ₹ 14 lakh
Operating Margin	= 10%
Hence operating cost	= (1 - 0.10) ₹ 660 lakhs = ₹ 594 lakh
Dividend Payout	= 16.67%
Tax rate	= 40%

(i) Income statement

	(₹ Lakhs)
Sale	660
Operating Exp	594
EBIT	66
Interest	14
EBT	52
Tax @ 40%	20.80
EAT	31.20
Dividend @ 16.67%	5.20
Retained Earnings	26.00

(ii) SGR = ROE (1-b)

$$ROE = \frac{PAT}{NW} \text{ and } NW = ₹\,100\,lakh + ₹\,300\,lakh = 400\,lakh$$

$$ROE = \frac{₹\,31.2\,lakhs}{₹\,400\,lakhs} \times 100 = 7.8\%$$

$$SGR = 0.078(1 - 0.1667) = 6.5\% \text{ or } \frac{0.078 \times 0.8333}{1-0.078 \times 0.8333} = 6.95\%$$

(iii) Calculation of fair price of share using dividend discount model

$$P_o = \frac{D_0(1+g)}{k_e - g}$$

$$\text{Dividends} = \frac{₹\,5.2\,lakhs}{₹\,10\,lakhs} = ₹\,0.52$$

Growth Rate = 6.5% or 6.95%

$$\text{Hence } P_o = \frac{₹\,0.52(1+0.065)}{0.15-0.065} = \frac{₹\,0.5538}{0.085} = ₹\,6.51 \text{ or } \frac{0.52(1+0.0695)}{0.15-0.0695}$$

$$= \frac{0.5561}{0.0805} = ₹\,6.91$$

(iv) Since the current market price of share is ₹ 14, the share is overvalued. Hence the investor should not invest in the company.

15. M/s X Ltd. has paid a dividend of Rs. 2.50 per share on a face value of Rs. 10 in the financial year ending on 31st March, 2009. The details are as follows:
Current market price of share Rs. 60
Growth rate of earnings and dividends 10%
Beta of share 0.75
Average market return 15%
Risk free rate of return 9%
Calculate the intrinsic value of the share.
Answer:

Intrinsic Value $P_0 = \frac{D1}{k-g}$

Using CAPM

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

R_f = Risk Free Rate

β = Beta of Security

R_m = Market Return

= 9% + 0.75 (15% - 9%) = 13.5%

$$P = \frac{2.5 \times 1.1}{0.135-0.10} = \frac{2.75}{0.035} = ₹\,78.57$$

16. Mr. A is thinking of buying shares at Rs. 500 each having face value of Rs. 100. He is expecting a bonus at the ratio of 1: 5 during the fourth year. Annual expected dividend is 20% and the same rate is expected to be maintained on the expanded capital base. He intends to sell the shares at the end of seventh year at an expected price of Rs. 900 each. Incidental expenses for purchase and sale of shares are estimated to be 5% of the market price. He expects a minimum return of 12% per annum.
Should Mr. A buy the share? If so, what maximum price should he pay for each share? Assume no tax on dividend income and capital gain.
Answer:
P.V. of dividend stream and sales proceeds

Year	Divd. /Sale	PVF (12%)	PV (₹)
1	₹ 20/-	0.893	17.86
2	₹ 20/-	0.797	15.94
3	₹ 20/-	0.712	14.24
4	₹ 24/-	0.636	15.26
5	₹ 24/	0.567	13.61
6	₹ 24/	0.507	12.17
7	₹ 24/	0.452	10.85
7	₹ 1026/- (₹ 900 x 1.2 x 0.95)	0.452	463.75
			₹ 563.68
	Less : - Cost of Share (₹ 500 x 1.05)		₹ 525.00
	Net gain		₹ 38.68

Since Mr. A is gaining ₹ 38.68 per share, he should buy the share.

Maximum price Mr. A should be ready to pay is ₹ 563.68 which will include incidental expenses. So the maximum price should be ₹ 563.68 x 100/105 = ₹ 536.84

17. The risk free rate of return Rf is 9 percent. The expected rate of return on the market portfolio Rm is 13 percent. The expected rate of growth for the dividend of Platinum Ltd. is 7 percent. The last dividend paid on the equity stock of firm A was Rs. 2.00. The beta of Platinum Ltd. equity stock is 1.2.
(i) What is the equilibrium price of the equity stock of Platinum Ltd.?
(ii) How would the equilibrium price change when

- **The inflation premium increases by 2 percent?**
- **The expected growth rate increases by 3 percent?**
- **The beta of Platinum Ltd. equity rises to 1.3?**

Answer:

(i) Equilibrium price of Equity using CAPM

= 9% + 1.2(13% - 9%)

= 9% + 4.8%= 13.8%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.07)}{0.138-0.07}=\frac{2.14}{0.068}=₹31.47$$

(ii) New Equilibrium price of Equity using CAPM

= 9.18% + 1.3(13% - 9.18%)

= 9.18% + 4.966%= 14.146%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.14146-0.10}=\frac{2.20}{0.04146}=₹53.06$$

Alternatively, it can also be computed as follows:

= 11% + 1.3(15% - 8%)

= 11% + 5.2%= 16.20%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.162-0.10}=₹35.48$$

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

(i) Inflation Premium increase by 3%. This raises R_X to 15.80%. Hence, new equilibrium price will be:

$$=\frac{2.00(1.07)}{0.158-0.07}=₹24.32$$

(ii) Expected Growth rate decrease by 3%. Hence, revised growth rate stands at 10%:

$$=\frac{2.00(1.10)}{0.138-0.10}=₹57.89$$

(iii) Beta decreases to 1.3. Hence, revised cost of equity shall be:

= 9% + 1.3(13% - 9%)

= 9% + 5.2%= 14.2%

As a result, New Equilibrium price shall be:

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.07)}{0.142-0.07}=₹29.72$$

18. SAM Ltd. has just paid a dividend of Rs. 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming

from the 4th year onward from now. The dividends will then be Rs. 2.50 per share and will grow @ 7% p.a. An investor has 1,000 shares in SAM Ltd. and wants a receipt of at least Rs. 2,000 p.a. from this investment. Show that the market value of the share is affected by the decision of the Board. Also show as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%.

Answer:

Value of share at present $= \frac{D_1}{k_e - g}$

$= \frac{2(1.06)}{0.08-0.06} = ₹\ 106$

However, if the Board implement its decision, no dividend would be payable for 3 years and the dividend for year 4 would be ₹ 2.50 and growing at 7% p.a. The price of the share, in this case, now would be:

$$P_0 = \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^3} = ₹\ 198.46$$

So, the price of the share is expected to increase from ₹ 106 to ₹ 198.45 after the announcement of the project. The investor can take up this situation as follows:

Expected market price after 3 years	$= \frac{2.50}{0.08-0.07}$	₹ 250.00
Expected market price after 2 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)}$	₹ 231.48
Expected market price after 1 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^2}$	₹ 214.33

In order to maintain his receipt at ₹ 2,000 for first 3 year, he would sell

10 shares in first year @ ₹ 214.33 for	₹ 2,143.30
9 shares in second year @ ₹ 231.48 for	₹ 2,083.32
8 shares in third year @ ₹ 250 for	₹ 2,000.00

At the end of 3rd year, he would be having 973 shares valued @ ₹ 250 each i.e. ₹ 2,43,250. On these 973 shares, his dividend income for year 4 would be @ ₹ 2.50 i.e. ₹ 2,432.50.

So, if the project is taken up by the company, the investor would be able to maintain his receipt of at least ₹ 2,000 for first three years and would be getting increased income thereafter.

19. XYZ Ltd. paid a dividend of Rs. 2 for the current year. The dividend is expected to grow at 40% for the next 5 years and at 15% per annum thereafter. The return on 182 days T-bills is 11% per annum and the market return is expected to be around 18% with a variance of 24%. The co-variance of XYZ's return with that of the market is 30%. You are required to calculate the required rate of return and intrinsic value of the stock.

Answer:

$$\beta = \frac{\text{Covariance of Market Return and Security Return}}{\text{Variance of Market Return}}$$

$$\beta = \frac{30\%}{24\%} = 1.25$$

Expected Return = $R_f + \beta(R_m - R_f)$

= 11% + 1.25(18% - 11%) = 11% + 8.75% = 19.75%

Intrinsic Value

Year	Dividend (₹)	PVF (19.75%,n)	Present Value (₹)
1	2.80	0.835	2.34
2	3.92	0.697	2.73
3	5.49	0.582	3.19
4	7.68	0.486	3.73
5	10.76	0.406	4.37
			16.36

PV of Terminal Value = $= \frac{10.76(1.15)}{0.1975-0.15} \times 0.406 =$ ₹ 105.77

Intrinsic Value = ₹ 16.36 + ₹ 105.77 = ₹ 122.13

20. Rahul Ltd. has surplus cash of Rs. 100 lakhs and wants to distribute 27% of it to the shareholders. The company decides to buy back shares. The Finance Manager of the company estimates that its share price after re-purchase is likely to be 10% above the buyback price-if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is Rs. 3.

You are required to determine:

(i) The price at which the shares can be re-purchased, if the market capitalization of the company should be Rs. 210 lakhs after buyback,

(ii) The number of shares that can be re-purchased, and

(iii) The impact of share re-purchase on the EPS, assuming that net *income is the same.*

Answer:

(i) **Let P be the buyback price decided by Rahul Ltd.**

Market Capitalisation after Buyback

1.1P (Original Shares – Shares Bought Back)

$$= 1.1P\left(10 \text{ lakhs} - \frac{27\% \text{ of } 100 \text{ lakhs}}{P}\right)$$

$= 11 \text{ lakhs} \times P - 27 \text{ lakhs} \times 1.1 = 11 \text{ lakhs } P - 29.7 \text{ lakhs}$

Again, 11 lakhs P – 29.7 lakhs

or 11 lakhs P = 210 lakhs + 29.7 lakhs

$$\text{or } P = \frac{239.7}{11} = ₹ 21.79 \text{ per share}$$

(ii) Number of Shares to be Bought Back :-

$$\frac{₹ 27 \text{ lakhs}}{₹ 21.79} = 1.24 \text{ lakhs (Approx.) or } 123910 \text{ share}$$

(iii) New Equity Shares :-

10 lakhs – 1.24 lakhs = 8.76 lakhs or 1000000 – 123910 = 876090 shares

$$\therefore \text{EPS} = \frac{3 \times 10 \text{ lakhs}}{8.76 \text{ lakhs}} = ₹ 3.43$$

Thus, EPS of Rahul Ltd., increases to ₹ 3.43.

21. Nominal value of 10% bonds issued by a company is Rs.100. The bonds are redeemable at Rs. 110 at the end of year 5. Determine the value of the bond if required yield is (i) 5%, (ii) 5.1%, (iii) 10% and (iv) 10.1%.
Answer:

Case (i) Required yield rate = 5%

Year	Cash Flow ₹	DF (5%)	Present Value ₹
1-5	10	4.3295	43.295
5	110	0.7835	86.185
Value of bond			129.48

Case (ii) Required yield rate = 5.1%

Year	Cash Flow ₹	DF (5.1%)	Present Value ₹
1-5	10	4.3175	43.175
5	110	0.7798	85.778
Value of bond			128.953

Case (iii) Required yield rate = 10%

Year	Cash Flow ₹	DF (10%)	Present Value ₹
1-5	10	3.7908	37.908
5	110	0.6209	68.299
Value of bond			106.207

22. An investor is considering the purchase of the following Bond:
Face value Rs. 100
Coupon rate 11%
Maturity 3 years
(i) If he wants a yield of 13% what is the maximum price, he should be ready to pay for?
(ii) If the Bond is selling for Rs. 97.60, what would be his yield?
Answer:

(i) Calculation of Maximum price

B_o = ₹ 11 × PVIFA (13%,3) + ₹ 100 × PVIF (13%,3)

= ₹ 11 × 2.361 + ₹ 100 × 0.693 = ₹ 25.97 + ₹ 69.30 = ₹ 95.27

(ii) Calculation of yield

At 12% the value = ₹ 11 × PVIFA (12%,3) + 100 × PVIF (12%,3)

= ₹ 11×2.402 + ₹ 100×0.712 = ₹ 26.42 + ₹ 71.20 = ₹ 97.62

It the bond is selling at ₹ 97.60 which is more than the fair value, the YTM of the bond would be less than 13%. This value is almost equal to the amount price of ₹ 97.60. Therefore, the YTM of the bond would be 12%.

Alternatively

$$YTM = \frac{₹\ 11 + \frac{(₹\ 100 - ₹\ 97.60)}{3}}{\frac{(₹\ 100 + ₹\ 97.60)}{2}} = 0.1194 \text{ or } 11.94\% \text{ say } 12\%$$

23. Calculate Market Price of:
(i) 10% Government of India security currently quoted at Rs. 110, but yield is expected to go up by 1%.
(ii) A bond with 7.5% coupon interest, Face Value Rs. 10,000 & term to maturity of 2 years, presently yielding 6% . Interest payable half yearly.
Answer:
(i) Current yield = (Coupon Interest / Market Price) X 100
(10/110) X 100 = 9.09%
If current yield go up by 1% i.e. 10.09 the market price would be

10.09 = 10 / Market Price X 100
Market Price = Rs. 99.11
(ii) Market Price of Bond = P.V. of Interest + P.V. of Principal
= Rs. 1,394 + Rs. 8,885 = Rs. 10,279

24. A convertible bond with a face value of Rs. 1,000 is issued at Rs. 1,350 with a coupon rate of 10.5%. The conversion rate is 14 shares per bond. The current market price of bond and share is Rs. 1,475 and Rs. 80 respectively. What is the premium over conversion value?

Answer:

Conversion rate is 14 shares per bond. Market price of share ₹ 80

Conversion Value 14 x ₹ 80 = ₹ 1120

Market price of bond = ₹ 1475

Premium over Conversion Value (₹ 1475- ₹ 1120) = $\frac{355}{1120}$ x 100 = 31.7%

25. Saranam Ltd. has issued convertible debentures with coupon rate 12%. Each debenture has an option to convert to 20 equity shares at any time until the date of maturity.
Debentures will be redeemed at Rs. 100 on maturity of 5 years. An investor generally requires a rate of return of 8% p.a. on a 5-year security. As an investor when will you exercise conversion for given market prices of the equity share of (i) Rs. 4, (ii) Rs. 5 and (iii) Rs. 6.
Cumulative PV factor for 8% for 5 years : 3.993
PV factor for 8% for year 5 : 0.681

Answer:

If Debentures are not converted its value is as under: -

	PVF @ 8 %	₹
Interest - ₹ 12 for 5 years	3.993	47.916
Redemption - ₹ 100 in 5th year	0.681	68.100
		116.016

Value of equity shares:-

Market Price	No.	Total
₹ 4	20	₹ 80
₹ 5	20	₹ 100
₹ 6	20	₹ 120

Hence, unless the market price is ₹ 6 conversion should not be exercised.

26. The data given below relates to a convertible bond :

Face value	₹ 250
Coupon rate	12%
No. of shares per bond	20
Market price of share	₹ 12
Straight value of bond	₹ 235
Market price of convertible bond	₹ 265

Calculate:
(i) Stock value of bond.
(ii) The percentage of downside risk.
(iii) The conversion premium
(iv) The conversion parity price of the stock. [ALSO IN MTP - APRIL 2018]
Answer:

(i) Stock value or conversion value of bond

$12 \times 20 = ₹ 240$

(ii) Percentage of the downside risk

$$\frac{₹ 265 - ₹ 235}{₹ 235} = 0.1277 \text{ or } 12.77\% \quad \text{or} \quad \frac{₹ 265 - ₹ 235}{₹ 265} = 0.1132 \text{ or } 11.32\%$$

This ratio gives the percentage price decline experienced by the bond if the stock becomes worthless.

(iii) Conversion Premium

$$\frac{\text{Market Price} - \text{Conversion Value}}{\text{Conversion Value}} \times 100$$

$$\frac{₹ 265 - ₹ 240}{₹ 240} \times 100 = 10.42\%$$

(iv) Conversion Parity Price

$$\frac{\text{Bond Price}}{\text{No. of Shares on Conversion}}$$

$$\frac{₹ 265}{20} = ₹ 13.25$$

This indicates that if the price of shares rises to ₹ 13.25 from ₹ 12 the investor will neither gain nor lose on buying the bond and exercising it. Observe that ₹ 1.25 (₹ 13.25 – ₹ 12.00) is 10.42% of ₹ 12, the Conversion Premium.

27. ABC Ltd. has Rs. 300 million, 12 per cent bonds outstanding with six years remaining to maturity. Since interest rates are falling, ABC Ltd. is contemplating of refunding these bonds with a Rs. 300 million issue of 6 year bonds carrying a coupon rate of 10 per cent. Issue cost of the new bond will be Rs. 6 million and the call premium is 4 per cent. Rs. 9 million being the unamortized portion of issue cost of old bonds can be written off no sooner the old bonds are called off. Marginal tax rate of ABC Ltd. is 30 per cent. You are required to analyze the bond refunding decision.

Answer:

(i) Calculation of initial outlay:-

		₹ (million)
a.	Face value	300
	Add:-Call premium	12
	Cost of calling old bonds	312
b.	Gross proceed of new issue	300
	Less: Issue costs	6
	Net proceeds of new issue	294
c.	Tax savings on call premium and unamortized cost 0.30 (12 + 9)	6.3

∴ Initial outlay = ₹ 312 million – ₹ 294 million – ₹ 6.3 million = ₹ 11.7 million

(ii) Calculation of net present value of refunding the bond:-

	₹ (million)
Saving in annual interest expenses [300 x (0.12 – 0.10)]	6.00
Less:- Tax saving on interest and amortization 0.30 x [6 + (9-6)/6]	1.95
Annual net cash saving	4.05
PVIFA (7%, 6 years)	4.766
∴ Present value of net annual cash saving	₹ 19.30 million
Less:- Initial outlay	₹ 11.70 million
Net present value of refunding the bond	₹ 7.60 million

Decision: The bonds should be refunded

28. The following data are available for a bond

Face value Rs. 1,000
Coupon Rate 16%
Years to Maturity 6
Redemption value Rs. 1,000
Yield to maturity 17%

What is the current market price, duration and volatility of this bond? Calculate the expected market price, if increase in required yield is by 75 basis points.

Answer:

1. **Calculation of Market price:**

$$TM = \frac{\text{Coupon interest} + \left(\frac{\text{Discount or premium}}{\text{Years left}}\right)}{\frac{\text{Face Value} + \text{Market value}}{2}}$$

Discount or premium – YTM is more than coupon rate, market price is less than Face Value i.e. at discount.

Let x be the market price

$$0.17 = \frac{160 + \left\{\frac{(1{,}000 - x)}{6}\right\}}{\frac{1{,}000 + x}{2}} \quad x = ₹\ 960.26$$

Alternatively, the candidate may attempt by

160 (PVIAF 17%,6) + 1,000 (PVIF 17%,6)

= 160 (3.589) + 1,000 (0.390) = 574.24 + 390 = 964.24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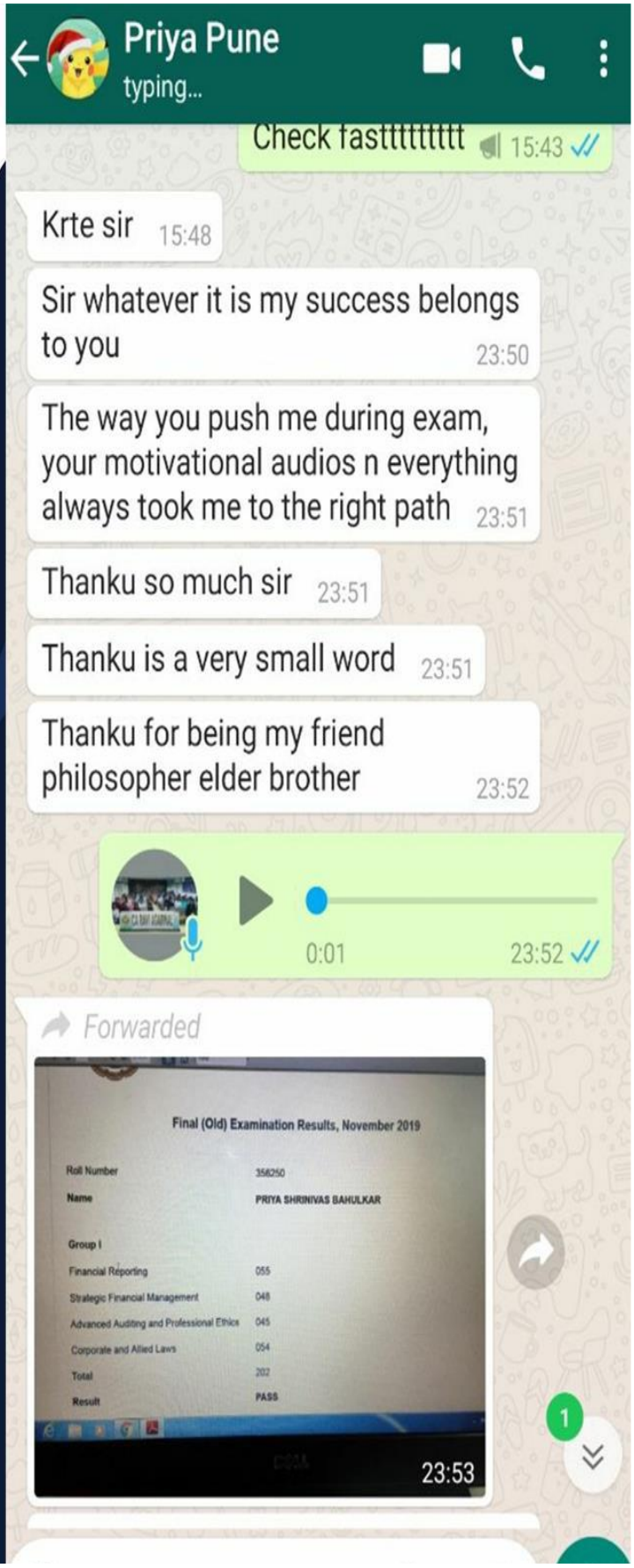
Priya Pune
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Check fastttttttt 15:43
Krte sir 15:48
Sir whatever it is my success belongs to you 23:50
The way you push me during exam, your motivational audios n everything always took me to the right path 23:51
Thanku so much sir 23:51
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Thanku for being my friend philosopher elder brother 23:52
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Final (Old) Examination Results, November 2019
Roll Number 358250
Name PRIYA SHRINIVAS BAHULKAR
Group I
Financial Reporting 055
Strategic Financial Management 048
Advanced Auditing and Professional Ethics 045
Corporate and Allied Laws 054
Total 202
Result PASS
23:53

2. Duration

Year	Cash flow	P.V. @ 17%		Proportion of bond value	Proportion of bond value x time (years)
1	160	.855	136.80	0.142	0.142
2	160	.731	116.96	0.121	0.246
3	160	.624	99.84	0.103	0.309
4	160	.534	85.44	0.089	0.356
5	160	.456	72.96	0.076	0.380
6	1160	.390	452.40	0.469	2.814
			964.40	1.000	4.247

Duration of the Bond is 4.247 years

Alternatively, as per Short Cut Method

$$D = \frac{1+YTM}{YTM} - \frac{(1+YTM)+t(c-YTM)}{c\left[(1+YTM)^t-1\right]+YTM}$$

Where YTM = Yield to Maturity

c = Coupon Rate

t = Years to Maturity

$$= \frac{1.17}{0.17} - \frac{1.17+6(0.16-0.17)}{0.16\left[(1.17)^6-1\right]+0.17}$$

D = 4.24 years

3. Volatility

$$\text{Volatility of the bonds} = \frac{\text{Duration}}{(1+\text{yields})} = \frac{4.247}{1.17} = 3.63 \text{ Or } = \frac{4.2422}{1.17} = 3.6258$$

4. The expected market price if increase in required yield is by 75 basis points.

= ₹ 960.26 × .75 (3.63/100) = ₹ 26.142

Hence expected market price is ₹ 960.26 – ₹ 26.142 = ₹ 934.118

Hence, the market price will decrease

This portion can also be alternatively done as follows

= ₹ 964.40 × .75 (3.63/100) = ₹ 26.26

then the market price will be = ₹ 964.40 – 26.26 = ₹ 938.14

29. Mr. A will need Rs. 1,00,000 after two years for which he wants to make one time necessary investment now. He has a choice of two types of bonds. Their details are as below:

	Bond X	Bond Y
Face value	₹ 1,000	₹ 1,000
Coupon	7% payable annually	8% payable annually
Years to maturity	1	4
Current price	₹ 972.73	₹ 936.52
Current yield	10%	10%

Advice Mr. A whether he should invest all his money in one type of bond or he should buy both the bonds and, if so, in which quantity? Assume that there will not be any call risk or default risk.

Answer:

Duration of Bond X

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	1070	.909	972.63	1.000	1.000

Duration of the Bond is 1 year

Duration of Bond Y

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	80	.909	72.72	0.077	0.077
2	80	.826	66.08	0.071	0.142
3	80	.751	60.08	0.064	0.192
4	1080	.683	737.64	0.788	3.152
			936.52	1.000	3.563

Duration of the Bond is 3.563 years

Let x_1 be the investment in Bond X and therefore investment in Bond Y shall be $(1 - x_1)$. Since the required duration is 2 year the proportion of investment in each of these two securities shall be computed as follows:

$2 = x_1 + (1 - x_1)\ 3.563$

$x_1 = 0.61$

Accordingly, the proportion of investment shall be 61% in Bond X and 39% in Bond Y respectively.

Amount of investment

Bond X	*Bond Y*
PV of ₹ 1,00,000 for 2 years @ 10% x 61% = ₹ 1,00,000 (0.826) x 61% = ₹ 50,386 No. of Bonds to be purchased = ₹ 50,386/₹ 972.73 = 51.79 i.e. approx. 52 bonds	PV of ₹ 1,00,000 for 2 years @ 10% x 39% = ₹ 1,00,000 (0.826) x 39% = ₹ 32,214 No. of Bonds to be purchased = ₹ 32,214/₹ 936.52 = 34.40 i.e. approx. 34 bonds

Note: The investor has to keep the money invested for two years. Therefore, the investor can invest in both the bonds with the assumption that Bond X will be reinvested for another one year on same returns. Further, in the above computation, Modified Duration can also be used instead of Duration.

30. RBI sold a 91-day T-bill of face value of Rs. 100 at an yield of 6%. What was the issue price?
Answer:

Let the issue price be X

By the terms of the issue of the T-bills:

$$6\% = \frac{100 - x}{x} \times \frac{365}{91} \times 100$$

$$\frac{6 \times 91 \times x}{36{,}500} = (100 - x)$$

$$0.01496\, x = 100 - x$$

$$x = \frac{100}{1.01496} = ₹\ 98.53$$

31. Wonderland Limited has excess cash of Rs. 20 lakhs, which it wants to invest in short term marketable securities. Expenses relating to investment will be Rs. 50,000.
The securities invested will have an annual yield of 9%.
The company seeks your advice
(i) as to the period of investment so as to earn a pre-tax income of 5%. (discuss)
(ii) the minimum period for the company to breakeven its investment expenditure overtime value of money.
Answer:

(i) Pre-tax Income required on investment of ₹ 20,00,000

Let the period of Investment be 'P' and return required on investment ₹ 1,00,000 (₹ 20,00,000 x 5%)

Accordingly,

$$(₹\ 20{,}00{,}000 \times \frac{9}{100} \times \frac{P}{12}) - ₹\ 50{,}000 = ₹\ 1{,}00{,}000$$

P = 10 months

(ii) Break-Even its investment expenditure

$$(₹\ 20{,}00{,}000 \times \frac{9}{100} \times \frac{P}{12}) - ₹\ 50{,}000 = 0$$

P = 3.33 months

32. Co. Ltd. issued commercial paper worth Rs.10 crores as per following details:
Date of issue : 16th January, 2019
Date of maturity: 17th April, 2019
No. of days : 91
Interest rate 12.04% p.a
What was the net amount received by the company on issue of CP? (Charges of intermediary may be ignored)
Answer:

The company had issued commercial paper worth ₹10 crores

No. of days Involves = 91 days

Interest rate applicable = 12.04 % p.a.

Interest for 91 days $= 12.04\% \times \frac{91\ \text{Days}}{365\ \text{Days}} = 3.002\%$

$= \text{or } ₹\ 10 \text{ crores x } \frac{3.002}{100 + 3.002} = ₹\ 29,14,507$

= or ₹ 29.14507 Lakhs

∴ Net amount received at the time of issue:- ₹ 10.00 Crores – ₹ 0.29151 Crores = ₹ 9.70849 Crores

Alternatively, it can also be computed as follows:

$$\text{Price} = \frac{\text{Rs.10 Crores}}{\left(1 + 12.04\% \times \frac{91\ \text{Days}}{365\ \text{Days}}\right)} = ₹\ 9.70855 \text{ Crores}$$

33. Bank A enter into a Repo for 14 days with Bank B in 10% Government of India Bonds 2028 @ 5.65% for Rs. 8 crore. Assuming that clean price (the price that does not have accrued interest) be Rs. 99.42 and initial Margin be 2% and days of accrued interest be 262 days. You are required to determine
(i) Dirty Price
(ii) Repayment at maturity. (consider 360 days in a year)
Answer:

(i) Dirty Price

= Clean Price + Interest Accrued

$$= 99.42 + 100 \times \frac{10}{100} \times \frac{262}{360} = 106.70$$

(ii) First Leg (Start Proceed)

$$= \text{Nominal Value x } \frac{\text{Dirty Price}}{100} \times \frac{100 - \text{Initial Margin}}{100}$$

$$= ₹8,00,00,000 \text{ x } \frac{106.70}{100} \times \frac{100-2}{100} = ₹8,36,52,800$$

$$\text{Second Leg (Repayment at Maturity)} = \text{Start Proceed x } (1 + \text{Repo rate} \times \frac{\text{No. of days}}{360})$$

$$= ₹ 8,36,52,800 \text{ x } (1 + 0.0565 \times \frac{14}{360}) = ₹ 8,38,36,604$$

PAST EXAMINATION, RTP, MTP QUESTIONS

34. a) The risk free rate of return is 5%. The expected rate of return on the market portfolio is 11%. The expected rate of growth in dividend of X Ltd. is 8%. The last dividend paid was Rs. 2.00 per share. The beta of X Ltd. equity stock is 1.5.
(i) What is the present price of the equity stock of X Ltd.?
(ii) How would the price change when:
- **The inflation premium increases by 3%**
- **The expected growth rate decreases by 3% and**
- **The beta decreases to 1.3.**

[MAY 2018-4 MARKS]

b) The risk-free rate of return Rf is 9 percent. The expected rate of return on the market portfolio Rm is 13 percent. The expected rate of growth for the dividend of Platinum Ltd. is 7 percent. The last dividend paid on the equity stock of firm A was Rs. 2.00. The beta of Platinum Ltd. equity stock is 1.2.
(i) Calculate the equilibrium price of the equity stock of Platinum Ltd.?
(ii) Also, calculate the equilibrium price when
- **The inflation premium increases by 2 percent?**
- **The expected growth rate increases by 3 percent?**
- **The beta of Platinum Ltd. equity rises to 1.3?**

[MTP MARCH 2018-8 MARKS]
Answer:

(i) Equilibrium price of Equity using CAPM

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

= 5% + 9%= 14%

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

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

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

= 5.15% + 7.61%= 12.76%

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

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

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

= 8% + 3.9%= 11.9%

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

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

(i) Inflation Premium increase by 3%.

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

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

(ii) Expected Growth rate decrease by 3%.

Hence, revised growth rate stand at 5%:

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

(iii) Beta decreases to 1.3.

Hence, revised cost of equity shall be:

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

= 5% + 7.8%= 12.8%

As a result New Equilibrium price shall be:

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

b)

(i) Equilibrium price of Equity using CAPM

= 9% + 1.2(13% - 9%)

= 9% + 4.8%= 13.8%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.07)}{0.138-0.07}=\frac{2.14}{0.068}=₹\ 31.47$$

(ii) New Equilibrium price of Equity using CAPM

= 9.18% + 1.3(13% - 9.18%)

= 9.18% + 4.966%= 14.146%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.14146-0.10}=\frac{2.20}{0.04146}=₹\ 53.06$$

Alternatively, it can also be computed as follows:

= 11% + 1.3(15% - 8%)

= 11% + 5.2%= 16.20%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.162-0.10}=\text{Rs. } 35.48$$

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

(i) Inflation Premium increase by 3%. This raises R_X to 15.80%. Hence, new equilibrium price will be:

$$=\frac{2.00(1.07)}{0.158-0.07}=\text{Rs. } 24.32$$

(ii) Expected Growth rate decrease by 3%. Hence, revised growth rate stands at 10%:

$$=\frac{2.00(1.10)}{0.138-0.10}=\text{Rs. } 57.89$$

(iii) Beta decreases to 1.3. Hence, revised cost of equity shall be:

= 9% + 1.3(13% - 9%)

= 9% + 5.2%= 14.2%

As a result, New Equilibrium price shall be:

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.07)}{0.142-0.07}=\textbf{Rs. } 29.72$$

35. Tangent Ltd. is considering calling Rs. 3 crores of 30 years, Rs. 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of Rs. 1,150 and had initially collected proceeds of Rs. 2.91 crores since a discount of Rs. 30 per bond was offered. The initial floating cost was Rs. 3,90,000. The Company intends to sell Rs. 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of Rs. 1,000. The estimated floatation cost is Rs. 4,25,000. The company is paying 40% tax and its after tax cost of debt is 8

per cent. As the new bonds must first be sold and then their proceeds to be used to retire the old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and the new bonds. You are required to evaluate the bond retiring decision. [PVIFA 8%, 25 = 10.675] [NOV 2018 - 8 MARKS]

Answer:

NPV for bond refunding

	₹
PV of annual cash flow savings (W.N. 2)	
(3,49,600 × PVIFA 8%,25) i.e. 10.675	37,31,980
Less: Initial investment (W.N. 1)	31,15,000
NPV	6,16,980

Recommendation: Refunding of bonds is recommended as NPV is positive.

Working Notes:

(1) Initial investment:

(a)	Call premium		
	Before tax (1,150 – 1,000) × 30,000	45,00,000	
	Less tax @ 40%	18,00,000	
	After tax cost of call prem.		27,00,000
(b)	Floatation cost		4,25,000
(c)	Overlapping interest		
	Before tax (0.14 × 2/12 × 3 crores)	7,00,000	
	Less tax @ 40%	2,80,000	4,20,000
(d)	Tax saving on unamortised discount on old bond (25/30 × 9,00,000 × 0.4) (3,00,000)		
(e)	Tax savings from unamortised floatation		
	Cost of old bond 25/30 × 3,90,000 × 0.4		(1,30,000)
			31,15,000

(2) Annual cash flow savings:

(a)	Old bond		
(i)	Interest cost (0.14 × 3 crores)	42,00,000	
	Less tax @ 40%	16,80,000	25,20,000
(ii)	Tax savings from amortisation of discount (9,00,000/30 × 0.4)		(12,000)
(iii)	Tax savings from amortisation of floatation cost (3,90,000/30 × 0.4)		(5,200)
	Annual after tax cost payment under old Bond (A)		**25,02,800**
(b)	New bond		
(i)	Interest cost before tax (0.12 × 3 crores)	36,00,000	
	Less tax @ 40%	14,40,000	
	After tax interest		21,60,000
(ii)	Tax savings from amortisation of floatation cost (0.4 × 4,25,000/25)		(6,800)
	Annual after tax payment under new Bond (B)		**21,53,200**
	Annual Cash Flow Saving (A) – (B)		**3,49,600**

36. Shares of Volga Ltd. are being quoted at a price-earning ratio of 8 times. The company retains 50% of its Earnings Per Share. The Company's EPS is Rs. 10. You are required to determine:
(1) the cost of equity to the company if the market expects a growth rate of 15% p.a.
(2) the indicative market price with the same cost of capital and if the anticipated growth rate is 16% p.a.
(3) the market price per share if the company's cost of capital is 20% p.a. and the anticipated growth rate is 18% p.a.
[NOV 2018 8 MARKS]
Answer:

(1) Cost of Capital

Retained earnings (50%)	₹ 5 per share
Dividend (50%)	₹ 5 per share
EPS (100%)	₹ 10 per share (given)
P/E Ratio	8 times (given)
Market price	₹ 10 × 8 = ₹ 80 per share

Cost of equity capital

$$= \left(\frac{\text{Div}}{\text{Price}} \times 100\right) + \text{Growth \%} = \frac{₹\ 5}{₹\ 80} \times 100 \times 100 + 15\% = 21.25\%$$

(2) Market Price $= \left(\frac{\text{Dividend}}{\text{Cost of Capital(\%)} - \text{Growth Rate(\%)}}\right)$

$$= \frac{₹5}{(21.25-16)\%} = ₹\ 95.24 \text{ per share}$$

(3) Market Price $= \frac{₹5}{(20-18)\%} = ₹\ 250 \text{ per share}$

Alternatively, if candidates have assumed the given figure of EPS as of last year then answer will be as follows:

(1) Cost of Capital

Retained earnings (50%)	₹ 5 per share
Dividend (50%)	₹ 5 per share
EPS (100%)	₹ 10 per share (given)

P/E Ratio 8 times (given)

Market price ₹ 10 × 8 = ₹ 80 per share

Cost of equity capital

$$=\left(\frac{\text{Div}}{\text{Price}}\times 100\right) + \text{Growth \%} = \frac{₹\,5(1.15)}{₹\ 80}\times 100 + 15\% = 22.19\%$$

(2) Market Price $= \left(\frac{\text{Dividend}}{\text{Cost of Capital(\%)} - \text{Growth Rate(\%)}}\right)$

$$= \frac{₹\ 5.75}{(22.19-16)\%} = ₹\ 92.89 \text{ per share}$$

(3) Market Price $= \frac{₹\,5(1.18)}{(20-18)\%} = ₹\ 295$ per share

37. Following details are available for X Ltd.

Income Statement for the year ended 31st March, 2018

Particulars	Amount
Sales	40,000
Gross Profit	12,000
Administrative Expenses	6,000
Profit Before tax	6,000
Tax @ 30%	1,800
Profit After Tax	4,200

Balance sheet as on 31st March, 2018

Particulars	Amount
Fixed Assets	10,000
Current Assets	6,000
Total Assets	16,000
Equity Share Capital	15,000
Sundry Creditors	1,000
Total Liabilities	16,000

The Company is contemplating for new sales strategy as follows :
(i) Sales to grow at 30% per year for next four years.
(ii) Assets turnover ratio, net profit ratio and tax rate will remain the same.
(iii) Depreciation will be 15% of value of net fixed assets at the beginning of the year.
(iv) Required rate of return for the company is 15%
Evaluate the viability of new strategy.
[NOV 2018 12 MARKS]
Answer:

Projected Balance Sheet					
	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Assets (25% of Sales)	13,000	16,900	21,970	28,561.00	28,561.00
Current Assets (15% of Sales)	7,800	10,140	13,182	17,136.60	17,136.60
Total Assets	20,800	27,040	35,152	45,697.60	45,697.60
Equity (37.5% of sales)	19,500	25,350	32,955	42,841.50	42,841.50
Sundry Creditors (2.5% of Sales)	1,300	1,690	2,197	2,856.10	2,856.10
Total Liabilities	20,800	27,040	35,152	45,697.60	45,697.60

Projected Cash Flows:-

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	52,000	67,600	87,880.00	1,14,244.00	1,14,244.00
PBT (15% of sales)	7,800	10,140	13,182.00	17,136.60	17,136.60
PAT (10.5% of sales)	5,460	7,098	9,227.40	11,995.62	11,995.62
Depreciation	1,500	1,950	2,535.00	3,295.50	4,284.15
Addition to Fixed Assets	4,500	5,850	7,605.00	9,886.50	4,284.15
Increase in Net Current Assets	1,500	1,950	2,535.00	3,295.50	-
Operating cash flow	960	1,248	1,622.40	2,109.12	11,995.62

Projected Cash Flows:-

Present value of Projected Cash Flows:-

Cash Flows	PVF at 15%	PV
960	0.870	835.20
1248	0.756	943.49
1622.40	0.658	1067.54
2109.12	0.572	1206.42
		4,052.65

Residual Value = 11,995.62/0.15 = 79,970.80
Present value of Residual value = 79,970.80 x PVF (15%, 4)
= 79,970.80 x 0.572 = 45,743.30
Total shareholders' value = 45743.30 + 4052.65 = 49795.95
Pre-strategy value = 4200 / 0.15 = 28,000
Value of strategy = 49795.95 – 28,000 = 21795.95

Conclusion: The strategy is financially viable.

38. The following data are available for three bonds A, B and C. These bonds are used by a bond portfolio manager to fund an outflow scheduled in 6 years. Current yield is 9%. All bonds have face value of Rs.100 each and will be redeemed at par. Interest is payable annually.

Bond	Maturity (Years)	Coupon rate
A	10	10%
B	8	11%
C	5	9%

(i) Calculate the duration of each bond.
(ii) The bond portfolio manager has been asked to keep 45% of the portfolio money in Bond A. Calculate the percentage amount to be invested in bonds B and C that need to be purchased to immunize the portfolio.
(iii) After the portfolio has been formulated, an interest rate change occurs, increasing the yield to 11%. The new duration of these bonds are: Bond A = 7.15 Years, Bond B = 6.03 Years and Bond C = 4.27 years.
Is the portfolio still immunized? Why or why not?
(iv) Determine the new percentage of B and C bonds that are needed to immunize the portfolio. Bond A remaining at 45% of the portfolio.

Present values be used as follows :

Present Values	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.09,t}$	0.917	0.842	0.772	0.708	0.650

Present Values	t_6	t_7	t_8	T_9	t_{10}
$PVIF_{0.09,t}$	0.596	0.547	0.502	0.460	0.4224

[NOV 2018 -12 MARKS]
Answer:
(i) Calculation of Bond Duration
Bond A

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	10	0.917	9.17	0.086	0.086
2	10	0.842	8.42	0.079	0.158
3	10	0.772	7.72	0.073	0.219
4	10	0.708	7.08	0.067	0.268
5	10	0.650	6.50	0.061	0.305
6	10	0.596	5.96	0.056	0.336
7	10	0.547	5.47	0.051	0.357

8	10	0.502	5.02	0.047	0.376
9	10	0.460	4.60	0.043	0.387
10	110	0.4224	46.46	0.437	4.370
			106.40	1.000	6.862

Duration of the bond is 6.862 years or 6.86 year

Bond B

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	11	0.917	10.087	0.091	0.091
2	11	0.842	9.262	0.083	0.166
3	11	0.772	8.492	0.076	0.228
4	11	0.708	7.788	0.070	0.280
5	11	0.650	7.150	0.064	0.320
6	11	0.596	6.556	0.059	0.354

7	11	0.547	6.017	0.054	0.378
8	111	0.502	55.772	0.502	4.016
			111.224	1.000	5.833

Duration of the bond B is 5.833 years or 5.84 years

Bond C

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	9	0.917	8.253	0.082	0.082
2	9	0.842	7.578	0.076	0.152
3	9	0.772	6.948	0.069	0.207
4	9	0.708	6.372	0.064	0.256
5	109	0.650	70.850	0.709	3.545
			100.00	1.000	4.242

Duration of the bond C is 4.242 years or 4.24 years

(ii) Amount of Investment required in Bond B and C

Period required to be immunized	6.000 Year
Less: Period covered from Bond A	3.087 Year
To be immunized from B and C	2.913 Year

Let proportion of investment in Bond B and C is b and c respectively then

b + c = 0.55 (1)

5.883b + 4.242c = 2.913 (2)

On solving these equations, the value of b and c comes 0.3534 or 0.3621 and 0.1966 or 0.1879 respectively and accordingly, the % of investment of B and C is 35.34% or 36.21% and 19.66 % or 18.79% respectively.

(iii) With revised yield the Revised Duration of Bond stands

0.45 x 7.15 + 0.36 x 6.03 + 0.19 x 4.27 = 6.20 year
No portfolio is not immunized as the duration of the portfolio has been increased from 6 years to 6.20 years.

(iv) New percentage of B and C bonds that are needed to immunize the portfolio.

Period required to be immunized	6.0000 Year
Less: Period covered from Bond A	3.2175 Year
To be immunized from B and C	2.7825 Year

Let proportion of investment in Bond B and C is b and c respectively, then
b + c = 0.55
6.03b + 4.27c = 2.7825
b = 0.2466
On solving these equations, the value of b and c comes 0.2466 and 0.3034 respectively and accordingly, the % of investment of B and C is 24.66% or 25% and 30.34 % or 30.00% respectively.

39. The shares of G Ltd. we currently being traded at Rs. 46. The company published its results for the year ended 31st March 2019 and declared a dividend of Rs. 5. The company made a return of 15% on its capital and expects that to be the norm in which it operates. G Ltd.
Also expects the dividends to grow at 10% for the first three years and thereafter at 5%.
You are required to advise whether the share of the company is being traded at a premium or discount. PVIF @ 15% for the next 3 years is 0.870, 0.756 and 0.658 respectively.
[MAY 2019- 8 MARKS]
Answer:

Expected dividend for next three years
Year 1 (D1) = 5 (1.1) = 5.5
Year 2 (D2) = 5.5 (1.1) = 6.05
Year 3 (D3) = 6.05 (1.1) = 6.655
Required Rate (Ke) = 15%
Present Value of Dividends
= 5.5 (0.870) + 6.05 (0.756) + 6.655 (0.658)
= 4.785 + 4.574 + 4.379
= 13.74
Now, PV at growth rate of 5%

$$P3 = \frac{D4}{Ke - g}$$

$$= \frac{6.655(1.05)}{0.15 - 0.05} = \frac{6.988}{0.1} = 69.88$$

Therefore, P0 = 69.88 x 0.658 = 45.98
Now, adding the PV of dividend at two different growth rates, we get,
13.74 + 45.98 = 59.72
Hence, it is clear that shares are being traded at discount i.e. undervalued because intrinsic value of share is more than the market price.

40. ABB Ltd. has a surplus cash balance of Rs. 180 lakhs and wants to distribute 50% of it to the equity shareholders. The company decides to buyback equity shares. The company estimates that its equity share price after re-purchase is likely to be 15% above the buyback price. if the buyback route is taken.
Other information is as under:
1. Number of equity shares outstanding at present (Face value Rs. 10 each) is Rs. 20 lakhs.
2. The current EPS is Rs. 5.
You are required to calculate the following:
I. The price at which the equity shares can be re-purchased, if market capitalization of the company should be Rs. 400 lakhs after buy back.
II. Number of equity shares that can be re-purchased.
III. The impact of equity shares re-purchase on the EPS, assuming that the net income remains unchanged.
[MAY 2019- 8 MARKS]
Answer:
(i) Let P be the buyback price decided by ABB Ltd.
Market Capitalisation after Buyback
400 lakhs = 1.15P (Original Shares – Shares Bought Back)

$$= 1.15P\left(20\text{ lakhs} - \frac{50\%\text{ of }180\text{ lakhs}}{P}\right)$$

$$= 23\text{ lakhs} \times P - 90\text{ lakhs} \times 1.15$$

$$= 23\text{ lakhs } P - 130.50\text{ lakhs}$$

Again, 23 lakhs P – 130.50 lakhs
or 23 lakhs P = 400 lakhs + 130.50 lakhs

$$\text{or } P = \frac{503.50}{23} = ₹\ 21.89 \text{ per share}$$

(ii) Number of Shares to be Bought Back :-
Rs. 90 lakhs/ 21.89 = 4.111 lakhs (Approx.) or 411147 shares

(iii) Shares after buyback
= 20 lakhs – 4.111 lakhs = 15.889 lakhs
or 20,00,000 – 4,11,147 = 15,88,853 shares
EPS = 5 x 20 lakhs/ 15.889 lakhs = Rs. 6.29
Thus, EPS of ABB Ltd., increases to Rs. 6.29.
So, EPS of ABB Ltd. is increased by Rs. 1.29 (6.29 – 5.00)

41. Following financial information's are available of XP Ltd. for the year 2018:

Equity Share Capital (₹10 each)	*₹200 Lakh*
Reserves and Surplus	*₹600 Lakh*
10% Debentures (₹100 each)	*₹350 Lakh*
Total Assets	*₹1200 Lakh*
Assets Turnover Ratio	*2 times*
Tax Rate	*30%*
Operating Margin	*10%*
Dividend Payout Ratio	*20%*
Current Market Price per Equity Share	*₹28*
Required Rate of Return of Investors	*18%*

You are required to:
(i) Prepare Income Statement for the year 2018.
(ii) Determine its Sustainable Growth Rate.
(iii) Determine the fair price of the company's share using Dividend Discount Model.
(iv) Give your opinion on investment in the company's share at current price.
(MAY 2019-8 MARKS)
8 MARKS]

Answer: Workings:
Asset turnover ratio = 2 times
Total Assets = Rs. 1200 lakh
Turnover Rs. 1200 lakhs × 2 = Rs. 2400 lakhs
Interest on Debentures = 350 lakh x 10% = 35 lakhs
Operating Margin = 10%
Hence operating cost = (1 - 0.10) 2400 lakhs = Rs. 2160 lakhs
Dividend Payout = 20% Tax rate = 30%

(i) Income statement

	(₹ Lakhs)
Sale	2400
Operating Exp	2160
EBIT	240
Interest	35
EBT	205
Tax @ 30%	61.5
EAT	143.5
Dividend @ 20%	28.7
Retained Earnings	114.8

(ii) SGR = Return on Equity (1- Dividend Payout Ratio)

= ROE (1-b)

$$ROE = \frac{PAT}{NW} \text{ and } NW = Rs.200\,lakh + Rs.\ 600\,lakh = Rs.800\,lakh$$

$$ROE = \frac{Rs.143.5\,lakhs}{Rs.800\,lakhs} \times 100 = 17.94\%$$

$$SGR = 0.1794\ (1 - 0.20) = 14.35\% \text{ or } \frac{0.1794 \times 0.80}{1 - 0.1794 \times 0.80} = \frac{0.14352}{0.85648} = 16.76\%$$

(iii) Calculation of fair price of share using dividend discount model

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

$$\text{Dividends} = \frac{₹\,28.7\,lakhs}{20\,lakhs} = ₹\ 1.435$$

Growth Rate = 14.35% or 16.76%

$$\text{Hence } P_0 = \frac{₹\,1.435(1+0.1435)}{0.18 - 0.1435} = \frac{₹\,1.64}{0.0365} = ₹\ 44.93 \text{ or } 44.96$$

$$\text{or } \frac{1.435(1+0.1676)}{0.18 - 0.1676} = \frac{₹\,1.676}{0.0124} = ₹\ 135.16 \text{ or } 135.12$$

(iv) Since the current market price of share is ₹ 28, the share is undervalued. Hence, the investor should invest in the company.

42. SAM Ltd. has just paid a dividend of Rs. 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming from the 4th year onward from now. The dividends will then be Rs. 2.50 per share and will grow @ 7% p.a. An investor has 1,000 shares in SAM Ltd. and wants a receipt of atleast Rs. 2,000 p.a. from this investment. Evaluate whether the market value of the share is affected by the decision of the Board. Evaluate also as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%

[MTP MARCH 2018 -7 MARKS | RTP- MAY 2018]

Answer:

Value of share at present = $\frac{D_1}{k_e - g}$

$= \frac{2(1.06)}{0.08-0.06} = ₹\ 106$

However, if the Board implement its decision, no dividend would be payable for 3 years and the dividend for year 4 would be ₹ 2.50 and growing at 7% p.a. The price of the share, in this case, now would be:

$P_0 = \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^3} = ₹\ 198.46$

So, the price of the share is expected to increase from ₹ 106 to ₹ 198.45 after the announcement of the project. The investor can take up this situation as follows:

Expected market price after 3 years	$= \frac{2.50}{0.08-0.07}$	₹ 250.00
Expected market price after 2 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)}$	₹ 231.48
Expected market price after 1 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^2}$	₹ 214.33

In order to maintain his receipt at ₹ 2,000 for first 3 year, he would sell

10 shares in first year @ ₹ 214.33 for	₹ 2,143.30
9 shares in second year @ ₹ 231.48 for	₹ 2,083.32
8 shares in third year @ ₹ 250 for	₹ 2,000.00

At the end of 3rd year, he would be having 973 shares valued @ ₹ 250 each i.e. ₹ 2,43,250. On these 973 shares, his dividend income for year 4 would be @ ₹ 2.50 i.e. ₹ 2,432.50.

So, if the project is taken up by the company, the investor would be able to maintain his receipt of at least ₹ 2,000 for first three years and would be getting increased income thereafter.

43. A hypothetical company ABC Ltd. issued a 10% Debenture (Face Value of Rs. 1000) of the duration of 10 years is currently trading at Rs. 850 per debenture. The bond is convertible into 50 equity shares being currently quoted at Rs. 17 per share. Calculate the spread of yield of the above bond from this comparable bond, if equivalent yield of the same is 11.80%.
The relevant present value table is as follows.

Present Values	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8	t_9	t_{10}
$PVIF_{0.11,\ t}$	0.901	0.812	0.731	0.659	0.593	0.535	0.482	0.434	0.391	0.352
$PVIF_{0.13,\ t}$	0.885	0.783	0.693	0.613	0.543	0.480	0.425	0.376	0.333	0.295

[MTP MARCH 2018 / APRIL 2019- 5 MARKS / 7 MARKS | RTP NOV 2019]
Answer:

Conversion Price = Rs. 50 x 17 = Rs. 850
Intrinsic Value = Rs. 850
Accordingly the yield (r) on the bond shall be :
Rs. 850 = Rs. 100 PVAF (r, 10) + Rs. 1000 PVF (r, 10)

Let us discount the cash flows by 11%
850 = 100 PVAF (11%, 10) + 1000 PVF (11%, 10)
850 = 100 x 5.889 + 1000 x 0.295
= 90.90

Let us discount the cash flows by 11%
850 = 100 PVAF (11%, 10) + 1000 PVF (11%, 10)
850 = 100 x 5.889 + 1000 x 0.352
= 90.90

Now let us discount the cash flows by 13%
850 = 100 PVAF (13%, 10) + 1000 PVF (13%, 10)
850 = 100 x 5.426 + 1000 x 0.295
= -12.40

Accordingly, IRR

$$11\% + \frac{90.90}{90.90-(-12.40)} \times (13\% - 11\%)$$

$$11\% + \frac{90.90}{103.30} \times (13\% - 11\%)$$

= 12.76%

The spread from comparable bond = 12.76% - 11.80% = 0.96%

44. Abhishek Ltd. has a surplus cash of Rs.90 lakhs and wants to distribute 30% of it to the shareholders. The Company decides to buyback shares. The Finance Manager of the Company estimates that its share price after re-purchase is likely to be 10% above the buyback price; if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is Rs.3.
Evaluate:
(i) The price at which the shares can be repurchased, if the market capitalization of the company should be Rs.200 lakhs after buyback. (4 Marks)
(ii) The number of shares that can be re-purchased. (1 Mark)
(iii) The impact of share re-purchase on the EPS, assuming the net income is same. (2 Marks)
Answer:

Calculation of Number of GDR to be issued and Cost of GDR to Odessa Ltd

Net Issue Size = $15 million

Gross Issue = $\frac{\$15\,\text{million}}{0.98}$ = $15.306 million

Issue Price per GDR in Rs. (300 x 3 x 90%)	Rs. 810
Issue Price per GDR in $ (Rs. 810/ Rs. 60)	$13.50
Dividend Per GDR (D_1) = Rs. 2* x 3 =	Rs. 6

* Assumed to be on based on Face Value of Rs. 10 each share.

Net Proceeds Per GDR = Rs. 810 x 0.98 = Rs. 793.80

(a) Number of GDR to be issued

$$\frac{\$15.306\ \text{million}}{\$13.50} = 1.1338\ \text{million}$$

(b) Cost of GDR to Odessa Ltd.

$$k_e = \frac{6.00}{793.80} + 0.20 = 20.76\%$$

45. ABC Ltd. issued 9%, 5 year bonds of Rs. 1,000/- each having a maturity of 3 years. The present rate of interest is 12% for one year tenure. It is expected that Forward rate of interest for one year tenure is going to fall by 75 basis points and further by 50 basis points for every next year in further for the same tenure. This bond has a beta value of 1.02 and is more popular in the market due to less credit risk.
Calculate
(i) Intrinsic value of bond (4 Marks)
(ii) Expected price of bond in the market (1 Mark)
[MTP -APRIL 2018]
Answer:

(i) Calculation of Intrinsic value of Bond

PV of Interest + PV of Maturity Value of Bond

Forward rate of interests

1st Year 12%

2nd Year 11.25%

3rd Year 10.75%

$$\text{PV of interest} = \frac{\text{Rs.90}}{(1+0.12)} + \frac{\text{Rs.90}}{(1+0.12)(1+0.1125)} + \frac{\text{Rs.90}}{(1+0.12)(1+0.1125)(1+0.1075)} = \text{Rs. } 217.81$$

$$\text{PV of Maturity Value of Bond} = \frac{\text{Rs.1000}}{(1+0.12)(1+0.1125)(1+0.1075)} = \text{Rs. } 724.67$$

Intrinsic value of Bond = Rs. 217.81 + Rs. 724.67 = Rs. 942.48

(ii) Calculation of Expected Price in the bond market

Expected Price = Intrinsic Value x Beta Value

= Rs. 948.48 x 1.02 = Rs. 961.33

46. Mr. A will need Rs. 1,00,000 after two years for which he wants to make one time necessary investment now. He has a choice of two types of bonds. Their details are as below:

	Bond X	Bond Y
Face value	Rs. 1,000	Rs. 1,000
Coupon	7% payable annually	8% payable annually
Years to maturity	1	4
Current price	Rs. 972.73	Rs. 936.52
Current yield	10%	10%

Advice Mr. A whether he should invest all his money in one type of bond or he should buy both the bonds and, if so, in which quantity? Assume that there will not be any call risk or default risk.

[MTP AUGUST 2018-6 MARKS]

Answer:

Duration of Bond X

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	1070	.909	972.63	1.000	1.000

Duration of the Bond is 1 year

Duration of Bond Y

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	80	.909	72.72	0.077	0.077
2	80	.826	66.08	0.071	0.142
3	80	.751	60.08	0.064	0.192
4	1080	.683	737.64	0.788	3.152
			936.52	1.000	3.563

Duration of the Bond is 3.563 years

Let x_1 be the investment in Bond X and therefore investment in Bond Y shall be $(1 - x_1)$. Since the required duration is 2 year the proportion of investment in each of these two securities shall be computed as follows:

$2 = x_1 + (1 - x_1)\ 3.563$

$x_1 = 0.61$

Accordingly, the proportion of investment shall be 61% in Bond X and 39% in Bond Y respectively.

Amount of investment

Bond X	*Bond Y*
PV of Rs. 1,00,000 for 2 years @ 10% x 61% = Rs. 1,00,000 (0.826) x 61% = Rs. 50,386 No. of Bonds to be purchased = Rs. 50,386/Rs. 972.73 = 51.79 i.e. approx. 52 bonds	PV of Rs. 1,00,000 for 2 years @ 10% x 39% = Rs. 1,00,000 (0.826) x 39% = Rs. 32,214 No. of Bonds to be purchased = Rs. 32,214/Rs. 936.52 = 34.40 i.e. approx. 34 bonds

Note: The investor has to keep the money invested for two years. Therefore, the investor can invest in both the bonds with the assumption that Bond X will be reinvested for another one year on same returns.

47. GHI Ltd., AAA rated company has issued, fully convertible bonds on the following terms, a year ago

Face value of bond	Rs. 1000
Coupon (interest rate)	8.5%
Time to Maturity (remaining)	3 years
Interest Payment	Annual, at the end of year
Principal Repayment	At the end of bond maturity
Conversion ratio (Number of shares per bond)	25
Current market price per share	Rs. 45
Market price of convertible bond	Rs. 1175

AAA rated company can issue plain vanilla bonds without conversion option at an interest rate of 9.5%.

Required: Calculate as of today:

(i) Straight Value of bond.

(ii) Conversion Value of the bond.

(iii) Conversion Premium.

(iv) Percentage of downside risk.

(v) Conversion Parity Price.

t	1	2	3
$PVIF_{0.095, t}$	0.9132	0.8340	0.7617

MTP AUGUST 2018 - 8 MARKS]

Answer:

(i) Straight Value of Bond

Rs. 85 x 0.9132 + Rs. 85 x 0.8340 + Rs. 1085 x 0.7617 = Rs. 974.96

(ii) Conversion Value

Conversion Ration x Market Price of Equity Share

= Rs. 45 x 25 = Rs. 1,125

(iii) Conversion Premium

Conversion Premium = Market Conversion Price - Market Price of Equity Share

$= \frac{Rs.1,175}{25}$ - Rs. 45 = Rs. 2

or = Rs. 1,175 - Rs. 45 x 25 = Rs. 50

or $\frac{Rs.1,175 - Rs.1,125}{Rs.1,125} = 4.47\%$

(iv) Percentage of Downside Risk

$= \frac{Rs.1,175 - Rs.974.96}{Rs.974.96} \times 100 = 20.52\%$ or $\frac{Rs.1,175 - Rs.974.96}{Rs.1,175} = 17.02\%$

(v) Conversion Parity Price

$$\frac{\text{Bond Price}}{\text{No. of Share on Conversion}}$$

$= \frac{Rs.1,175}{25} = Rs. 47$

48. Mr. A is thinking of buying shares at Rs. 500 each having face value of Rs. 100. He is expecting a bonus at the ratio of 1:5 during the fourth year. Annual expected dividend is 20% and the same rate is expected to be maintained on the expanded capital base. He intends to sell the shares at the end of seventh year at an expected price of Rs. 900 each. Incidental expenses for purchase and sale of shares are estimated to be 5% of the market price. He expects a minimum return of 12% per annum.
Recommend whether Mr. A should buy the shares? If so, what maximum price should he pay for each share? Assume no tax on dividend income and capital gain
[MTP-APRIL 2019- 6 MARKS | RTP- NOV 2019]
Answer:

P.V. of dividend stream and sales proceeds

Year	Divd. /Sale	PVF (12%)	PV (Rs.)
1	Rs. 20/-	0.893	17.86
2	Rs. 20/-	0.797	15.94
3	Rs. 20/-	0.712	14.24
4	Rs. 24/-	0.636	15.26
5	Rs. 24/	0.567	13.61
6	Rs. 24/	0.507	12.17
7	Rs. 24/	0.452	10.85
7	Rs. 1026/- (Rs. 900 x 1.2 x 0.95)	0.452	463.75
			Rs. 563.68
	Less : Cost of Share (Rs. 500 x 1.05)		Rs. 525.00
	Net gain		Rs. 38.68

Since Mr. A is gaining Rs. 38.68 per share, he should buy the share.

Maximum price Mr. A should be ready to pay is Rs. 563.68 which will include incidental expenses.
So the maximum price should be Rs. 563.68 x 100/105 = Rs. 536.84

49. The following data is available for a bond:

Face Value	**Rs. 1,000**
Coupon Rate	**11%**
Years to Maturity	**6**
Redemption Value	**Rs. 1,000**
Yield to Maturity	**15%**

(Round-off your answers to 3 decimals)
Calculate the following in respect of the bond:
(i) Current Market Price.
(ii) Duration of the Bond.
(iii) Volatility of the Bond.
(iv) Expected market price if increase in required yield is by 100 basis points.
(v) Expected market price if decrease in required yield is by 75 basis points.
[MTP APRIL 2019- 8 MARKS]
Answer:

(i) Calculation of Market price:

$$TM = \frac{\text{Coupon interest} + \left(\frac{\text{Discount or premium}}{\text{Years left}}\right)}{\frac{\text{Face Value} + \text{Market value}}{2}}$$

Discount or premium – YTM is more than coupon rate, market price is less than Face Value i.e. at discount.

Let x be the market price

$$0.15 = \frac{110 + \left\{\frac{(1{,}000 - x)}{6}\right\}}{\frac{1{,}000 + x}{2}}$$

x = Rs. 834.48

Alternatively, it can also be calculated using Tabular Method.

(ii) Duration

Year	*Cash flow*	*P.V. @ 15%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	110	.870	95.70	0.113	0.113
2	110	.756	83.16	0.098	0.196
3	110	.658	72.38	0.085	0.255
4	110	.572	62.92	0.074	0.296
5	110	.497	54.67	0.064	0.320
6	1110	.432	479.52	0.565	3.39
			848.35	1.000	4.570

Duration of the Bond is 4.570 years

(iii) Volatility

$$\text{Volatility of the bond} = \frac{\text{Duration}}{(1 + \text{yields})} = \frac{4.570}{1.15} = 3.974$$

(iv) The expected market price if increase in required yield is by 100 basis points.

= Rs. 834.48× 1.00 (3.974/100) = Rs. 33.162

Hence expected market price is Rs. 834.48 – Rs. 33.162 = Rs. 801.318

Alternatively, this can also be calculated as follows:

Rs. 848.35 x 100 (3.794/100) = 33.71

Hence, expected market price is 848.48 – 33.71 = 814.77

Thus, the market price will decrease.

(v) The expected market price if decrease in required yield is by 75 basis points.

= Rs. 834.48× 0.75 (3.974/100) = Rs. 24.87

Hence expected market price is Rs. 834.48 + Rs. 24.87 = Rs. 859.35

Alternatively, this can also be calculated as follows:

848.35 x 0.75 (3.974/100) = 25.29

Hence, expected market price = 848.35 – 25.29 = Rs. 823.06

Thus, the market price will increase.

50. ABC Co. is considering a new sales strategy that will be valid for the next 4 years. They want to know the value of the new strategy. Following information relating to the year which has just ended, is available:

Income Statement	Rs.
Sales	20,000
Gross margin (20%)	4,000
Administration, Selling & distribution expense (10%)	2,000
PBT	2,000
Tax (30%)	600
PAT	1,400
Balance Sheet Information	
Fixed Assets	8,000
Current Assets	4,000
Equity	12,000

If it adopts the new strategy, sales will grow at the rate of 20% per year for three years. The gross margin ratio, Assets turnover ratio, the Capital structure and the income tax rate will remain unchanged. Depreciation would be at 10% of net fixed assets at the beginning of the year. The Company's target rate of return is 15%. Calculate the incremental value due to adoption of the strategy.
[MTP APRIL 2019 8 MARKS | RTP MAY 2020]

Answer:

Projected Balance Sheet				
	Year 1	Year 2	Year 3	Year 4
Fixed Assets (40% of Sales)	9,600	11,520	13,824	13,824
Current Assets (20% of Sales)	4,800	5,760	6,912	6,912
Total Assets	14,400	17,280	20,736	20,736
Equity	14,400	17,280	20,736	20,736

Projected Cash Flows:-

	Year 1	Year 2	Year 3	Year 4
Sales	24,000	28,800	34,560	34,560
PBT (10% of sale)	2,400	2,880	3,456	3,456
PAT (70%)	1,680	2,016	2,419.20	2,419.20
Depreciation	800	960	1,152	1,382
Addition to Fixed Assets	2,400	2,880	3,456	1,382
Increase in Current Assets	800	960	1,152	-
Operating cash flow (FCFF)	(720)	(864)	(1,036.80)	2,419.20

Projected Cash Flows:-

Present value of Projected Cash Flows:-

Cash Flows	*PVF at 15%*	*PV*
-720	0.870	-626.40
-864	0.756	-653.18
-1,036.80	0.658	-682.21
		-1,961.79

Residual Value - 2419.20/0.15 = 16,128

Present value of Residual value = $16128/(1.15)^3$

= 16128/1.521 = 10603.55

Total shareholders' value = 10,603.55 – 1,961.79 = 8,641.76

Pre strategy value = 1,400 / 0.15 = 9,333.33

∴ Value of strategy = 8,641.76 – 9,333.33 = – 691.57

Conclusion: The strategy is not financially viable

51. X Limited, just declared a dividend of Rs. 14.00 per share. Mr. B is planning to purchase the share of X Limited, anticipating increase in growth rate from 8% to 9%, which will continue for three years. He also expects the market price of this share to be Rs. 360.00 after three years.
You are required to calculate:
(i) the maximum amount Mr. B should pay for shares, if he requires a rate of return of 13% per annum.
(ii) the maximum price Mr. B will be willing to pay for share, if he is of the opinion that the 9% growth can be maintained indefinitely and require 13% rate of return per annum.
(iii) the price of share at the end of three years, if 9% growth rate is achieved and assuming other conditions remaining same as in (ii) above.

Calculate rupee amount up to two decimal points.

	Year-1	Year-2	Year-3
FVIF @ 9%	1.090	1.188	1.295
FVIF @ 13%	1.130	1.277	1.443
PVIF @ 13%	0.885	0.783	0.693

[MTP OCTOBER 2019-7 MARKS]

Answer:

(i) Expected dividend for next 3 years.

Year 1 (D_1) Rs. 14.00 (1.09) = Rs. 15.26

Year 2 (D_2) Rs. 14.00 $(1.09)^2$ = Rs. 16.63

Year 3 (D_3) Rs. 14.00 $(1.09)^3$ = Rs. 18.13

Required rate of return = 13% (Ke)

Market price of share after 3 years = (P_3) = Rs. 360

The present value of share

$$P_0 = \frac{D_1}{(1+ke)} + \frac{D_2}{(1+ke)^2} + \frac{D_3}{(1+ke)^3} + \frac{P_3}{(1+ke)^3}$$

$$P_0 = \frac{15.26}{(1+0.13)} + \frac{16.63}{(1+0.13)^2} + \frac{18.13}{(1+0.13)^3} + \frac{360}{(1+0.13)^3}$$

P_0 = 15.26(0.885) + 16.63(0.783) +18.13(0.693)+360(0.693)

P_0 = 13.50 + 13.02 + 12.56 + 249.48

P_0 = Rs. 288.56

(ii) If growth rate 9% is achieved for indefinite period, then maximum price of share should Mr. A willing be to pay is

$$P_0 = \frac{D_1}{(ke-g)} = \frac{₹\ 15.26}{0.13\text{-}0.09} = \frac{₹15.26}{0.04} = \text{Rs. } 381.50$$

(iii) Assuming that conditions mentioned above remain same, the price expected after 3 years will be:

$$P_3 = \frac{D_4}{k_e - g} = \frac{D_3(1.09)}{0.13-0.09} = \frac{18.13\times 1.09}{0.04} = \frac{19.76}{0.04} = \text{Rs. } 494$$

52. XL Ispat Ltd. has made an issue of 14 per cent non-convertible debentures on January 1, 2007. These debentures have a face value of Rs. 100 and is currently traded in the market at a price of Rs. 90. Interest on these NCDs will be paid through post-dated cheques dated June 30 and December 31. Interest payments for the first 3 years will be paid in advance through postdated cheques while for the last 2 years post-dated cheques will be issued at the third year. The bond is redeemable at par on December 31, 2011 at the end of 5 years.

Required:

(i) CALCULATE the current yield and YTM of the bond.

(ii) CALCULATE the duration of the NCD.

(iii) CALCULATE the realized yield on the NCD assuming that intermediate coupon payments are, not available for reinvestment calculate.

[RTP MAY 2018]

Answer:

(i) Current yield = $\frac{₹\ 7}{₹\ 90} \times \frac{12}{6}$ = 0.1555 or 15.55%

YTM can be determined from the following equation

7 × PVIFA (YTM, 10) + 100 × PVIF (YTM, 10) = 90

Let us discount the cash flows using two discount rates 7.50% and 9% as follows:

Year	Cash Flows	PVF@7.50%	PV@7.50%	PVF@9%	PV@9%
0	-90	1	-90	1	-90
1	7	0.930	6.51	0.917	6.419
2	7	0.865	6.055	0.842	5.894
3	7	0.805	5.635	0.772	5.404
4	7	0.749	5.243	0.708	4.956
5	7	0.697	4.879	0.650	4.550
6	7	0.648	4.536	0.596	4.172
7	7	0.603	4.221	0.547	3.829
8	7	0.561	3.927	0.502	3.514
9	7	0.522	3.654	0.460	3.220
10	107	0.485	51.90	0.422	45.154
			6.560		-2.888

Now we use interpolation formula

$$7.50\% + \frac{6.560}{6.560-(-2.888)} \times 1.50\%$$

$$7.50\% + \frac{6.560}{9.448} \times 1.50\% = 7.50\% + 1.041\%$$

YTM = 8.541% say 8.54%

Note: Students can also compute the YTM using rates other than 15% and 18%.

(ii) The duration can be calculated as follows:

Year	Cash Flow	PVF@ 8.54%	PV @ 8.54%	Proportion of NCD value	Proportion of NCD value × time
1	7	0.921	6.447	0.0717	0.0717
2	7	0.849	5.943	0.0661	0.1322

3	7	0.782	5.474	0.0608	0.1824
4	7	0.721	5.047	0.0561	0.2244
5	7	0.664	4.648	0.0517	0.2585
6	7	0.612	4.284	0.0476	0.2856
7	7	0.563	3.941	0.0438	0.3066
8	7	0.519	3.633	0.0404	0.3232
9	7	0.478	3.346	0.0372	0.3348
10	107	0.441	47.187	0.5246	5.2460
			89.95		7.3654

Duration = 7.3654 half years i.e. 3.683 years.

(iii) Realized Yield can be calculated as follows:

$$\frac{(7\times10)+100}{(1+R)^{10}} = 90$$

$$(1+R)^{10} = \frac{170}{90}$$

$$R = \left(\frac{170}{90}\right)^{1/10} - 1 = 0.06380 \text{ or } 6.380\% \text{ for half yearly and } 12.76\% \text{ annually.}$$

50.4018]

53. ABC Limited's shares are currently selling at Rs. 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise Rs. 20 lakhs to Finance a new project.

(i) CALCULATE the ex-right price of shares and the value of a right, if the firm offers one right share for every two shares held.

(ii) CALCULATE the ex-right price of shares and the value of a right, if the firm offers one right share for every four shares held.

(iii) ANALYSE how does the shareholders' wealth change from (i) to (ii) above and right issue increases shareholders' wealth?

[RTP NOV 2018]

Answer:

(i) Number of shares to be issued: 5,00,000

Subscription price ₹ 20,00,000 / 5,00,000 = ₹ 4

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{15,00,000} = ₹\ 10$$

$$\text{Value of right} = \frac{₹\ 10 - ₹\ 4}{2} = 3$$

Or = ₹ 10 – ₹ 4 = ₹ 6

(ii) Subscription price ₹ 20,00,000 / 2,50,000 = ₹ 8

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{12,50,000} = ₹\ 12$$

$$\text{Value of right} = \frac{₹\ 12 - ₹\ 8}{4} = ₹\ 1.$$

Or = ₹ 12 – ₹ 8 = ₹ 4

(iii) The effect of right issue on wealth of Shareholder's wealth who is holding, say 100 shares.

(a) When firm offers one share for two shares held.

Value of Shares after right issue	(150 X ₹ 10)	₹ 1,500
Less: Amount paid to acquire right shares	(50X₹4)	₹ 200
		₹1,300

(b) When firm offers one share for every four shares held.

Value of Shares after right issue	(125 X ₹ 12)	₹ 1,500
Less: Amount paid to acquire right shares	(25X₹8)	₹ 200
		₹1,300

(c) Wealth of Shareholders before Right Issue ₹1,300

Thus, there will be no change in the wealth of shareholders from (i) and (ii).

54.Based on the credit rating of bonds, Mr. Z has decided to apply the following discount rates for valuing bonds:

Credit Rating	Discount Rate
AAA	364 day T bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated, Rs. 1,000 face value bond currently selling at Rs.1,025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364 day T-bill rate to be 9%). You are required to calculate the intrinsic value of the bond for Mr. Z. Should he invests in the bond? Also calculate the current yield and the Yield to Maturity (YTM) of the bond.

[RTP MAY 2019]

Answer:

The appropriate discount rate for valuing the bond for Mr. Z is:

R = 9% + 3% + 2% = 14%

Time	CF	PVIF 14% PV (CF)	PV (CF)
1	150	0.877	131.55
2	150	0.769	115.35
3	150	0.675	101.25
4	150	0.592	88.80
5	1150	0.519	596.85
		∑ PV (CF) i.e. P_0 =	1033.80

Since, the current market value is less than the intrinsic value; Mr. Z should buy the bond. Current yield = Annual Interest / Price = 150 / 1025.86 = 14.62%

The YTM of the bond is calculated as follows:

@15%

$P = 150 \times PVIFA_{15\%, 4} + 1150 \times PVIF_{15\%, 5}$

$= 150 \times 2.855 + 1150 \times 0.497 = 428.25 + 571.55 = 999.80$

@14%

As found in sub part (a) P_0 = 1033.80

By interpolation we get,

$$= 14\% + \frac{7.94}{7.94 - (-26.06)} \times (15\% - 14\%) = 14\% + \frac{7.94}{34}\%$$

YTM = 14.23%

55. Seawell Corporation, a manufacturer of do-it-yourself hardware and housewares, reported earnings per share of € 2.10 in 2013, on which it paid dividends per share of €0.69. Earnings are expected to grow 15% a year from 2004 to 2008, during this period the dividend payout ratio is expected to remain unchanged. After 2018, the earnings growth rate is expected to drop to a stable rate of 6%, and the payout ratio is expected to increase to 65% of earnings. The firm has a beta of 1.40 currently, and is expected to have a beta of 1.10 after 2018. The market risk premium is 5.5%. The Treasury bond rate is 6.25%.
(a) What is the expected price of the stock at the end of 2018?
(b) What is the value of the stock, using the two-stage dividend discount model?
[RTP MAY 2019]
Answer:

The expected rate of return on equity after 2018 = 0.0625 + 1.10(0.055) = 12.3%

The dividends from 2013 onwards can be estimated as:

Year	2013	2014	2015	2016	2017	2018	2019
Earnings Per Share (€)	2.1	2.415	2.78	3.19	3.67	4.22	4.48
Dividends Per Share (€)	0.69	0.794	0.913	1.048	1.206	1.387	2.91

a. The price as of 2018 = €2.91/(0.123- 0.06) = €46.19

b. The required rate of return upto 2018 = 0.0625 + 1.4(0.055) = 13.95%. The dividends upto 2018 are discounted using this rate as follow:

Year	PV of Dividend
2014	0.794/1.1395 = 0.70
2015	$0.913/(1.1395)^2$ = 0.70
2016	$1.048/(1.1395)^3$ = 0.70
2017	$1.206/(1.1395)^4$ = 0.72
2018	$1.387/(1.1395)^5$ = 0.72
Total	3.54

The current price = €3.54 + €46.19/$(1.1395)^5$= €27.58.

56. SAM Ltd. has just paid a dividend of Rs. 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming from the 4th year onward from now. The dividends will then be Rs. 2.50 per share and will grow @ 7% p.a. An investor has 1,000 shares in SAM Ltd. and wants a receipt of at least Rs. 2,000 p.a. from this investment. Interpret how the market value of the share is affected by the decision of the Board. Also advise as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%. (MTP-OCT 2020-8 Marks)
Answer:

Value of share at present = $\frac{D_1}{k_e - g}$

$= \frac{2(1.06)}{0.08-0.06} = ₹\ 106$

However, if the Board implement its decision, no dividend would be payable for 3 years and the dividend for year 4 would be ₹ 2.50 and growing at 7% p.a. The price of the share, in this case, now would be:

$P_0 = \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^3} = ₹\ 198.46$

So, the price of the share is expected to increase from ₹ 106 to ₹ 198.45 after the announcement of the project. The investor can take up this situation as follows:

Expected market price after 3 years	$= \frac{2.50}{0.08-0.07}$	₹ 250.00
Expected market price after 2 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)}$	₹ 231.48
Expected market price after 1 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^2}$	₹ 214.33

In order to maintain his receipt at ₹ 2,000 for first 3 year, he would sell

10 shares in first year @ ₹ 214.33 for	₹ 2,143.30
9 shares in second year @ ₹ 231.48 for	₹ 2,083.32
8 shares in third year @ ₹ 250 for	₹ 2,000.00

At the end of 3rd year, he would be having 973 shares valued @ ₹ 250 each i.e. ₹ 2,43,250. On these 973 shares, his dividend income for year 4 would be @ ₹ 2.50 i.e. ₹ 2,432.50.

So, if the project is taken up by the company, the investor would be able to maintain his receipt of at least ₹ 2,000 for first three years and would be getting increased income thereafter.

57. M/s Agfa Industries is planning to issue a debenture series on the following terms:

Face value	**Rs. 100**
Term of maturity	**10 years**
Years	**Yearly coupon rate**
1 – 4	**9%**
5 – 8	**10%**
9 – 10	**14%**

The current market rate on similar debentures is 15 per cent per annum. The Company proposes to price the issue in such a manner that it can yield 16 per cent compounded rate of return to the investors. The Company also proposes to redeem the debentures at 5 percent premium on maturity. Determine the issue price of the debentures.

[RTP MAY 2020]

The issue price of the debentures will be the sum of present value of interest payments during 10 years of its maturity and present value of redemption value of debenture.

Years	Cash out flow (₹)	PVIF @ 16%	PV
1	9	.862	7.758
2	9	.743	6.687
3	9	.641	5.769
4	9	.552	4.968
5	10	.476	4.76
6	10	.410	4.10
7	10	.354	3.54
8	10	.305	3.05
9	14	.263	3.682
10	14 + 105 = 119	.227	3.178 + 23.835
			71.327

Thus the debentures should be priced at ₹ 71.327

58.

Today being 1st January 2019, Ram is considering to purchase an outstanding Corporate Bond having a face value of ₹ 1,000 that was issued on 1st January 2017 which has 9.5% Annual Coupon and 20 years of original maturity (i.e. maturing on 31st December 2027). Since the bond was issued, the interest rates have been on downside and it is now selling at a premium of ₹ 125.75 per bond.

Determine the prevailing interest on the similar type of Bonds if it is held till the maturity which shall be at Par.

PV Factors:

	1	2	3	4	5	6	7	8	9
6%	0.943	0.890	0.840	0.792	0.747	0.705	0.665	0.627	0.592
8%	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500

(RTP-NOV 2020)

Answer:

To determine the prevailing rate of interest for the similar type of Bonds we shall compute the YTM of this Bond using IRR method as follows:

M = ₹ 1000

Interest = ₹ 95 (0.095 x ₹ 1000)

n = 9 years

V_0 = ₹ 1125.75 (₹ 1,000 + ₹ 125.75)

YTM can be determined from the following equation

₹ 95 × PVIFA (YTM, 9) + ₹ 1000 × PVIF (YTM, 9) = ₹ 1125.75

Let us discount the cash flows using two discount rates 8% and 10% as follows:

Year	Cash Flows	PVF@6%	PV@6%	PVF@8%	PV@8%
0	-1125.75	1	-1125.75	1	-1125.75
1	95	0.943	89.59	0.926	87.97
2	95	0.890	84.55	0.857	81.42
3	95	0.840	79.80	0.794	75.43
4	95	0.792	75.24	0.735	69.83
5	95	0.747	70.97	0.681	64.70
6	95	0.705	66.98	0.630	59.85
7	95	0.665	63.18	0.583	55.39
8	95	0.627	59.57	0.540	51.30
9	1095	0.592	648.24	0.500	547.50
			112.37		-32.36

Now we use interpolation formula

$$6.00\% + \frac{112.37}{112.37 - (-32.36)} \times 2.00\%$$

$$6.00\% + \frac{112.37}{144.73} \times 2.00\% = 6.00\% + 1.553\%$$

YTM = 7.553% say 7.55%

Thus, prevailing interest rate on similar type of Bonds shall be approx. 7.55%.

59.

The following data is available for NNTC bond:

Face value: ₹ 1000

Coupon rate: 7.50%

Years to maturity: 8 years

Redemption Value: ₹ 1000

YTM: 8%

Calculate:

(i) The current market price, duration and volatility of the bond.

(ii) The expected market price if there is a decrease in required yield by 50 bps.

((RTP-NOV 2020)

Answer:

(i) Current Market Price of Bond shall be computed as follows:

Year	Cash Flows	PVF@ 8%	PV@8%
1	75	0.926	69.45
2	75	0.857	64.28
3	75	0.794	59.55
4	75	0.735	55.13
5	75	0.681	51.08
6	75	0.630	47.25
7	75	0.583	43.73
8	1075	0.540	580.50
			970.97

Thus, the current market price of the Bond shall be ₹ 970.97.

Alternatively, using the Short-cut method the Market Price of Bond can also be computed as follows:

$$\frac{\text{Interest+(Discount/Premium)/ Years to maturity}}{\text{(Face Value + market Value)/2}}$$

Let market price be X

$$0.08 = \frac{75 + (1000-X)/8}{(1000+X)/2}$$

Thus, Value of X i.e. the price of Bond shall be ₹ 969.70

For the duration of the bond, we have to see the future cash flow and discount them as follows:

Year	CF	PV@8%	DCF	Proportion	Prop* Time (Yrs)
1	75	0.926	69.45	0.071	0.071
2	75	0.857	64.28	0.066	0.132
3	75	0.794	59.55	0.061	0.183
4	75	0.735	55.13	0.057	0.228
5	75	0.681	51.08	0.053	0.265
6	75	0.630	47.25	0.049	0.294
7	75	0.583	43.73	0.045	0.315
8	1075	0.540	580.50	0.598	4.784
		Total	970.97	1.000	6.272

Volatility of the bond = Duration / (1+ Yield) = 6.272/1.08 = 5.81

(ii) If there is decrease in required yield by 50 bps the expected market price of the Bond shall be increased by:

= ₹ 970.97 × 0.50 (5.81/100) = ₹ 28.21

Hence expected market price is ₹ 970.97 + ₹ 28.21 = ₹ 999.18

Alternatively, this portion using Bond Price as per Short-cut method can also be computed as follows:

= ₹ 969.70 × 0.50 (5.81/100) = ₹ 28.17

then the market price will be = ₹ 969.70 + ₹ 28.17 = ₹ 997.87

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CHAPTER-5 PORTFOLIO MANAGEMENT

QUESTIONS FROM STUDY MATERIAL

Theory Questions

1. Write short note on factors affecting decision of investment in fixed income securities.

Answer:

Bonds are fixed income avenues. The following factors have to be evaluated in selecting fixed income avenues:

(a) Yield to maturity: The yield to maturity for a fixed income avenues represent the rate of return earned by the investor, if he invests in the fixed income avenues and holds it till its maturity.

(b) Risk of Default: To assess such risk on a bond, one has to look at the credit rating of the bond. If no credit rating is available relevant financial ratios of the firm have to be examined such as debt equity, interest coverage, earning power etc and the general prospect of the industry to which the firm belongs have to be assessed.

(c) Tax Shield: In the past, several fixed income avenues offers tax shields but at present only a few of them do so.

(d) Liquidity: If the fixed income avenues can be converted wholly or substantially into cash at a fairly short notice it possesses a liquidity of a high order.

2. Briefly explain the objectives of "Portfolio Management".

Answer:

Some of the important objectives of portfolio management are:

(i) Security/Safety of Principal: Security not only involves keeping the principal sum intact but also its purchasing power.

(ii) Stability of Income: To facilitate planning more accurately and systematically the reinvestment or consumption of income.

(iii) Capital Growth: It can be attained by reinvesting in growth securities or through purchase of growth securities.

(iv) Marketability i.e. the case with which a security can be bought or sold: This is essential for providing flexibility to investment portfolio.

(v) Liquidity i.e. nearness to money: It is desirable for the investor so as to take advantage of attractive opportunities upcoming in the market.

(vi) Diversification: The basic objective of building a portfolio is to reduce the risk of loss of capital and/or income by investing in various types of securities and over a wide range of industries.

(vii) Favourable Tax Status: The effective yield an investor gets from his investment depends on tax to which it is subjected to. By minimising the tax burden, yield can be effectively improved.

3. Discuss the Capital Asset Pricing Model (CAPM) and its relevant assumptions.

[ALSO ASKED IN MAY 2018 EXAMS- 4 MARKS]

Answer:

The CAPM distinguishes between risk of holding a single Sasset and holding a portfolio of assets. There is a trade off between risk and return. Modern portfolio theory concentrates on risk and stresses on risk management rather than on return management. Risk may be security risk involving danger of loss of return from an investment in a single financial or capital asset. Security risk differs from portfolio risk, which is the probability of loss from investment in a portfolio of assets. Portfolio risk is comprised of unsystematic risk and systematic risk. Unsystematic risks can be averted through diversification and is related to random variables. Systematic risk is market related component of portfolio risk. It is commonly measured by regression coefficient Beta or the Beta coefficient. Low Beta reflects low risk and high Beta reflects high risk. As the unsystematic risk can be diversified by building a portfolio, the relevant risk is the nondiversifiable component of the total risk. As mentioned earlier, it can be measured by using Beta (β) a statistical parameter which measures the market sensitivity of returns. The beta for the market is equal to 1.0. Beta explains the systematic relationship between the return on a security and the return on the market by using a simple linear regression equation. The return on a security is taken as a dependent variable and the return on market is taken as independent variable then $Rj = Rf + \beta (Rm – Rf)$. The beta parameter β in this William Sharpe model represents the slope of the above regression relationship and measures the sensitivity or responsiveness of the security returns to the general market returns. The portfolio beta is merely the weighted average of the betas of individual securities included in the portfolio. Portfolio beta $\beta = \Sigma$ proportion of security × beta for security. CAPM provides a conceptual framework for evaluating any investment decision where capital is committed with a goal of producing future returns. CAPM is based on certain assumptions to provide conceptual framework for evaluating risk and return. Some of the important assumptions are discussed below:

(i) Efficient market: It is the first assumption of CAPM. Efficient market refers to the existence of competitive market where financial securities and capital assets are bought and sold with full information of risk and return available to all participants. In an efficient market, the price of individual assets will reflect a real or intrinsic value of a share as the market prices will adjust quickly to any new situation, John J. Hampton has remarked in “Financial decision making” that although efficient capital market is not much relevant to capital budgeting decisions, but CAPM would be useful to evaluate capital budgeting proposal because the company can compare risk and return to be obtained by investment in machinery with risk and return from investment in securities.

(ii) Rational investment goals: Investors desire higher return for any acceptable level of risk or the lowest risk for any desired level of return. Such a rational choice is made on logical and consistent ranking of proposals in order of preference for higher good to lower good and this is the scale of the marginal efficiency of capital. Beside, transactive preferences and certainty equivalents are other parameters of rational choice.

(iii) Risk aversion in efficient market is adhered to although at times risk seeking behavior is adopted for gains.

(iv) CAPM assumes that all assets are divisible and liquid assets.

(v) Investors are able to borrow freely at a risk less rate of interest i.e. borrowings can fetch equal return by investing in safe Government securities.

(vi) Securities can be exchanged without payment of brokerage, commissions or taxes and without any transaction cost.

(vii) Securities or capital assets face no bankruptcy or insolvency.

Practical Questions

1. A stock costing Rs. 120 pays no dividends. The possible prices that the stock might sell for at the end of the year with the respective probabilities are:

Price	Probability
115	0.1
120	0.1
125	0.2
130	0.3
135	0.2
140	0.1

Required:

(i) Calculate the expected return.

(ii) Calculate the Standard deviation of returns.

Answer:

(i) Here, the probable returns have to be calculated using the formula

$$R = \frac{D}{P_0} + \frac{P_1 - P_0}{P_0}$$

Calculation of Probable Returns

Possible prices (P_1) ₹	P_1-P_0 ₹	[(P_1-P_0)/ P_0] x 100 Return (per cent)
115	-5	-4.17
120	0	0.00
125	5	4.17
130	10	8.33
135	15	12.50
140	20	16.67

Alternatively, it can be calculated as follows:

Calculation of Expected Returns

Possible return X_i	Probability $p(X_i)$	Product X_1-$p(X_i)$
-4.17	0.1	-0.417
0.00	0.1	0.000
4.17	0.2	0.834
8.33	0.3	2.499
12.50	0.2	2.500
16.67	0.1	1.667
		X = 7.083

Expected return X = 7.083 per

Alternatively, it can also be calculated as follows:

Expected Price = 115 x 0.1 + 120 x 0.1 + 125 x 0.2 + 130 x 0.3 + 135 x 0.2 + 140 x 0.1 = 128.50

$$\text{Return} = \frac{128.50 - 120}{120} \times 100 = 7.0833\%$$

(ii) **Calculation of Standard Deviation of Returns**

Probable return X_i	Probability $p(X_i)$	Deviation $(X_i - X)$	Deviation squared $(X_i - X)^2$	Product $(X_i - X)^2 p(X_i)$
-4.17	0.1	-11.253	126.63	12.66
0.00	0.1	-7.083	50.17	5.017
4.17	0.2	-2.913	8.49	1.698
8.33	0.3	1.247	1.56	0.467
12.50	0.2	5.417	29.34	5.869
16.67	0.1	9.587	91.91	9.191
				σ^2 = 34.902

Variance, σ^2 = 34.902 per cent

Standard deviation, $\sigma = \sqrt{34.902}$ = 5.908 per cent

2. Following information is available in respect of expected dividend, market price and market condition after one year.

Market condition	Probability	Market Price	Dividend per share
		₹	₹
Good	0.25	115	9
Normal	0.50	107	5
Bad	0.25	97	3

The existing market price of an equity share is Rs. 106 (F.V. Rs. 1), which is cum 10% bonus debenture of Rs. 6 each, per share. M/s. X Finance Company Ltd. had offered the buy-back of debentures at face value.

Find out the expected return and variability of returns of the equity shares if buyback offer is accepted by the investor.
And also advise-Whether to accept buy back offer?
Answer:

The Expected Return of the equity share may be found as follows:

Market Condition	Probability	Total Return	Cost (*)	Net Return
Good	0.25	₹ 124	₹ 100	₹ 24
Normal	0.50	₹ 112	₹ 100	₹ 12
Bad	0.25	₹ 100	₹ 100	₹ 0

Expected Return = $(24 \times 0.25) + (12 \times 0.50) + (0 \times 0.25) = 12 = \left(\frac{12}{100}\right) \times 100 = 12\%$

The variability of return can be calculated in terms of standard deviation.

$$V\,SD = 0.25\,(24 - 12)^2 + 0.50\,(12 - 12)^2 + 0.25\,(0 - 12)^2$$

$$= 0.25\,(12)^2 + 0.50\,(0)^2 + 0.25\,(-12)^2$$

$$= 36 + 0 + 36$$

$$SD = \sqrt{72}$$

$$SD = 8.485 \text{ or say } 8.49$$

(*) The present market price of the share is ₹ 106 cum bonus 10% debenture of ₹ 6 each; hence the net cost is ₹ 100.

M/s X Finance company has offered the buyback of debenture at face value. There is reasonable 10% rate of interest compared to expected return 12% from the market. Considering the dividend rate and market price the creditworthiness of the company se ems to be very good. The decision regarding buy-back should be taken considering the maturity period and opportunity in the market. Normally, if the maturity period is low say up to 1 year better to wait otherwise to opt buy back option.

3. Mr. A is interested to invest Rs. 1,00,000 in the securities market. He selected two securities B and D for this purpose. The risk return profile of these securities are as follows :

Security	Risk	Expected Return (ER)
B	10%	12%
D	18%	20%

Co-efficient of correlation between B and D is 0.15.
You are required to calculate the portfolio return of the following portfolios of B and D to be considered by A for his investment.
(i) 100 percent investment in B only;

(ii) 50 percent of the fund in B and the rest 50 percent in D;
(iii) 75 percent of the fund in B and the rest 25 percent in D; and
(iv) 100 percent investment in D only.
Also indicate that which portfolio is best for him from risk as well as return point of view?

Answer:

We have $E_p = W_1E_1 + W_3E_3 + \ldots\ldots\ldots W_nE_n$

and for standard deviation $\sigma^2_p = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \sigma_{ij}$

$$\sigma^2_p = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij}\, \sigma_i\, \sigma_j$$

Two asset portfolio

$\sigma^2_p = w^2_1\sigma^2_1 + w^2_2\sigma^2_2 + 2\, w_1w_2\sigma_1\sigma_2\rho_{12}$

Substituting the respective values we get,

(i) All funds invested in B

$Ep = 12\%$

$\sigma_p = 10\%$

(ii) 50% of funds in each of B & D

$Ep = 0.50X12\%+0.50X20\%=16\%$

$\sigma^2_p = (0.50)^2(10\%)^2 + (0.50)^2(18\%)^2 +2(0.50)(0.50)(0.15)(10\%)(18\%)$

$\sigma^2_p = 25 + 81 + 13.5 = 119.50$

$\sigma_p = 10.93\%$

(iii) 75% in B and 25% in D

$Ep = 0.75\%X12\%+0.25\%X20=14\%$

$\sigma^2_p = (0.75)^2(10\%)^2 + (0.25)^2(18\%)^2 +2(0.75)(0.25)(0.15)(10\%)(18\%)$

$\sigma^2_p = 56.25 + 20.25 + 10.125 = 86.625$

$\sigma_p = 9.31\%$

(iv) All funds in D

$Ep = 20\%$

$\sigma_p = 18.0\%$

Portfolio	(i)	(ii)	(iii)	(iv)
Return	12	16	14	20
σ	10	10.93	9.31	18

In the terms of return, we see that portfolio (iv) is the best portfolio. In terms of risk we see that portfolio (iii) is the best portfolio.

4. Consider the following information on two stocks, A and B :

Year	Return on A (%)	Return on B (%)
2006	10	12
2007	16	18

You are required to determine:
(i) The expected return on a portfolio containing A and B in the proportion of 40% and 60% respectively.
(ii) The Standard Deviation of return from each of the two stocks.
(iii) The covariance of returns from the two stocks.
(iv) Correlation coefficient between the returns of the two stocks.
(v) The risk of a portfolio containing A and B in the proportion of 40% and 60%.
Answer:

(i) Expected return of the portfolio A and B

E (A) = (10 + 16) / 2 = 13%

E (B) = (12 + 18) / 2 = 15%

$$Rp = \sum_{i=1}^{N} X_i R_i = 0.4(13) + 0.6(15) = 14.2\%$$

(ii) Stock A:

Variance = 0.5 (10 – 13)² + 0.5 (16 – 13) ² = 9

Standard deviation = $\sqrt{9}$ = 3%

Stock B:

Variance = 0.5 (12 – 15) ² + 0.5 (18 – 15) ² = 9

Standard deviation = 3%

(iii) Covariance of stocks A and B

Cov_{AB} = 0.5 (10 – 13) (12 – 15) + 0.5 (16 – 13) (18 – 15) = 9

(iv) Correlation of coefficient

$$r_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B} = \frac{9}{3 \times 3} = 1$$

(v) Portfolio Risk

$$\sigma_P = \sqrt{X^2{}_A \sigma^2{}_A + X^2{}_B \sigma^2{}_B + 2X_A X_B (\sigma_A \sigma_B \sigma_{AB})}$$

$$= \sqrt{(0.4)^2(3)^2 + (0.6)^2(3)^2 + 2(0.4)(0.6)(3)(3)(1)}$$

$$= \sqrt{1.44 + 3.24 + 4.32} = 3\%$$

5. Following is the data regarding six securities:

	A	B	C	D	E	F
Return (%)	8	8	12	4	9	8
Risk (Standard deviation)	4	5	12	4	5	6

(i) Assuming three will have to be selected, state which ones will be picked.

(ii) Assuming perfect correlation, show whether it is preferable to invest 75% in A and 25% in C or to invest 100% in E

Answer:

(i) Security A has a return of 8% for a risk of 4, whereas B and F have a higher risk for the same return. Hence, among them A dominates. For the same degree of risk 4, security D has only a return of 4%. Hence, D is also dominated by A. Securities C and E remain in reckoning as they have a higher return though with higher degree of risk. Hence, the ones to be selected are A, C & E.

(ii) The average values for A and C for a proportion of 3 : 1 will be :

$$\text{Risk} = \frac{(3\times 4)+(1\times 12)}{4} = 6\%$$

$$\text{Return} = \frac{(3\times 8)+(1\times 12)}{4} = 9\%$$

Therefore:	75% A	E
	25% C	–
Risk	6	5
Return	9%	9%

For the same 9% return the risk is lower in E. Hence, E will be preferable.

6. The historical rates of return of two securities over the past ten years are given. Calculate the Covariance and the Correlation coefficient of the two securities:

Years:	1	2	3	4	5	6	7	8	9	10
Security 1: (Return per cent)	12	8	7	14	16	15	18	20	16	22
Security 2: (Return per cent)	20	22	24	18	15	20	24	25	22	20

Answer:

Calculation of Covariance

Year	R_1	*Deviation* $(R_1-\overline{R_1})$	*Deviation* $(R_1-\overline{R_1})^2$	R_2	*Deviation* $(R_2-\overline{R_2})$	*Deviation* $(R_2-\overline{R_2})^2$	*Product of deviations*
1	12	-2.8	7.84	20	-1	1	2.8
2	8	-6.8	46.24	22	1	1	-6.8
3	7	-7.8	60.84	24	3	9	-23.4
4	14	-0.8	0.64	18	-3	9	2.4

5	16	1.2	1.44	15	-6	36	-7.2
6	15	0.2	0.04	20	-1	1	-0.2
7	18	3.2	10.24	24	3	9	9.6
8	20	5.2	27.04	25	4	16	20.8
9	16	1.2	1.44	22	1	1	1.2
10	22	7.2	51.84	20	-1	1	-7.2
$R_1 = \frac{148}{10} = 14.8$			Σ=207.60		$R_2 = \frac{210}{10} = 21$	Σ=84.00	

$$\text{Covariance} = \frac{\sum_{i=1}^{N} [R_1 - \overline{R_1}][R_2 - \overline{R_2}]}{N} = -8/10 = -0.8$$

Standard Deviation of Security 1

$$\sigma_1 = \sqrt{\frac{(R_1 - \overline{R_1})^2}{N}}$$

$$\sigma_1 = \sqrt{\frac{207.60}{10}} = \sqrt{20.76}$$

$$\sigma_1 = 4.56$$

Standard Deviation of Security 2

$$\sigma_2 = \sqrt{\frac{(R_2 - \overline{R_2})^2}{N}}$$

$$\sigma_2 = \sqrt{\frac{84}{10}} = \sqrt{8.40}$$

$$\sigma_2 = 2.90$$

Alternatively, Standard Deviation of securities can also be calculated as follows:

Calculation of Standard Deviation

Year	R_1	R_1^2	R_2	R_2^2
1	12	144	20	400
2	8	64	22	484
3	7	49	24	576
4	14	196	18	324
5	16	256	15	225
6	15	225	20	400
7	18	324	24	576
8	20	400	25	625
9	16	256	22	484
10	22	484	20	400
	148	2398	210	4494

Standard deviation of security 1:

$$\sigma_1 = \sqrt{\frac{N\sum R_1^2 - (\sum R_1)^2}{N^2}}$$

$$= \sqrt{\frac{(10\times 2398) - (148)^2}{10\times 10}} = \sqrt{\frac{23980 - 21904}{100}}$$

$$= \sqrt{20.76} = 4.56$$

Standard deviation of security 2:

$$\sigma_2 = \sqrt{\frac{N\sum R_2^2 - (\sum R_2)^2}{N^2}}$$

$$= \sqrt{\frac{(10\times 4494) - (210)^2}{10\times 10}} = \sqrt{\frac{44940 - 44100}{100}}$$

$$= \sqrt{\frac{840}{100}} = \sqrt{8.4} = 2.90$$

Correlation Coefficient

$$r_{12} = \frac{Cov}{\sigma_1 \sigma_2} = \frac{-0.8}{4.56\times 2.90} = \frac{-0.8}{13.22} = -0.0605$$

7. An investor has decided to invest to invest Rs. 1,00,000 in the shares of two companies, namely, ABC and XYZ. The projections of returns from the shares of the two companies along with their probabilities are as follows:

Probability	ABC(%)	XYZ(%)
.20	12	16
.25	14	10
.25	-7	28
.30	28	-2

You are required to

(i) Comment on return and risk of investment in individual shares.

(ii) Compare the risk and return of these two shares with a Portfolio of these shares in equal proportions.

(iii) Find out the proportion of each of the above shares to formulate a minimum risk portfolio.

Answer:

(i)

Probability	ABC (%)	XYZ (%)	1X2 (%)	1X3 (%)
(1)	(2)	(3)	(4)	(5)
0.20	12	16	2.40	3.2
0.25	14	10	3.50	2.5
0.25	-7	28	-1.75	7.0
0.30	28	-2	8.40	-0.6
	Average return		12.55	12.1

Hence the expected return from ABC = 12.55% and XYZ is 12.1%

Probability (1)	$(ABC-\overline{ABC})$ (2)	$(ABC-\overline{ABC})^2$ (3)	1X3 (4)	$(XYZ-\overline{XYZ})$ (5)	$(XYZ-\overline{XYZ})^2$ (6)	(1)X(6)
0.20	-0.55	0.3025	0.06	3.9	15.21	3.04
0.25	1.45	2.1025	0.53	-2.1	4.41	1.10
0.25	-19.55	382.2025	95.55	15.9	252.81	63.20
0.30	15.45	238.7025	71.61	-14.1	198.81	59.64
			167.75			126.98

$\sigma^2_{ABC} = 167.75(\%)^2$; $\sigma_{ABC} = 12.95\%$

$\sigma^2_{XYZ} = 126.98(\%)^2$; $\sigma_{XYZ} = 11.27\%$

(ii) In order to find risk of portfolio of two shares, the covariance between the two is necessary here.

Probability	$(ABC-\overline{ABC})$	$(XYZ-\overline{XYZ})$	2X3	1X4
(1)	(2)	(3)	(4)	(5)
0.20	-0.55	3.9	-2.145	-0.429
0.25	1.45	-2.1	-3.045	-0.761
0.25	-19.55	15.9	-310.845	-77.71
0.30	15.45	-14.1	-217.845	-65.35
				-144.25

$\sigma^2_P = (0.5^2 \times 167.75) + (0.5^2 \times 126.98) + 2 \times (-144.25) \times 0.5 \times 0.5$

$\sigma^2_P = 41.9375 + 31.745 - 72.125$

$\sigma^2_P = 1.5575$ or $1.56(\%)$

$\sigma_P = \sqrt{1.56} = 1.25\%$

$E(R_p) = (0.5 \times 12.55) + (0.5 \times 12.1) = 12.325\%$

Hence, the return is 12.325% with the risk of 1.25% for the portfolio. Thus the portfolio results in the reduction of risk by the combination of two shares.

(iii) For constructing the minimum risk portfolio the condition to be satisfied is

$$X_{ABC} = \frac{\sigma_X^2 - r_{AX}\sigma_A\sigma_X}{\sigma_A^2 + \sigma_X^2 - 2r_{AX}\sigma_A\sigma_X} \text{ or } = \frac{\sigma_X^2 - Cov._{AX}}{\sigma_A^2 + \sigma_X^2 - 2Cov._{AX}}$$

σ_X = Std. Deviation of XYZ

σ_A = Std. Deviation of ABC

r_{AX}= Coefficient of Correlation between XYZ and ABC

$Cov._{AX}$ = Covariance between XYZ and ABC.

Therefore,

$$\% \text{ ABC} = \frac{126.98 - (-144.25)}{126.98 + 167.75 - [2 \times (-144.25)]} = \frac{271.23}{583.23} = 0.46 \text{ or } 46\%$$

% ABC = 46%, XYZ = 54%

(1 – 0.46) =0.54

8. The following information are available with respect of Krishna Ltd.

Year	Krishna Ltd. Average share price	Dividend per Share	Average Market Index	Dividend Yield	Return on Govt. bonds
	₹	₹			
2012	245	20	2013	4%	7%
2013	253	22	2130	5%	6%
2014	310	25	2350	6%	6%
2015	330	30	2580	7%	6%

Compute Beta Value of the Krishna Ltd. at the end of 2015 and state your observation.

Answer:

(i) Computation of Beta Value

Calculation of Returns

$$\text{Returns} = \frac{D_1 + (P_1 - P_0)}{P_0} \times 100$$

Year	Returns
2012 – 13	$\frac{22 + (253 - 245)}{245} \times 100 = 12.24\%$
2013 – 14	$\frac{25 + (310 - 253)}{253} \times 100 = 32.41\%$
2014 – 15	$\frac{30 + (330 - 310)}{310} \times 100 = 16.13\%$

Calculation of Returns from market Index

Year	% of Index Appreciation	Dividend Yield %	Total Return %
2012–13	$\frac{(2130 - 2013)}{2013} \times 100 = 5.81\%$	5%	10.81%
2013–14	$\frac{(2350 - 2130)}{2130} \times 100 = 10.33\%$	6%	16.33%
2014–15	$\frac{(2580 - 2350)}{2350} \times 100 = 9.79\%$	7%	16.79%

Computation of Beta

Year	Krishna Ltd. (X)	Market Index (Y)	XY	Y^2
2012–13	12.24%	10.81%	132.31	116.86
2013–14	32.41%	16.33%	529.25	266.67
2014–15	16.13%	16.79%	270.82	281.90
Total	60.78%	43.93%	932.38	665.43

Average Return of Krishna Ltd. = $\frac{60.78}{3} = 20.26\%$

Average Market Return = $\frac{43.93}{3} = 14.64\%$

$$\text{Beta } (\beta) = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum Y^2 - n(\bar{Y})^2} = \frac{932.38 - 3 \times 20.26 \times 14.64}{665.43 - 3(14.64)^2} = 1.897$$

(ii) Observation

	Expected Return (%)	Actual Return (%)	Action
2012 – 13	6%+ 1.897(10.81% - 6%) = 15.12%	12.24%	Sell
2013 – 14	6%+ 1.897(16.33% - 6%) = 25.60%	32.41%	Buy
2014 – 15	6%+ 1.897(16.79% - 6%) = 26.47%	16.13%	Sell

9. The distribution of return of security 'F' and the market portfolio 'P' is given below:

Probability	Return %	
	F	P
0.30	30	-10
0.40	20	20
0.30	0	30

You are required to calculate the expected return of security 'F' and the market portfolio 'P', the covariance between the market portfolio and security and beta for the security.

Answer:

Security F

Prob(P)	R_f	PxR_f	Deviations of F ($R_f - ER_f$)	(Deviation)² of F	(Deviations)² P_x
0.3	30	9	13	169	50.7
0.4	20	8	3	9	3.6
0.3	0	0	-17	289	86.7
		ER_f=17			Var_f =141

STDEV $\sigma_f = \sqrt{141} = 11.87$

Market Portfolio, P

R_M %	P_M	Exp. Return $R_M \times P_M$	Dev. of P (R_M-ER_M)	(Dev. of P)²	(DeV.)² P_M	(Deviation of F) x (Deviation of P)	Dev. of F x Dev. of P) x P
-10	0.3	-3	-24	576	172.8	-312	-93.6
20	0.4	8	6	36	14.4	18	7.2
30	0.3	9	16	256	76.8	-272	-81.6
		ER_M=14			Var $_M$=264		=Co Var P_M
					σ_M=16.25		=- 168

Beta= $\frac{Co\,Var\,P_M}{\sigma_M^2} = \frac{-168}{264} = -.636$

10. Given below is information of market rates of Returns and Data from two Companies A and B:

	Year 2007	Year 2008	Year 2009
Market (%)	12.0	11.0	9.0
Company A (%)	13.0	11.5	9.8
Company B (%)	11.0	10.5	9.5

You are required to determine the beta coefficients of the Shares of Company A and Company B.

Answer:

Company A:

Year	Return % (Ra)	Market return % (Rm)	Deviation R(a)	Deviation Rm	D Ra × DRm	Rm²
1	13.0	12.0	1.57	1.33	2.09	1.77
2	11.5	11.0	0.07	0.33	0.02	0.11
3	9.8	9.0	−1.63	−1.67	2.72	2.79
	34.3	32.0			4.83	4.67

Average Ra = 11.43

Average Rm = 10.67

$$\text{Covariance} = \frac{\sum(R_m - \bar{R}_m)(R_a - \bar{R}_a)}{N}$$

$$\text{Covariance} = \frac{4.83}{3} = 1.61$$

$$\text{Variance } (\sigma_m^2) = \frac{\sum (R_m - \bar{R}_m)^2}{N}$$

$$= \frac{4.67}{3} = 1.557$$

$$\beta = \frac{1.61}{1.557} = 1.03$$

Company B:

Year	Return % (Rb)	Market return % (Rm)	Deviation R(b)	Deviation Rm	D Rb × D Rm	Rm²
1	11.0	12.0	0.67	1.33	0.89	1.77
2	10.5	11.0	0.17	0.33	0.06	0.11
3	9.5	9.0	−0.83	−1.67	1.39	2.79
	31.0	32.0			2.34	4.67

Average Rb = 10.33

Average Rm = 10.67

$$\text{Covariance} = \frac{\sum (R_m - \bar{R}_m)(R_b - \bar{R}_b)}{N}$$

$$\text{Covariance} = \frac{2.34}{3} = 0.78$$

$$\text{Variance } (\sigma_m^2) = \frac{\sum (R_m - \bar{R}_m)^2}{N}$$

$$= \frac{4.67}{3} = 1.557$$

$$\beta = \frac{0.78}{1.557} = 0.50$$

11. The returns on stock A and market portfolio for a period of 6 years are as follows:

Year	Return on A (%)	Return on market portfolio (%)
1	12	8
2	15	12
3	11	11
4	2	-4
5	10	9.5
6	-12	-2

You are required to determine:
(i) Characteristic line for stock A
(ii) The systematic and unsystematic risk of stock A.
Answer:

Characteristic line is given by

$\alpha + \beta R_m$

$$\beta i = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n(\bar{x})^2}$$

$$\alpha i = \bar{y} - \beta \bar{x}$$

Return on A (Y)	Return on market (X)	xy	x^2	$(x-\bar{x})$	$(x-\bar{x})^2$	$(y-\bar{y})$	$(y-\bar{y})^2$
12	8	96	64	2.25	5.06	5.67	32.15
15	12	180	144	6.25	39.06	8.67	75.17
11	11	121	121	5.25	27.56	4.67	21.81
2	-4	-8	16	-9.75	95.06	-4.33	18.75
10	9.5	95	90.25	3.75	14.06	3.67	13.47
-12	-2	24	4	-7.75	60.06	-18.33	335.99
38	34.5	508	439.25		240.86		497.34

$$\bar{y} = \frac{38}{6} = 6.33$$

$$\bar{x} = \frac{34.5}{6} = 5.75$$

$$\beta = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n(\bar{x})^2} = \frac{508 - 6(5.75)(6.33)}{439.25 - 6(5.75)^2} = \frac{508 - 218.385}{439.25 - 198.375}$$

$$= \frac{289.615}{240.875} = 1.202$$

$\alpha = \bar{y} - \beta \bar{x} = 6.33 - 1.202\ (5.75) = -0.58$

Hence the characteristic line is -0.58 + 1.202 (R_m)

Total Risk of Market = $\sigma_{m^2} = \frac{\Sigma(x-\bar{x})^2}{n} = \frac{240.86}{6} = 40.14(\%)$

Total Risk of Stock= $\frac{497.34}{6} = 82.89\ (\%)$

Systematic Risk = $\beta i^2\ \sigma_2 = (1.202)^2 \times 40.14 = 57.99(\%)$

Unsystematic Risk is = Total Risk – Systematic Risk
= 82.89 - 57.99 = 24.90(%)

12. The rates of return on the security of Company X and market portfolio for 10 periods are given below:

Period	Return of Security X (%)	Return on Market Portfolio (%)
1	20	22
2	22	20
3	25	18
4	21	16
5	18	20
6	–5	8
7	17	–6
8	19	5
9	–7	6
10	20	11

(i) What is the beta of Security X?
(ii) What is the characteristic line for Security X?
Answer:

(i)

Period	R_X	R_M	$R_X - \bar{R}_X$	$R_M - \bar{R}_M$	$(R_X - \bar{R}_X)(R_M - \bar{R}_M)$	$(R_M - \bar{R}_M)^2$
1	20	22	5	10	50	100
2	22	20	7	8	56	64
3	25	18	10	6	60	36
4	21	16	6	4	24	16
5	18	20	3	8	24	64
6	-5	8	-20	-4	80	16
7	17	-6	2	-18	-36	324
8	19	5	4	-7	-28	49
9	-7	6	-22	-6	132	36
10	20	11	5	-1	-5	1
	150	120			357	706
	ΣR_X	ΣR_M			$\sum (R_X - \bar{R}_X)(R_M - \bar{R}_M)$	$\sum (R_M - \bar{R}_M)^2$

$\bar{R}_X = 15 \quad \bar{R}_M = 12$

$$\sigma^2_M = \frac{\sum\left(R_M - \bar{R}_M\right)^2}{n} = \frac{706}{10} = 70.60$$

$$Cov_{XM} = \frac{\sum\left(R_X - \bar{R}_X\right)\left(R_M - \bar{R}_M\right)}{n} = \frac{357}{10} = 35.70$$

$$Beta_x = \frac{Cov_{XM}}{\sigma^2_M} = \frac{35.70}{70.60} = 0.505$$

Alternative Solution

Period	X	Y	Y^2	XY
1	20	22	484	440
2	22	20	400	440
3	25	18	324	450
4	21	16	256	336

5	18	20	400	360
6	-5	8	64	-40
7	17	-6	36	-102
8	19	5	25	95
9	-7	6	36	-42
10	20	11	121	220
	150	120	2146	2157
	$\bar{X} = 15$	$\bar{Y} = 12$		

$$= \frac{\Sigma XY - n\bar{X}\bar{Y}}{\Sigma X^2 - n(\bar{X})^2}$$

$$= \frac{2157 - 10 \times 15 \times 12}{2146 - 10 \times 12 \times 12} = \frac{357}{706} = 0.506$$

(ii) $\bar{R}_X = 15$ $\bar{R}_M = 12$

$y = \alpha + \beta x$

$15 = \alpha + 0.505 \times 12$

Alpha (α) $= 15 - (0.505 \times 12) = 8.94\%$

Characteristic line for security X = $\alpha + \beta \times R_M$

Where, R_M = Expected return on Market Index

∴ Characteristic line for security X = $8.94 + 0.505\ R_M$

13. Expected returns on two stocks for particular market returns are given in the following table:

Market Return	Aggressive	Defensive
7%	4%	9%
25%	40%	18%

You are required to calculate:
(a) The Betas of the two stocks.
(b) Expected return of each stock, if the market return is equally likely to be 7% or 25%.
(c) The Security Market Line (SML), if the risk free rate is 7.5% and market return is equally likely to be 7% or 25%.
(d) The Alphas of the two stocks.

Answer:

(a) The Betas of two stocks:

Aggressive stock - (40% - 4%)/(25% - 7%) = 2

Defensive stock - (18% - 9%)/(25% - 7%) = 0.50

Alternatively, it can also be solved by using the Characteristic Line Relationship as follows:

Rs = α + βRm

Where

α = Alpha

β = Beta
Rm= Market Return
For Aggressive Stock

4% = α + β(7%)
40% = α + β(25%)
36% = β(18%)
β = 2

For Defensive Stock

9% = α + β(7%)
18% = α + β(25%)
9% = β(18%)
β =0.50

(b) Expected returns of the two stocks:-
Aggressive stock - 0.5 x 4% + 0.5 x 40% = 22%
Defensive stock - 0.5 x 9% + 0.5 x 18% = 13.5%

(c) Expected return of market portfolio = 0.5 x 7% + 0.5% x 25% = 16%
Market risk prem. = 16% - 7.5% = 8.5%
SML is, required return = 7.5% + βi 8.5%

(d) Rs = α + βRm
For Aggressive Stock
22% = αA + 2(16%)
αA = -10%

For Defensive Stock
13.5% = αD + 0.50(16%)
αD = 5.5%

14. A study by a Mutual fund has revealed the following data in respect of three securities:

Security	σ (%)	Correlation with Index, Pm
A	20	0.60
B	18	0.95
C	12	0.75

The standard deviation of market portfolio (BSE Sensex) is observed to be 15%.
(i) What is the sensitivity of returns of each stock with respect to the market?
(ii) What are the covariances among the various stocks?
(iii) What would be the risk of portfolio consisting of all the three stocks equally?
(iv) What is the beta of the portfolio consisting of equal investment in each stock?
(v) What is the total, systematic and unsystematic risk of the portfolio in (iv)?
Answer:
(i) Sensitivity of each stock with market is given by its beta.
Standard deviation of market Index = 15%

Variance of market Index = 0.0225
Beta of stocks = σi r/ σ m
A = 20 × 0.60/15 = 0.80
B = 18 × 0.95/15 = 1.14
C = 12 × 0.75/15 = 0.60

(ii) Covariance between any 2 stocks = $\beta_1\beta_2\sigma^2_m$

Covariance matrix

Stock/Beta	0.80	1.14	0.60
A	400.000	205.200	108.000
B	205.200	324.000	153.900
C	108.000	153.900	144.000

(iii) Total risk of the equally weighted portfolio (Variance) = 400(1/3) 2 + 324(1/3)2 + 144(1/3)2 + 2 (205.20)(1/3)2 + 2(108.0)(1/3)2 + 2(153.900) (1/3)2 = 200.244

(iv) β of equally weighted portfolio =

$= \beta_p = \Sigma \beta_i/N = \frac{0.80+1.14+0.60}{3}$

$= 0.8467$

(v)

Systematic Risk $\beta_p^2\sigma_m^2$ $= (0.8467)^2 (15)^2 = 161.302$

Unsystematic Risk = Total Risk – Systematic Risk

= 200.244 – 161.302 = 38.942

15. Mr. X owns a portfolio with the following characteristics:

	Security A	Security B	Risk Free security
Factor 1 sensitivity	0.80	1.50	0
Factor 2 sensitivity	0.60	1.20	0
Expected Return	15%	20%	10%

It is assumed that security returns are generated by a two factor model.
(i) If Mr. X has Rs. 1,00,000 to invest and sells short Rs. 50,000 of security B and purchases Rs. 1,50,000 of security A what is the sensitivity of Mr. X's portfolio to the two factors?
(ii) If Mr. X borrows Rs. 1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of Rs. 1,00,000 in security A and B in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?
(iii) What is the expected return premium of factor 2?
Answer:

(i) Mr. X's position in the two securities are +1.50 in security A and -0.5 in security B. Hence the portfolio sensitivities to the two factors:-

b prop. 1 =1.50 x 0.80 + (-0.50 x 1.50) = 0.45

b prop. 2 = 1.50 x 0.60 + (-0.50 x 1.20) = 0.30

(ii) Mr. X's current position:-

Security A ₹ 3,00,000 / ₹ 1,00,000 = 3

Security B -₹ 1,00,000 / ₹ 1,00,000 = -1
Risk free asset -₹ 100000 / ₹ 100000 = -1

b prop. 1 = 3.0 x 0.80 + (-1 x 1.50) + (- 1 x 0) = 0.90

b prop. 2 = 3.0 x 0.60 + (-1 x 1.20) + (-1 x 0) = 0.60

(iii) Expected Return = Risk Free Rate of Return + Risk Premium

Let λ_1 and λ_2 are the Value Factor 1 and Factor 2 respectively.

Accordingly

$15 = 10 + 0.80\ \lambda_1 + 0.60\ \lambda_2$

$20 = 10 + 1.50\ \lambda_1 + 1.20\ \lambda_2$

On solving equation, the value of $\lambda_1 = 0$, and Securities A & B shall be as follows:

Security A

Total Return = 15%

Risk Free Return = 10%

Risk Premium = 5%

Security B

Total Return = 20%

Risk Free Return = 10%

Risk Premium = 10%

16. Mr. Tempest has the following portfolio of four shares:

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

The risk-free rate of return is 7% and the market rate of return is 14%.
Required.
(i) Determine the portfolio return. (ii) Calculate the portfolio Beta.

Answer:

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

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

Total Investment ₹ 9,05,000

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

(ii) Portfolio Beta

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

7% + 7β = 16.13%

β = 1.30

Alternative Approach

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

$$Beta_P = 0.45X\frac{0.80}{9.05} + 0.35X\frac{1.50}{9.05} + 1.15X\frac{2.25}{9.05} + 1.85X\frac{4.50}{9.05}$$

= 0.45x0.0884+ 0.35X0.1657+ 1.15X0.2486+ 1.85X0.4972 = 0.0398+ 0.058 + 0.2859 + 0.9198 = 1.3035

Accordingly,

(i) Portfolio Return using CAPM formula will be as follows:

$R_P = R_F + Beta_P(R_M - R_F)$

= 7% + 1.3035(14% - 7%) = 7% + 1.3035(7%)

= 7% + 9.1245% = 16.1245%

(ii) Portfolio Beta

As calculated above 1.3035

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

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

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

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

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

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

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

You are required to calculate:

(i) variance of return from MFX, MFY and market return,

(ii) portfolio return, beta, portfolio variance and portfolio standard deviation,

(iii) expected return, systematic risk and unsystematic risk; and

(iv) Sharpe ratio, Treynor ratio and Alpha of MFX, MFY and Portfolio Mix (ALSO IN RTP-NOV 2020)

Answer:

(i) Variance of Returns

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

Accordingly, for MFX

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

$\sigma_X^2 = 4.800$

Accordingly, for MFY

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

$\sigma_Y^2 = 4.250$

Accordingly, for Market Return

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

$\sigma_M^2 = 3.100$

(ii) Portfolio return, beta, variance and standard deviation

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

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

Accordingly Portfolio Return

0.60 × 15% + 0.40 × 14% = 14.60%

Beta of each Fund

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

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

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

Portfolio Beta

0.60 x 1.087 + 0.40 x 0.903 = 1.013

Portfolio Variance

$\sigma^2_{XY} = w^2_X\sigma^2_X + w^2_Y\sigma^2_Y + 2\,w_X w_Y Cov_{X,Y}$

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

$= 4.472$

Or Portfolio Standard Deviation

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

(iii) Expected Return, Systematic and Unsystematic Risk of Portfolio

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

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

MF Y Return = 10% + 0.903(12% - 10%) = 11.81%

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

Accordingly,

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

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

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

Unsystematic Risk = Total Risk – Systematic Risk

Accordingly,

Unsystematic Risk of MFX = 4.80 – 3.663 = 1.137

Unsystematic Risk of MFY = 4.250 – 2.528 = 1.722

Unsystematic Risk of Portfolio = 4.472 – 3.181 = 1.291

(iv) Sharpe and Treynor Ratios and Alpha

Sharpe Ratio

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

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

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

Treynor Ratio

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

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

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

Alpha

MFX = 15% - 12.17% = 2.83%

MFY = 14% - 11.81% = 2.19%

Portfolio = 14.6% - 12.03% = 2.57%

18. Amal Ltd. has been maintaining a growth rate of 12% in dividends. The company has paid dividend @ Rs. 3 per share. The rate of return on market portfolio is 15% and the risk-free rate of return in the market has been observed as10%. The beta co-efficient of the company's share is 1.2. You are required to calculate the expected rate of return on the company's shares as per CAPM model and the equilibrium price per share by dividend growth model.

Answer:

Capital Asset Pricing Model (CAPM) formula for calculation of expected rate of return is

ER = Rf + β (Rm – Rf)

ER = Expected Return

β = Beta of Security

R_m = Market Return

R_f = Risk free Rate

= 10 + [1.2 (15 – 10)]

= 10 + 1.2 (5)

= 10 + 6 = 16% or 0.16

Applying dividend growth mode for the calculation of per share equilibrium price:-

$$E_R = \frac{D_1}{P_0} + g$$

$$\text{or } 0.16 = \frac{3(1.12)}{P_0} + 0.12 \quad \text{or} \quad 0.16 - 0.12 = \frac{3.36}{P_0}$$

$$\text{or } 0.04\ P_0 = 3.36 \quad \text{or} \quad P_0 = \frac{3.36}{0.04} = ₹\ 84$$

Therefore, equilibrium price per share will be ₹ 84.

19. The following information is available in respect of Security X

Equilibrium Return	15%
Market Return	15%
7% Treasury Bond Trading at	$140
Covariance of Market Return and Security Return	225%
Coefficient of Correlation	0.75

You are required to determine the Standard Deviation of Market Return and Security Return.

Answer:

First we shall compute the β of Security X.

$$\text{Risk Free Rate} = \frac{\text{Coupon Payment}}{\text{Current Market Price}} = \frac{7}{140} = 5\%$$

Assuming equilibrium return to be equal to CAPM return then:

$15\% = R_f + \beta_X(R_m - R_f)$

$15\% = 5\% + \beta_X(15\% - 5\%)$

$\beta_X = 1$

or it can also be computed as follows:

$$\frac{R_m}{R_s} = \frac{15\%}{15\%} = 1$$

(i) Standard Deviation of Market Return

$$\beta_m = \frac{Cov_{X,m}}{\sigma_m^2} = \frac{225\%}{\sigma_m^2} = 1$$

$\sigma^2_m = 225$

$\sigma_m = \sqrt{225} = 15\%$

(ii) Standard Deviation of Security Return

$$\beta_X = \frac{\sigma_X}{\sigma_m} \times \rho_{Xm} = \frac{\sigma_X}{15} \times 0.75 = 1$$

$$\sigma_X = \frac{15}{0.75} = 20\%$$

20. Assuming that shares of ABC Ltd. and XYZ Ltd. are correctly priced according to Capital Asset Pricing Model. The expected return from and Beta of these shares are as follows:

Share	Beta	Expected return
ABC	1.2	19.8%
XYZ	0.9	17.1%

You are required to derive Security Market Line.

Answer:

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

Accordingly

$R_{ABC} = R_f + 1.2 (R_m - R_f) = 19.8$

$R_{XYZ} = R_f + 0.9 (R_m - R_f) = 17.1$

$19.8 = R_f + 1.2 (R_m - R_f)$ ------(1)

$17.1 = R_f + 0.9 (R_m - R_f)$ ------(2)

Deduct (2) from (1)

$2.7 = 0.3 (R_m - R_f)$

$R_m - R_f = 9$

$R_f = R_m - 9$

Substituting in equation (1)

$19.8 = (R_m - 9) + 1.2 (R_m - R_m + 9)$

$19.8 = R_m - 9 + 10.8$

$19.8 = R_m + 1.8$

Then $R_m = 18\%$ and $R_f = 9\%$

Security Market Line

$= R_f + \beta$ (Market Risk Premium)

$= 9\% + \beta \times 9\%$

21. A Ltd. has an expected return of 22% and Standard deviation of 40%. B Ltd. has an expected return of 24% and Standard deviation of 38%. A Ltd. has a beta of 0.86 and B Ltd. a beta of 1.24. The correlation coefficient between the return of A Ltd. and B Ltd. is 0.72. The Standard deviation of the market return is 20%. Suggest:

(i) Is investing in B Ltd. better than investing in A Ltd.?

(ii) If you invest 30% in B Ltd. and 70% in A Ltd., what is your expected rate of return and portfolio Standard deviation?

(iii) What is the market portfolios expected rate of return and how much is the risk-free rate?

(iv) What is the beta of Portfolio if A Ltd.'s weight is 70% and B Ltd.'s weight is 30%?

Answer:

(i) A Ltd. has lower return and higher risk than B Ltd. investing in B Ltd. is better than in A Ltd. because the returns are higher and the risk, lower. However, investing in both will yield diversification advantage.

(ii) $r_{AB} = .22 \times 0.7 + .24 \times 0.3 = 22.6\%$

$\sigma^2_{AB} = 0.40^2 \text{ X } 0.7^2 + 0.38^2 \text{ X } 0.3^2 + 2\text{X } 0.7 \text{ X } 0.3 \text{ X } 0.72 \text{ X } 0.40 \text{ X } 0.38 = 0.1374$

$\sigma_{AB} = \sqrt{\sigma^2_{AB}} = \sqrt{.1374} = .37 = 37\%$ *

* Answer = 37.06% is also correct and variation may occur due to approximation.

(iii) This risk-free rate will be the same for A and B Ltd. Their rates of return are given as follows:

$r_A = 22 = r_f + (r_m - r_f)\ 0.86$

$r_B = 24 = r_f + (r_m - r_f)\ 1.24$

$r_A - r_B = -2 = (r_m - r_f)\ (-0.38)$

$r_m - r_f = -2/-0.38 = 5.26\%$

$r_A = 22 = r_f + (5.26)\ 0.86$

$r_f = 17.5\%$*

$r_B = 24 = r_f + (5.26)\ 1.24$

$r_f = 17.5\%$*

$r_m - 17.5 = 5.26$

$r_m = 22.76\%$**

*Answer = 17.47% might occur due to variation in approximation.

**Answer may show small variation due to approximation. Exact answer is 22.73%.

(iv) $\beta_{AB} = \beta_A \times W_A + \beta_B \times W_B$

$= 0.86 \times 0.7 + 1.24 \times 0.3 = 0.974$

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

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

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

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

Answer:

(i) Computation of Beta of Portfolio

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

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

Beta of Port Folio 1.46

Market Risk implicit

$0.2238 = 0.11 + \beta \times (0.19 - 0.11)$

Or, $0.08\ \beta + 0.11 = 0.2238$

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

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

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

Expected return R_s as per CAPM is:

$R_s = I_{RF} + (R_M - I_{RF})\beta$

For investment I $R_s = I_{RF} + (R_M - I_{RF})\beta$

$= .11 + (.19 - .11)\ 1.16$

$= 20.28\%$

For investment II, $R_s = .11 + (.19 - .11)\ 2.28 = 29.24\%$

For investment III, $R_s = .11 + (.19 - .11)\ .90$

$= 18.20\%$

For investment IV, $R_s = .11 + (.19 - .11)\ 1.50$

$= 23\%$

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

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

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

Required:

(i) If the company invests 20% of its investment in each of the first two mutual funds and an equal amount in the mutual funds C, D and E, what is the beta of the portfolio?

(ii) If the company invests 15% of its investment in C, 15% in A, 10% in E and the balance in equal amount in the other two mutual funds, what is the beta of the portfolio?

(ii) If the expected return of market portfolio is 12% at a beta factor of 1.0, what will be the portfolios expected return in both the situations given above?

Answer:

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

(i)

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

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

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

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

= 12% × 1.22 i.e. 14.64%

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

24. Suppose that economy A is growing rapidly and you are managing a global equity fund and so far you have invested only in developed-country stocks only. Now you have decided to add stocks of economy A to your portfolio. The table below shows the expected rates of return, standard deviations, and correlation coefficients (all estimates are for aggregate stock market of developed countries and stock market of Economy A).

	Developed Country Stocks	Stocks of Economy A
Expected rate of return (annualized percentage)	10	15
Risk [Annualized Standard Deviation (%)]	16	30
Correlation Coefficient (ρ)	0.30	

Assuming the risk-free interest rate to be 3%, you are required to determine:
(a) What percentage of your portfolio should you allocate to stocks of Economy A if you want to increase the expected rate of return on your portfolio by 0.5%?
(b) What will be the standard deviation of your portfolio assuming that stocks of Economy A are included in the portfolio as calculated above?
(c) Also show how well the Fund will be compensated for the risk undertaken due to inclusion of stocks of Economy A in the portfolio?
Answer:

(a) Let the weight of stocks of Economy A is expressed as w, then

$(1- w)\times 10.0 + w \times 15.0 = 10.5$

i.e. w = 0.1 or 10%.

(b) Variance of portfolio shall be:

$(0.9)^2 (0.16)^2 + (0.1)^2 (0.30)^2 + 2(0.9)(0.1)(0.16)(0.30)(0.30) = 0.02423$

Standard deviation is $(0.02423)^{½} = 0.15565$ or 15.6%.

(c) The Sharpe ratio will improve by approximately 0.04, as shown below:

$$\text{Sharpe Ratio} = \frac{\text{Expected Return - Risk Free Rate of Return}}{\text{Standard Deviation}}$$

Investment only in developed countries: $\frac{10-3}{16} = 0.437$

With inclusion of stocks of Economy A: $\frac{10.5-3}{15.6} = 0.481$

25. Mr. FedUp wants to invest an amount of Rs. 520 lakhs and had approached his Portfolio Manager. The Portfolio Manager had advised Mr. FedUp to invest in the following manner:

Security	Moderate	Better	Good	Very Good	Best
Amount (in ₹ Lakhs)	60	80	100	120	160
Beta	0.5	1.00	0.80	1.20	1.50

You are required to advise Mr. FedUp in regard to the following, using Capital Asset Pricing Methodology:

(i) Expected return on the portfolio, if the Government Securities are at 8% and the NIFTY is yielding 10%.
(ii) Advisability of replacing Security 'Better' with NIFTY.
Answer:

(i) Computation of Expected Return from Portfolio

Security	Beta (β)	Expected Return (r) as per CAPM	Amount (₹ Lakhs)	Weights (w)	wr
Moderate	0.50	8%+0.50(10% - 8%) = 9%	60	0.115	1.035
Better	1.00	8%+1.00(10% - 8%) = 10%	80	0.154	1.540
Good	0.80	8%+0.80(10% - 8%) = 9.60%	100	0.192	1.843
Very Good	1.20	8%+1.20(10% - 8%)=10.40%	120	0.231	2.402
Best	1.50	8%+1.50(10% - 8%) = 11%	160	0.308	3.388
Total			520	1	10.208

Thus Expected Return from Portfolio 10.208% say 10.21%.

Alternatively, it can be computed as follows:

$$\text{Average } \beta = 0.50 \times \frac{60}{520} + 1.00 \times \frac{80}{520} + 0.80 \times \frac{100}{520} + 1.20 \times \frac{120}{520} + 1.50 \times \frac{160}{520} = 1.104$$

As per CAPM

= 0.08 + 1.104(0.10 – 0.08) = 0.10208 i.e. 10.208%

(ii) As computed above the expected return from Better is 10% same as from Nifty, hence there will be no difference even if the replacement of security is made. The main logic behind this neutrality is that the beta of security 'Better' is 1 which clearly indicates that this security shall yield same return as market return.

26. Your client is holding the following securities:

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

Average return of the portfolio is 15.7%, calculate:
(i) Expected rate of return in each, using the Capital Asset Pricing Model (CAPM).
(ii) Risk free rate of return.

Answer:

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

Expected rate of return on market portfolio

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

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

Risk free return

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

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

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

Risk free return = 14.7%

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

Expected Rate of Return for each security is

Rate of Return = Rf + B (Rm – Rf)

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

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

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

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

27. A holds the following portfolio:

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

Calculate:

(i) The expected rate of return of each security using Capital Asset Pricing Method (CAPM)

(ii) The average return of his portfolio.

Risk-free return is 14%

Answer:

(i) Expected rate of return

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

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

CAPM $E(Rp) = RF + \beta [E(RM) - RF]$

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

(ii) Average Return of Portfolio

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

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

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

28. Your client is holding the following securities:

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

Assuming a Risk-free rate of 15%, calculate:
– Expected rate of return in each, using the Capital Asset Pricing Model (CAPM).
– Simple Average return of the portfolio.

Answer:

Calculation of expected return on market portfolio (R_m)

Investment	*Cost (₹)*	*Dividends (₹)*	*Capital Gains (₹)*
Shares X	8,000	800	200
Shares Y	10,000	800	500
Shares Z	16,000	800	6,000
PSU Bonds	34,000	3,400	–1,700
	68,000	5,800	5,000

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

Calculation of expected rate of return on individual security:

Security		
Shares X	15 + 0.8 (15.88 – 15.0)	= 15.70%
Shares Y	15 + 0.7 (15.88 – 15.0)	= 15.62%
Shares Z	15 + 0.5 (15.88 – 15.0)	= 15.44%
PSU Bonds	15 + 0.2 (15.88 – 15.0)	= 15.18%

Calculation of the Average Return of the Portfolio:

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

29. An investor is holding 1,000 shares of Fatlass Company. Presently the rate of dividend being paid by the company is Rs. 2 per share and the share is being sold at Rs. 25 per share in the market. However, several factors are likely to change during the course of the year as indicated below:

	Existing	Revised
Risk free rate	12%	10%
Market risk premium	6%	4%
Beta value	1.4	1.25
Expected growth rate	5%	9%

In view of the above factors whether the investor should buy, hold or sell the shares? And why?

Answer:

On the basis of existing and revised factors, rate of return and price of share is to be calculated.

Existing rate of return

$= R_f + \text{Beta}\ (R_m - R_f) = 12\% + 1.4\ (6\%) = 20.4\%$

Revised rate of return

$= 10\% + 1.25\ (4\%) = 15\%$

Price of share (original)

$$P_o = \frac{D(1+g)}{K_e - g} = \frac{2(1.05)}{.204 - .05} = \frac{2.10}{.154} = \text{Rs.}13.63$$

Price of share (Revised)

$$P_o = \frac{2(1.09)}{.15 - .09} = \frac{2.18}{.06} = \text{Rs.}36.33$$

In case of existing market price of c 25 per share, rate of return (20.4%) and possible equilibrium price of share at Rs. 13.63, this share needs to be sold because the share is overpriced (Rs. 25 – 13.63) by Rs. 11.37. However, under the changed scenario where growth of dividend has been revised at 9% and the return though decreased at 15% but the possible price of share is to be at Rs. 36.33 and therefore, in order to expect price appreciation to Rs. 36.33 the investor should hold the shares, if other things remain the same.

30. An investor is holding 5,000 shares of X Ltd. Current year dividend rate is Rs. 3/ share. Market price of the share is Rs. 40 each. The investor is concerned about several factors which are likely to change during the next financial year as indicated below:

	Current Year	Next Year
Dividend paid /anticipated per share (₹)	3	2.5
Risk free rate	12%	10%
Market Risk Premium	5%	4%
Beta Value	1.3	1.4
Expected growth	9%	7%

In view of the above, advise whether the investor should buy, hold or sell the shares.

Answer:

On the basis of existing and revised factors, rate of return and price of share is to be calculated.

Existing rate of return

$= R_f + \text{Beta} (R_m - R_f)$

$= 12\% + 1.3 (5\%) = 18.5\%$

Revised rate of return

$= 10\% + 1.4 (4\%) = 15.60\%$

Price of share (original)

$$P_o = \frac{D (1 + g)}{K_e - g} = \frac{3 (1.09)}{0.185 - 0.09} = \frac{3.27}{0.095} = ₹ 34.42$$

Price of share (Revised)

$$P_o = \frac{2.50 (1.07)}{0.156 - 0.07} = \frac{2.675}{0.086} = ₹ 31.10$$

Market price of share of Rs. 40 is higher in comparison to current equilibrium price of Rs. 34.42 and revised equity price of Rs. 31.10. Under this situation investor should sell the share.

31. An investor has two portfolios known to be on minimum variance set for a population of three securities A, B and C having below mentioned weights: s

	WA	WB	WC
Portfolio X	0.30	0.40	0.30
Portfolio Y	0.20	0.50	0.30

It is supposed that there are no restrictions on short sales.
(i) What would be the weight for each stock for a portfolio constructed by investing Rs. 5,000 in portfolio X and Rs. 3,000 in portfolio Y?.
(ii) Suppose the investor invests Rs. 4,000 out of Rs. 8,000 in security A. How he will allocate the balance between security B and C to ensure that his portfolio is on minimum variance set?
Answer:

(i) Investment committed to each security would be:-

	A (₹)	B (₹)	C (₹)	Total (₹)
Portfolio X	1,500	2,000	1,500	5,000
Portfolio Y	600	1,500	900	3,000
Combined Portfolio	2,100	3,500	2,400	8,000
∴ Stock weights	0.26	0.44	0.30	

(ii) The equation of critical line takes the following form:-

WB = a + bWA

Substituting the values of WA & WB from portfolio X and Y in above equation, we get

0.40 = a + 0.30b, and

0.50 = a + 0.20b

Solving above equation we obtain the slope and intercept, a = 0.70 and b= -1 and thus, the critical line is

WB = 0.70 – WA

If half of the funds is invested in security A then,

WB = 0.70 – 0.50 = 0.20

Since WA + WB + WC = 1

WC = 1 - 0.50 – 0.20 = 0.30

∴ Allocation of funds to security B = 0.20 x 8,000 = ₹ 1,600, and

Security C = 0.30 x 8,000 = ₹ 2,400

32. X Co., Ltd., invested on 1.4.2009 in certain equity shares as below:

Name of Co.	No. of shares	Cost (₹)
M Ltd.	1,000 (₹ 100 each)	2,00,000
N Ltd.	500 (₹ 10 each)	1,50,000

In September, 2009, 10% dividend was paid out by M Ltd. and in October, 2009, 30% dividend paid out by N Ltd. On 31.3.2010 market quotations showed a value of Rs. 220 and Rs. 290 per share for M Ltd. and N Ltd. respectively.

On 1.4.2010, investment advisors indicate (a) that the dividends from M Ltd. and N Ltd. for the year ending 31.3.2011 are likely to be 20% and 35%, respectively and (b) that the probabilities of market quotations on 31.3.2011 are as below:

Probability factor	Price/share of M Ltd.	Price/share of N Ltd.
0.2	220	290
0.5	250	310
0.3	280	330

You are required to:

(i) Calculate the average return from the portfolio for the year ended 31.3.2010;

(ii) Calculate the expected average return from the portfolio for the year 2010-11; and

(iii) Advise X Co. Ltd., of the comparative risk in the two investments by calculating the standard deviation in each case.

Answer:

Workings:

Calculation of return on portfolio for 2009-10	(Calculation in ₹ / share)		
	M	N	
Dividend received during the year	10	3	
Capital gain/loss by 31.03.10			
Market value by 31.03.10	220	290	
Cost of investment	200	300	
Gain/loss	20	(-)10	
Yield	30	(-)7	
Cost	200	300	
% return	15%	(-)2.33%	
Weight in the portfolio	57	43	
Weighted average return			7.55%
Calculation of estimated return for 2010-11			
Expected dividend	20	3.5	
Capital gain by 31.03.11			
(220x0.2)+ (250x0.5)+(280x0.3) – 220=(253-220)	33	-	
(290x0.2)+(310x0.5)+(330x0.3) – 290= (312 – 290)	-	22	
Yield	53	25.5	
*Market Value 01.04.10	220	290	
% return	24.09%	8.79%	
*Weight in portfolio (1,000x220): (500x290)	60.3	39.7	
Weighted average (Expected) return			18.02%
(*The market value on 31.03.10 is used as the base for calculating yield for 10-11)			

(i) Average Return from Portfolio for the year ended 31.03.2010 is 7.55%.

(ii) Expected Average Return from portfolio for the year 2010-11 is 18.02%

(iii) **Calculation of Standard Deviation**

M Ltd.

Exp. market value	*Exp. gain*	*Exp. div.*	*Exp Yield (1)*	*Prob. Factor (2)*	(1) X(2)	*Dev.* $(P_M - \overline{P_M})$	*Square of dev. (3)*	(2) X (3)
220	0	20	20	0.2	4	-33	1089	217.80
250	30	20	50	0.5	25	-3	9	4.50
280	60	20	80	0.3	24	27	729	218.70
					53			σ^2_M = 441.00

Standard Deviation (σ_M) 21

N Ltd.

Exp. market value	*Exp. gain*	*Exp. div.*	*Exp Yield (1)*	*Prob. Factor (2)*	(1) X(2)	*Dev.* $(P_N - \overline{P_N})$	*Square of dev. (3)*	(2) X (3)
290	0	3.5	3.5	0.2	0.7	-22	484	96.80
310	20	3.5	23.5	0.5	11.75	-2	4	2.00
330	40	3.5	43.5	0.3	13.05	18	324	97.20
					25.5			σ^2_N = 196.00

Standard Deviation (σ_N) 14

Share of company M Ltd. is more risky as the S.D. is more than company N Ltd.

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

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

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

Answer:

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

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

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

Expected Return on 'B'

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

Expected Return on Market index

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

Variance of Market index

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

= 24.34 + 2.35 + 52.27 = 78.96%

Covariance of stock A and Market Index M

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

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

= 42.12 + (-1.26) + 65.34=106.20

Covariance of stock B and Market index M

(20-10.1) (18-10.2)(0.40)+(15-10.1)(13-10.2)(0.30) + (-8-10.1)(-3-10.2)(0.30)= 30.89 + 4.12 + 71.67=106.68

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

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

Required Return for A

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

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

Required Return for B

11% + 1.351 (10.2 – 11) % = 9.92%

Alpha for Stock A

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

Alpha for Stock B

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

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

34. Following are the details of a portfolio consisting of three shares:

Share	Portfolio weight	Beta	Expected return in %	Total variance
A	0.20	0.40	14	0.015
B	0.50	0.50	15	0.025
C	0.30	1.10	21	0.100

Standard Deviation of Market Portfolio Returns = 10%
You are given the following additional data:
Covariance (A, B) = 0.030
Covariance (A, C) = 0.020
Covariance (B, C) = 0.040
Calculate the following:
(i) The Portfolio Beta
(ii) Residual variance of each of the three shares
(iii) Portfolio variance using Sharpe Index Model
(iv) Portfolio variance (on the basis of modern portfolio theory given by Markowitz)
Answer:
(i) Portfolio Beta
0.20 x 0.40 + 0.50 x 0.50 + 0.30 x 1.10 = 0.66

(ii) Residual Variance

To determine Residual Variance first of all we shall compute the Systematic Risk as follows:

$\beta_A^2 \times \sigma_M^2 = (0.40)^2(0.01) = 0.0016$

$\beta_B^2 \times \sigma_M^2 = (0.50)^2(0.01) = 0.0025$

$\beta_C^2 \times \sigma_M^2 = (1.10)^2(0.01) = 0.0121$

Residual Variance

A 0.015 – 0.0016 = 0.0134

B 0.025 – 0.0025 = 0.0225

C 0.100 – 0.0121 = 0.0879

(iii) Portfolio variance using Sharpe Index Model

Systematic Variance of Portfolio = $(0.10)^2 \times (0.66)^2 = 0.004356$

Unsystematic Variance of Portfolio = $0.0134 \times (0.20)^2 + 0.0225 \times (0.50)^2 + 0.0879 \times (0.30)^2 = 0.014072$

Total Variance = 0.004356 + 0.014072 = 0.018428

(iv) Portfolio variance on the basis of Markowitz Theory

$= (w_A \times w_A \times \sigma_A^2) + (w_A \times w_B \times Cov_{AB}) + (w_A \times w_C \times Cov_{AC}) + (w_B \times w_A \times Cov_{AB}) + (w_B \times w_B \times \sigma_B^2) + (w_B \times w_C \times Cov_{BC}) + (w_C \times w_A \times Cov_{CA}) + (w_C \times w_B \times Cov_{CB}) + (w_C \times w_C \times \sigma_C^2)$

$= (0.20 \times 0.20 \times 0.015) + (0.20 \times 0.50 \times 0.030) + (0.20 \times 0.30 \times 0.020) + (0.20 \times 0.50 \times 0.030) + (0.50 \times 0.50 \times 0.025) + (0.50 \times 0.30 \times 0.040) + (0.30 \times 0.20 \times 0.020) + (0.30 \times 0.50 \times 0.040) + (0.30 \times 0.30 \times 0.10)$

$= 0.0006 + 0.0030 + 0.0012 + 0.0030 + 0.00625 + 0.0060 + 0.0012 + 0.0060 + 0.0090$

$= 0.0363$

35. Ramesh wants to invest in stock market. He has got the following information about individual securities

Security	Expected Return	Beta	σ^2_{ci}
A	15	1.5	40
B	12	2	20
C	10	2.5	30
D	09	1	10
E	08	1.2	20
F	14	1.5	30

Market index variance is 10 percent and the risk free rate of return is 7%. What should be the optimum portfolio assuming no short sales?

Answer:

Securities need to be ranked on the basis of excess return to beta ratio from highest to the lowest.

Security	R_i	β_i	$R_i - R_f$	$\frac{R_i - R_f}{\beta_i}$
A	15	1.5	8	5.33
B	12	2	5	2.5
C	10	2.5	3	1.2
D	9	1	2	2
E	8	1.2	1	0.83
F	14	1.5	7	4.67

Ranked Table:

Security	$R_i - R_f$	β_i	σ^2_{ei}	$\frac{(R_i - R_f) \times \beta}{\sigma^2_{ei}}$	$\sum_{e=i}^{N} \frac{(R_i - R_f) \times \beta}{\sigma^2_{ei}}$	$\frac{\beta_i^2}{\sigma^2_{ei}}$	$\sum_{e=i}^{N} \frac{\beta_i^2}{\sigma^2_{ei}}$	C_i
A	8	1.5	40	0.30	0.30	0.056	0.056	1.923
F	7	1.5	30	0.35	0.65	0.075	0.131	2.814
B	5	2	20	0.50	1.15	0.20	0.331	2.668
D	2	1	10	0.20	1.35	0.10	0.431	2.542
C	3	2.5	30	0.25	1.60	0.208	0.639	2.165
E	1	1.2	20	0.06	1.66	0.072	0.711	2.047

CA = 10 x 0.30 / [1 + (10 x 0.056)] = 1.923

CF = 10 x 0.65 / [1 + (10 x 0.131)] = 2.814

CB = 10 x 1.15 / [1 + (10 x 0.331)] = 2.668

CD = 10 x 1.35 / [1 + (10 x 0.431)] = 2.542

CC = 10 x 1.60 / [1 + (10 x 0.639)] = 2.165

CE = 10 x 1.66 / [1 + (10 x 0.7111)] = 2.047

Cut off point is 2.814

$$Z_i = \frac{\beta_i}{\sigma^2_{ei}}\left[\left(\left[\left[\frac{(R_i - R_f)}{\beta_i} - C\right]\right]\right)\right]$$

$$Z_A = \frac{1.5}{40}(5.33 - 2.814) = 0.09435$$

$$Z_F = \frac{1.5}{30}(4.67 - 2.814) = 0.0928$$

$$X_A = 0.09435/[0.09435 + 0.0928] = 50.41\%$$

$$X_F = 0.0928/[0.09435 + 0.0928] = 49.59\%$$

36. A Portfolio Manager (PM) has the following four stocks in his portfolio:

Security	No. of Shares	Market Price per share (₹)	β
VSL	10,000	50	0.9
CSL	5,000	20	1.0
SML	8,000	25	1.5
APL	2,000	200	1.2

Compute the following:
(i) Portfolio beta.
(ii) If the PM seeks to reduce the beta to 0.8, how much risk free investment should he bring in?
(ii) If the PM seeks to increase the beta to 1.2, how much risk free investment should he bring in?
Answer:

(i)

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.4167	0.9	0.375
CSL	5000	20	100000	0.0833	1	0.083
SML	8000	25	200000	0.1667	1.5	0.250
APL	2000	200	400000	0.3333	1.2	0.400
			1200000	1		1.108

Portfolio beta 1.108

(ii) Required Beta 0.8

It should become (0.8 / 1.108) 72.2 % of present portfolio

If ₹ 12,00,000 is 72.20%, the total portfolio should be

₹ 12,00,000 × 100/72.20 or ₹ 16,62,050

Additional investment in zero risk should be (₹ 16,62,050 – ₹ 12,00,000) = ₹ 4,62,050

Revised Portfolio will be

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.3008	0.9	0.271
CSL	5000	20	100000	0.0602	1	0.060
SML	8000	25	200000	0.1203	1.5	0.180
APL	2000	200	400000	0.2407	1.2	0.289
Risk free asset	46205	10	462050	0.2780	0	0
			1662050	1		0.800

(iii) To increase Beta to 1.2

Required beta 1.2

It should become 1.2 / 1.108 108.30% of present beta

If 1200000 is 108.30%, the total portfolio should be

1200000 × 100/108.30 or 1108033 say 1108030

Additional investment should be (-) 91967 i.e. Divest ₹ 91970 of Risk Free Asset

Revised Portfolio will be

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.4513	0.9	0.406
CSL	5000	20	100000	0.0903	1	0.090
SML	8000	25	200000	0.1805	1.5	0.271
APL	2000	200	400000	0.3610	1.2	0.433
Risk free asset	-9197	10	-91970	-0.0830	0	0
			1108030	1		1.20

Portfolio beta 1.20

37. A has portfolio having following features:

Security	β	Random Error σ_{ei}	Weight
L	1.60	7	0.25
M	1.15	11	0.30
N	1.40	3	0.25
K	1.00	9	0.20

You are required to find out the risk of the portfolio if the standard deviation of the market index is 18%.

Answer:

$$\beta_p = \sum_{i-1}^{4} x_i\beta_i$$

$= 1.60 \times 0.25 + 1.15 \times 0.30 + 1.40 \times 0.25 + 1.00 \times 0.20$

$= 0.4 + 0.345 + 0.35 + 0.20 = 1.295$

The Standard Deviation (Risk) of the portfolio is

$= [(1.295)^2(18)^2+(0.25)^2(7)^2+(0.30)^2(11)^2+(0.25)^2(3)^2+(0.20)^2(9)^2)]$

$= [543.36 + 3.0625 + 10.89 + 0.5625 + 3.24] = [561.115]^{½} = 23.69\%$

Alternative Answer

The variance of Security's Return

$\sigma^2 = \beta_i^2\,\sigma^2_m + \sigma^2_{ei}$

Accordingly, variance of various securities

		σ^2	Weight(w)	σ^2Xw
L	$(1.60)^2\,(18)^2 + 7^2$ =	878.44	0.25	219.61
M	$(1.15)^2\,(18)^2 + 11^2$ =	549.49	0.30	164.85
N	$(1.40)^2\,(18)^2 + 3^2$ =	644.04	0.25	161.01
K	$(1.00)^2\,(18)^2 + 9^2$ =	405.00	0.20	81
		Variance		626.47

SD = $\sqrt{626.47}$ = 25.03

38. Mr. Tamarind intends to invest in equity shares of a company the value of which depends upon various parameters as mentioned below

Factor	Beta	Expected value in %	Actual value in %
GNP	1.20	7.70	7.70
Inflation	1.75	5.50	7.00
Interest rate	1.30	7.75	9.00
Stock market index	1.70	10.00	12.00
Industrial production	1.00	7.00	7.50

If the risk free rate of interest be 9.25%, how much is the return of the share under Arbitrage Pricing Theory?

Answer:

Return of the stock under APT

Factor	*Actual value in %*	*Expected value in %*	*Difference*	*Beta*	*Diff. x Beta*
GNP	7.70	7.70	0.00	1.20	0.00
Inflation	7.00	5.50	1.50	1.75	2.63
Interest rate	9.00	7.75	1.25	1.30	1.63
Stock index	12.00	10.00	2.00	1.70	3.40
Ind. Production	7.50	7.00	0.50	1.00	0.50
					8.16
Risk free rate in %					9.25
Return under APT					17.41

39. The total market value of the equity share of O.R.E. Company is Rs. 60,00,000 and the total value of the debt is Rs. 40,00,000. The treasurer estimate that the beta of the stock is currently 1.5 and that the expected risk premium on the market is 10 per cent. The treasury bill rate is 8 per cent.
Required:
(i) What is the beta of the Company's existing portfolio of assets?
(ii) Estimate the Company's Cost of capital and the discount rate for an expansion of the company's present business.
Answer:

(i) $$\beta_{company} = \beta_{equity} \times \frac{V_E}{V_0} + B_{debt} \times \frac{V_D}{V_0}$$

Note: Since β_{debt} is not given it is assumed that company debt capital is virtually riskless.

If company's debt capital is riskless than above relationship become:

$$\text{Here } \beta_{equity} = 1.5;\ \beta_{company} = \beta_{equity} \frac{V_E}{V_0}$$

As $\beta_{debt} = 0$

V_E = ₹ 60 lakhs.

V_D = ₹ 40 lakhs.

V_0 = ₹ 100 lakhs.

$$\beta_{company} = 1.5 \times \frac{₹\ 60\ lakhs}{₹\ 100\ lakhs}$$

$$= 0.9$$

(ii) Company's cost of equity = $R_f + \beta_A \times$ Risk premium

Where R_f = Risk free rate of return

β_A = Beta of company assets

Therefore, company's cost of equity = 8% + 0.9 × 10 = 17% and overall cost of capital shall be

$$= 17\% \times \frac{60,00,000}{100,00,000} + 8\% \times \frac{40,00,000}{100,00,000}$$

= 10.20% + 3.20% = 13.40%

Alternatively it can also be computed as follows:

Cost of Equity = 8% + 1.5 x 10 = 23%

Cost of Debt = 8%

$$\text{WACC (Cost of Capital)} = 23\% \times \frac{60,00,000}{1,00,00,000} + 8\% \times \frac{40,00,000}{1,00,00,000} = 17\%$$

In case of expansion of the company's present business, the same rate of return i.e. 13.40% will be used. However, in case of diversification into new business the risk profile of new business is likely to be different. Therefore, different discount factor has to be worked out for such business.

40. Mr. Nirmal Kumar has categorized all the available stock in the market into the following types:

(i) Small cap growth stocks
(ii) Small cap value stocks
(iii) Large cap growth stocks
(iv) Large cap value stocks

Mr. Nirmal Kumar also estimated the weights of the above categories of stocks in the market index. Further, the sensitivity of returns on these categories of stocks to the three important factor are estimated to be:

Category of Stocks	Weight in the Market Index	Factor I (Beta)	Factor II (Book Price)	Factor III (Inflation)
Small cap growth	25%	0.80	1.39	1.35
Small cap value	10%	0.90	0.75	1.25
Large cap growth	50%	1.165	2.75	8.65
Large cap value	15%	0.85	2.05	6.75
Risk Premium		6.85%	-3.5%	0.65%

The rate of return on treasury bonds is 4.5%
Required:
(a) Using Arbitrage Pricing Theory, determine the expected return on the market index.
(b) Using Capital Asset Pricing Model (CAPM), determine the expected return on the market index.
(c) Mr. Nirmal Kumar wants to construct a portfolio constituting only the 'small cap value' and 'large cap growth' stocks. If the target beta for the desired portfolio is 1, determine the composition of his portfolio.

Answer:

(a) Method I

Stock's return

Small cap growth = 4.5 + 0.80 x 6.85 + 1.39 x (-3.5) + 1.35 x 0.65 = 5.9925%

Small cap value = 4.5 + 0.90 x 6.85 + 0.75 x (-3.5) + 1.25 x 0.65 = 8.8525%

Large cap growth = 4.5 + 1.165 x 6.85 + 2.75 x (-3.5) + 8.65 x 0.65 = 8.478%

Large cap value = 4.5 + 0.85 x 6.85 + 2.05 x (-3.5) + 6.75 x 0.65 = 7.535%

Expected return on market index

0.25 x 5.9925 + 0.10 x 8.8525 + 0.50 x 8.478 + 0.15 x 7.535 = 7.7526%

Method II

Expected return on the market index

= 4.5% + [0.1x0.9 + 0.25x0.8 + 0.15x0.85 + 0.50x1.165] x 6.85 + [(0.75 x 0.10 + 1.39 x 0.25 + 2.05 x 0.15 + 2.75 x 0.5)] x (-3.5) + [{1.25 x 0.10 + 1.35 x 0.25 + 6.75 x 0.15 + 8.65 x 0.50)] x 0.65

= 4.5 + 6.85 + (-7.3675) + 3.77 = 7.7525%.

(b) Using CAPM,

Small cap growth = 4.5 + 6.85 x 0.80 = 9.98%

Small cap value = 4.5 + 6.85 x 0.90 = 10.665%

Large cap growth = 4.5 + 6.85 x 1.165 = 12.48%

Large cap value = 4.5 + 6.85 x 0.85 = 10.3225%

Expected return on market index

= 0.25 x 9.98 + 0.10 x 10.665 + 0.50 x 12.45 + 0.15 x 10.3225 = 11.33%

(c) Let us assume that Mr. Nirmal will invest X_1% in small cap value stock and X_2% in large cap growth stock

$X_1 + X_2 = 1$

$0.90\ X_1 + 1.165\ X_2 = 1$

$0.90\ X_1 + 1.165(1 - X_1) = 1$

$0.90\ X_1 + 1.165 - 1.165\ X_1 = 1$

$0.165 = 0.265\ X_1$

$\frac{0.165}{0.265} = X_1$

$0.623 = X_1,\ X_2 = 0.377$

62.3% in small cap value

37.7% in large cap growth.

41. The following are the data on five mutual funds:

Fund	Return	Standard Deviation	Beta
A	15	7	1.25
B	18	10	0.75
C	14	5	1.40
D	12	6	0.98
E	16	9	1.50

Fund Return Standard Deviation Beta A 15 7 1.25 B 18 10 0.75 C 14 5 1.40 D 12 6 0.98 E 16 9 1.50
You are required to compute Reward to Volatility Ratio and rank these portfolio using:
:- Sharpe method and
:- Treynor's method
assuming the risk free rate is 6%. (ALSO IN MTP-OCT 2020)
Answer:

Sharpe Ratio $S = (R_p - R_f)/\sigma_p$

Treynor Ratio $T = (R_p - R_f)/\beta_p$

Where,

R_p = Return on Fund

R_f = Risk-free rate

σ_p = Standard deviation of Fund

β_p = Beta of Fund

Reward to Variability (Sharpe Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	σ_p	Reward to Variability	Ranking
A	15	6	9	7	1.285	2
B	18	6	12	10	1.20	3
C	14	6	8	5	1.60	1
D	12	6	6	6	1.00	5
E	16	6	10	9	1.11	4

Reward to Volatility (Treynor Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	β_p	Reward to Volatility	Ranking
A	15	6	9	1.25	7.2	2
B	18	6	12	0.75	16	1
C	14	6	8	1.40	5.71	5
D	12	6	6	0.98	6.12	4
E	16	6	10	1.50	6.67	3

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Consider the following information on two stocks, X and Y.

Year	2016	2017
Return on X (%)	10	16
Return on Y (%)	12	18

You are required to calculate:
(i) The expected return on a portfolio containing X and Y in the proportion of 40% and 60% respectively.
(ii) The Standard Deviation of return from each of the two stocks.
(iii) The Covariance of returns from the two stocks.
(iv) The Correlation coefficient between the returns of the two stocks.
(v) The risk of a portfolio containing X and Y in the proportion of 40% and 60%.
[MAY 2018 - 10 MARKS]
Answer:

(i) Expected return of portfolio containing X and Y in the ratio 40%,60%

E (X) = (10 + 16) / 2 = 13%

E (Y) = (12 + 18) / 2 = 15%

$$Rp = \sum_{i=I}^{N} X_i R_i = 0.4(13) + 0.6(15) = 14.2\%$$

(ii) Standard Deviation of X and Y

Stock X:

Variance = 0.5 (10 – 13)² + 0.5 (16 – 13) ² = 9

Standard deviation = 3%

Stock Y:

Variance = 0.5 (12 – 15) ² + 0.5 (18 – 15) ² = 9

Standard deviation = 3%

(iii) Cov_{XY} = 0.5 (10 – 13) (12 – 15) + 0.5 (16 – 13) (18 – 15) = 9

(iv) Correlation Coefficient $= \rho = \frac{Cov\ (X,Y)}{\sigma x \sigma y} = \frac{9}{9} = 1$

(v) Risk of portfolio containing 40% X and 60 % Y

$$\sigma p = \sqrt{X_X^2\sigma_X^2 + X_Y^2\sigma_Y^2 + 2X_X X_Y(\sigma_X \sigma_Y Corr._{XY})}$$

$$= \sqrt{(0.4)^2(3)^2 + (0.6)^2(3)^2 + 2(0.4)(0.6)(3)(3)(1)}$$

$$= \sqrt{1.44 + 3.24 + 4.32} = 3\%$$

2. Mr. Kapoor owns a portfolio with the following characteristics:
It is assumed that security returns are generated by a two factor model.
(i) If Mr. Kapoor has Rs. 1,00,000 to invest and sells short Rs. 50,000 of security Y and purchases Rs. 1,50,000 of security X, what is the sensitivity of Mr. Kapoor's portfolio to the two factors?
(ii) If Mr. Kapoor borrows Rs. 1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of Rs. 1,00,000 in security X and Y in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?
(iii) What is the expected return premium of factor 2?
[NOV 2018 - 8 MARKS]
Answer:
(i) Mr. Kapoor's position in the two securities is +1.50 in security X and -0.5 in security Y. Hence the portfolio sensitivities to the two factors:-
b prop. 1 =1.50 x 0.75 + (-0.50 x 1.50) = 0.375
b prop. 2 = 1.50 x 0.60 + (-0.50 x 1.10) = 0.35

(ii) Mr. Kapoor's current position:
Security X Rs. 3,00,000 / Rs. 1,00,000 = 3
Security Y -Rs. 1,00,000 / Rs. 1,00,000 = -1
Risk free asset -Rs. 100000 / Rs. 100000 = -1
b prop. 1 = 3.0 x 0.75 + (-1 x 1.50) + (- 1 x 0) = 0.75
b prop. 2 = 3.0 x 0.60 + (-1 x 1.10) + (-1 x 0) = 0.70

(iii) Expected Return = Risk Free Rate of Return + Risk Premium
Let λ1 and λ2 are the Value Factor 1 and Factor 2 respectively.
Accordingly
15 = 10 + 0.75 λ1 + 0.60 λ2
20 = 10 + 1.50 λ1 + 1.10 λ2
On solving equation, the value of λ1 and λ2 comes 6.67 and 0 respectively.
Accordingly, the expected risk premium for the factor 2 shall be Zero and whatever be the risk the same shall be on account of factor 1.

Alternatively, the risk premium of Securities X & Y can be calculated as follows:
Security X
Total Return = 15%
Risk Free Return = 10%
Risk Premium = 5%
Security Y
Total Return = 20%
Risk Free Return = 10%
Risk Premium = 10%

3. Following are the details of a portfolio consisting of 3 shares:

Shares	Portfolio Weight	Beta	Expected Return (%)	Total Variance
X Ltd.	0.3	0.50	15	0.020
Y Ltd.	0.5	0.60	16	0.010
Z Ltd.	0.2	1.20	20	0.120

Standard Deviation of Market Portfolio Return = 12%
You are required to calculate the following:
(i) The Portfolio Beta.
(ii) Residual Variance of each of the three shares.
(iii) Portfolio Variance using Sharpe Index Model.
[MAY 2019 - 8 MARKS]
Answer:

(i) Portfolio Beta

0.30 x 0.50 + 0.50 x 0.60 + 0.20 x 1.20
= 0.15 + 0.3 + 0.24
= 0.69

(ii) Residual Variance

To determine Residual Variance first of all we shall compute the Systematic Risk as follows:

$\beta_X^2 \times \sigma_M^2 = (0.5)^2(0.12)^2 = 0.0036$

$\beta_Y^2 \times \sigma_M^2 = (0.6)^2(0.12)^2 = 0.0052$

$\beta_Z^2 \times \sigma_M^2 = (1.20)^2(0.12)^2 = 0.0207$

Residual Variance = Total Variance – Systematic Risk

X 0.020 – 0.0036 = 0.0164

Y 0.010 – 0.0052 = 0.0048

Z 0.120 – 0.0207 = 0.0993

(iii) Portfolio variance using Sharpe Index Model

Portfolio Variance = Systematic Risk of the Portfolio + Unsystematic Risk of the Portfolio

Systematic Variance of Portfolio = $(0.12)^2$ x $(0.69)^2$ = 0.006856

Unsystematic Variance of Portfolio = 0.0164 x $(0.30)^2$ + 0.0048 x $(0.50)^2$ + 0.0993 x $(0.20)^2$ = 0.006648

Total Variance = 0.006856+ 0.006648 = 0.013504

4. On 1 April 2015, Sunidhi was holding a portfolio of 10 securities whose value was Rs.9,94,450, the weighted average of beta of 9 securities was 1.10. Since she was expecting a fall in the prices of the shares in near future to hedge her portfolio she sold 5 contract of NIFTY Futures (Multiplier of 25) expiring in May 2015, which was trading at 8767.07 on 1 April.

(a) Calculate the beta of the 10th security.
(b) Reconcile the reasons in spite of 2% fall in the market as per Sunidhi's apprehension if she would have earned some profit on her cash position.
[MTP MARCH 2018 - 8 MARKS]

Answer:

(i) To compute the beta of 10th security first we shall compute overall weighted beta as follows:

Let weighted β be w, then

$$5 = \frac{994450}{8767.07 \times 25} \times w$$

w = 1.102 approximately

Let beta of 10th security is β then,

1.102 = 0.90 x 1.10 + 0.10 x β

β = 1.12

(ii) the main reason for the profit in cash position might due to reason that contrary to her expectation fall in the value of cash position there may be increase in value of cash position.

5. Following is the data regarding six securities:

	U	V	W	X	Y	Z
Return (%)	10	10	15	5	11	10
Risk (%) (Standard deviation)	5	6	13	5	6	7

(i) Recommend at least three securities which shall be selected among the six securities mentioned above.
(ii) Assuming perfect correlation, evaluate whether it is preferable to invest 80% in security U and 20% in security W or to invest 100% in Y.
[MTP -MARCH 2018]

Answer:

(i) When we make risk-return analysis of different securities from U to Z, we can observe that security U gives a return of 10% at risk level of 5%. Simultaneously securities V and Z give the same return of 10% as of security U, but their risk levels are 6% and 7% respectively. Security X is giving only 5% return for the risk rate of 5%. Hence, security U dominates securities V, X and Z.

Securities W and Y offer more return but it carries higher level of risk. Hence securities U, W and Y can be selected based on individual preferences.

(ii) In a situation where the perfect positive correlation exists between two securities, their risk and return can be averaged with the proportion. Assuming the perfect correlation exists between the securities U and W, average risk and return of U and W together for proportion 4 : 1 is calculated as follows:

Risk = (4 × 5% + 1 × 13%) ÷ 5 = 6.6%

Return = (4 × 10% + 1 × 15%) ÷ 5 = 11%

Therefore:	80% U	100%Y
	20% V	-
Risk	6.6%	6%
Return	11%	11%

When we compare risk of 6.6% and return of 11% with security Y with 6% risk and 11% return, security Y is preferable over the portfolio of securities U and W in proportion of 4: 1.

6. Explain Asset Allocation Strategies.
[MTP AUGUST 2018 - 4 MARKS]

Answer:

(a) Integrated Asset Allocation: Under this strategy, capital market conditions and investor objectives and constraints are examined and the allocation that best serves the investor's needs while incorporating the capital market forecast is determined.
(b) Strategic Asset Allocation: Under this strategy, optimal portfolio mixes based on returns, risk, and co-variances is generated using historical information and adjusted periodically to restore target allocation within the context of the investor's objectives and constraints.
(c) Tactical Asset Allocation: Under this strategy, investor's risk tolerance is assumed constant and the asset allocation is changed based on expectations about capital market conditions.
(d) Insured Asset Allocation: Under this strategy, risk exposure for changing portfolio values (wealth) is adjusted; more value means more ability to take risk.

7. Mr. Tempest has the following portfolio of four shares:

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

The risk-free rate of return is 7% and the market rate of return is 14%.
CALCULATE
(i) Portfolio return.
(ii) Calculate the portfolio Beta
[MTP - OCTOBER 2018 -8 MARKS]
Answer:

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

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

Total Investment ₹ 9,05,000

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

(ii) Portfolio Beta

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

7% + 7β = 16.13%

β = 1.30

Alternative Approach

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

$$Beta_P = 0.45X\frac{0.80}{9.05} + 0.35X\frac{1.50}{9.05} + 1.15X\frac{2.25}{9.05} + 1.85X\frac{4.50}{9.05}$$

= 0.45x0.0884+ 0.35X0.1657+ 1.15X0.2486+ 1.85X0.4972 = 0.0398+ 0.058 + 0.2859 + 0.9198 = 1.3035

Accordingly,

(i) Portfolio Return using CAPM formula will be as follows:

$R_P = R_F + Beta_P(R_M - R_F)$

= 7% + 1.3035(14% - 7%) = 7% + 1.3035(7%)

= 7% + 9.1245% = 16.1245%

(ii) Portfolio Beta

As calculated above 1.3035

8. The following information is available with respect of Krishna Ltd.

Year	Krishna Ltd. Average share price	Dividend per Share	Average Market Index	Dividend Yield	Return on Govt. bonds
	Rs.	Rs.			
2012	245	20	2013	4%	7%
2013	253	22	2130	5%	6%
2014	310	25	2350	6%	6%
2015	330	30	2580	7%	6%

Calculate the Beta Value of the Krishna Ltd. at the end of 2015 and State your observation.
[MTP -MARCH 2019 -8 MARKS]
Answer:

(i) Computation of Beta Value

Calculation of Returns

$$\text{Returns} = \frac{D_1 + (P_1 - P_0)}{P_0} \times 100$$

Year	Returns
2012 – 13	$\frac{22 + (253 - 245)}{245} \times 100 = 12.24\%$
2013 – 14	$\frac{25 + (310 - 253)}{253} \times 100 = 32.41\%$
2014 – 15	$\frac{30 + (330 - 310)}{310} \times 100 = 16.13\%$

Calculation of Returns from market Index

Year	% of Index Appreciation	Dividend Yield %	Total Return %
2012–13	$\frac{(2130 - 2013)}{2013} \times 100 = 5.81\%$	5%	10.81%
2013–14	$\frac{(2350 - 2130)}{2130} \times 100 = 10.33\%$	6%	16.33%
2014–15	$\frac{(2580 - 2350)}{2350} \times 100 = 9.79\%$	7%	16.79%

Computation of Beta

Year	Krishna Ltd. (X)	Market Index (Y)	XY	Y^2
2012–13	12.24%	10.81%	132.31	116.86
2013–14	32.41%	16.33%	529.25	266.67
2014–15	16.13%	16.79%	270.82	281.90
Total	60.78%	43.93%	932.38	665.43

Average Return of Krishna Ltd. = $\frac{60.78}{3} = 20.26\%$

Average Market Return = $\frac{43.93}{3} = 14.64\%$

$$\text{Beta } (\beta) = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum Y^2 - n(\bar{Y})^2} = \frac{932.38 - 3 \times 20.26 \times 14.64}{665.43 - 3(14.64)^2} = 1.897$$

(ii) Observation

	Expected Return (%)	Actual Return (%)	Action
2012 – 13	6%+ 1.897(10.81% - 6%) = 15.12%	12.24%	Sell
2013 – 14	6%+ 1.897(16.33% - 6%) = 25.60%	32.41%	Buy
2014 – 15	6%+ 1.897(16.79% - 6%) = 26.47%	16.13%	Sell

9. Details about portfolio of shares of an investor is as below:

Shares	No. of shares (lakh)	Price per share	Beta
A Ltd.	3.00	Rs. 500	1.40
B Ltd.	4.00	Rs. 750	1.20
C Ltd.	2.00	Rs. 250	1.60

The investor thinks that the risk of portfolio is very high and wants to reduce the portfolio beta to 0.91. He is considering two below mentioned alternative strategies:

(1) Dispose off a part of his existing portfolio to acquire risk free securities, or
(2) Take appropriate position on Nifty Futures which are currently traded at Rs. 8125 and each Nifty points is worth Rs.200.

You are required to calculate:
(i) portfolio beta,
(ii) the value of risk free securities to be acquired,
(iii) the number of shares of each company to be disposed off,
(iv) the number of Nifty contracts to be bought/sold; and
(v) the value of portfolio beta for 2% rise in Nifty.
[MTP APRIL 2019 / OCTOBER 2019 -10 MARKS / 8 MARKS]
Answer:

Shares	No. of shares (lakhs) (1)	Market Price of Per Share (2)	(1) × (2) (Rs. lakhs)	% to total (w)	ß (x)	wx
A Ltd.	3.00	500.00	1500.00	0.30	1.40	0.42
B Ltd.	4.00	750.00	3000.00	0.60	1.20	0.72
C Ltd.	2.00	250.00	500.00	0.10	1.60	0.16
			5000.00	1.00		1.30

(i) Portfolio beta 1.30

(ii) Required Beta 0.91

Let the proportion of risk free securities for target beta 0.91 = p

$$0.91 = 0 \times p + 1.30 (1 - p)$$

$$p = 0.30 \text{ i.e. } 30\%$$

Shares to be disposed off to reduce beta (5000 × 30%) Rs. 1,500 lakh and Risk Free securities to be acquired.

(iii) Number of shares of each company to be disposed off

Shares	% to total (w)	Proportionate Amount (Rs. lakhs)	Market Price Per Share	No. of Shares (Lakh)
A Ltd.	0.30	450.00	500.00	0.90
B Ltd.	0.60	900.00	750.00	1.20
C Ltd.	0.10	150.00	250.00	0.60

(iv) Number of Nifty Contract to be sold

$$\frac{(1.30-0.91) \times 5000 \text{ lakh}}{8,125 \times 200} = 120 \text{ contracts}$$

(v) 2% rises in Nifty is accompanied by 2% x 1.30 i.e. 2.6% rise for portfolio of shares

	Rs. Lakh
Current Value of Portfolio of Shares	5000
Value of Portfolio after rise	5130
Mark-to-Market Margin paid (8125 × 0.020 × Rs. 200 × 120)	39
Value of the portfolio after rise of Nifty	5091
% change in value of portfolio (5091 – 5000)/ 5000	1.82%
% rise in the value of Nifty	2%
Beta	0.91

10. Ram buys 10,000 shares of X Ltd. at a price of Rs. 22 per share whose beta value is 1.5 and sells 5,000 shares of A Ltd. at a price of Rs. 40 per share having a beta value of 2. He obtains a complete hedge by Nifty futures at Rs. 1,000 each. He closes out his position at the closing price of the next day when the share of X Ltd. dropped by 2%, share of A Ltd. appreciated by 3% and Nifty futures dropped by 1.5%.
Calculate the overall profit/loss to Ram?
[MTP - APRIL 2019 -7 MARKS | RTP -NOV 2018]
Answer:

No. of the Future Contract to be obtained to get a complete hedge

$$= \frac{10000 \times ₹22 \times 1.5 - 5000 \times ₹40 \times 2}{₹1000}$$

$$= \frac{₹3,30,000 - ₹4,00,000}{₹1000} = 70 \text{ contracts}$$

Thus, by purchasing 70 Nifty future contracts to be long to obtain a complete hedge.

Cash Outlay

= 10000 x Rs. 22 – 5000 x Rs. 40 + 70 x Rs. 1,000

= Rs. 2,20,000 – Rs. 2,00,000 + Rs. 70,000 = Rs. 90,000

Cash Inflow at Close Out

= 10000 x Rs. 22 x 0.98 – 5000 x Rs. 40 x 1.03 + 70 x Rs. 1,000 x 0.985

= Rs. 2,15,600 – Rs. 2,06,000 + Rs. 68,950 = Rs. 78,550

Gain/ Loss

= Rs. 78,550 – Rs. 90,000 = - Rs. 11,450 (Loss)

11. Given below is information of market rates of Returns and Data from two Companies A and B:

	Year 2015	Year 2016	Year 2017
Market (%)	12.0	11.0	9.0
Company A (%)	13.0	11.5	9.8
Company B (%)	11.0	10.5	9.5

Calculate the beta coefficients of the Shares of Company A and Company B
[MTP -APRIL 2019 - 7 MARKS]
Answer:

Company A:

Year	*Return % (Ra)*	*Market return % (Rm)*	*Deviation R(a)*	*Deviation Rm*	*D Ra × DRm*	*Rm²*
1	13.0	12.0	1.57	1.33	2.09	1.77
2	11.5	11.0	0.07	0.33	0.02	0.11
3	9.8	9.0	–1.63	–1.67	2.72	2.79
	34.3	32.0			4.83	4.67

Average Ra = 11.43

Average Rm = 10.67

$$\text{Covariance} = \frac{\sum(R_m - \bar{R}_m)(R_a - \bar{R}_a)}{N}$$

$$\text{Covariance} = \frac{4.83}{3} = 1.61$$

$$\text{Variance } (\sigma_m^2) = \frac{\sum(R_m - \bar{R}_m)^2}{N}$$

$$= \frac{4.67}{3} = 1.557$$

$$\beta = \frac{1.61}{1.557} = 1.03$$

Company B:

Year	Return % (Rb)	Market return % (Rm)	Deviation R(b)	Deviation Rm	D Rb × D Rm	Rm^2
1	11.0	12.0	0.67	1.33	0.89	1.77
2	10.5	11.0	0.17	0.33	0.06	0.11
3	9.5	9.0	–0.83	–1.67	1.39	2.79
	31.0	32.0			2.34	4.67

Average Rb = 10.33

Average Rm = 10.67

$$\text{Covariance} = \frac{\sum(R_m - \bar{R}_m)(R_b - \bar{R}_b)}{N}$$

$$\text{Covariance} = \frac{2.34}{3} = 0.78$$

$$\text{Variance } (\sigma_m^2) = \frac{\sum(R_m - \bar{R}_m)^2}{N}$$

$$= \frac{4.67}{3} = 1.557$$

$$\beta = \frac{0.78}{1.557} = 0.50$$

12. X Co., Ltd., invested on 1.4.2009 in certain equity shares as below:

Name of Co.	No. of shares	Cost (Rs.)
M Ltd.	1,000 (Rs. 100 each)	2,00,000
N Ltd.	500 (Rs. 10 each)	1,50,000

In September, 2009, 10% dividend was paid out by M Ltd. and in October, 2009, 30% dividend paid out by N Ltd. On 31.3.2010 market quotations showed a value of Rs. 220 and Rs. 290 per share for M Ltd. and N Ltd. respectively.

On 1.4.2010, investment advisors indicate (a) that the dividends from M Ltd. and N Ltd. for the year ending 31.3.2011 are likely to be 20% and 35%, respectively and (b) that the probabilities of market quotations on 31.3.2011 are as below:

Probability factor	Price/share of M Ltd.	Price/share of N Ltd.
0.2	220	290
0.5	250	310
0.3	280	330

You are required to:

(i) Calculate the average return from the portfolio for the year ended 31.3.2010;
(ii) Calculate the expected average return from the portfolio for the year 2010-11; and
(iii) Advise X Co. Ltd., of the comparative risk in the two investments by calculating the standard deviation in each case.
[MTP - APRIL 2019 -8 MARKS | RTP - MAY 2019]

Answer:

Calculation of return on portfolio for 2009-10	(Calculation in Rs. / share)		
	M	N	
Dividend received during the year	10	3	
Capital gain/loss by 31.03.10			
Market value by 31.03.10	220	290	
Cost of investment	200	300	
Gain/loss	20	(-)10	
Yield	30	(-)7	
Cost	200	300	
% return	15%	(-)2.33%	
Weight in the portfolio	57	43	
Weighted average return			7.55%
Calculation of estimated return for 2010-11			

Expected dividend	20	3.5	
Capital gain by 31.03.11			
(220x0.2) + (250x0.5) + (280x0.3) – 220 = (253-220)	33	-	
(290x0.2) + (310x0.5) + (330x0.3) – 290 = (312 – 290)	-	22	
Yield	53	25.5	
*Market Value 01.04.10	220	290	
% return	24.09%	8.79%	
*Weight in portfolio (1,000x220): (500x290)	60.3	39.7	
Weighted average (Expected) return			18.02%
(*The market value on 31.03.10 is used as the base for calculating yield for 10-11)			

Calculation of Standard Deviation

M Ltd.

Exp. market value	*Exp. gain*	*Exp. div.*	*Exp Yield (1)*	*Prob. Factor (2)*	*(1) X (2)*	*Dev. (P_M-$\overline{P_M}$)*	*Square of dev. (3)*	*(2) X (3)*
220	0	20	20	0.2	4	-33	1089	217.80
250	30	20	50	0.5	25	-3	9	4.50
280	60	20	80	0.3	24	27	729	218.70
					53			σ^2_M = 441.00

Standard Deviation (σ_M) 21

N Ltd.

Exp. market value	*Exp. gain*	*Exp. div.*	*Exp. Yield (1)*	*Prob. Factor (2)*	*(1) X (2)*	*Dev. (P_N-$\overline{P_N}$)*	*Square of dev. (3)*	*(2) X (3)*
290	0	3.5	3.5	0.2	0.7	-22	484	96.80
310	20	3.5	23.5	0.5	11.75	-2	4	2.00
330	40	3.5	43.5	0.3	13.05	18	324	97.20
					25.5			σ^2_N = 196.00

Standard Deviation (σ_N) 14

Share of company M Ltd. is more risky as the S.D. is more than company N Ltd.

13. Expected returns on two stocks for particular market returns are given in the following table:

Market Return	Aggressive	Defensive
7%	4%	9%
25%	40%	18%

You are required to calculate:

(i) The Betas of the two stocks.

(ii) Expected return of each stock, if the market return is equally likely to be 7% or 25%.

(iii) The Security Market Line (SML), if the risk free rate is 7.5% and market return is equally likely to be 7% or 25%.

(iv) The Alphas of the two stocks.

[MTP OCTOBER 2019 8 MARKS | RTP MAY 2018]

Answer:

(i) The Betas of two stocks:

Aggressive stock - 40% - 4%/25% - 7% = 2

Defensive stock - 18% - 9%/25% - 7% = 0.50

Alternatively, it can also be solved by using the Characteristic Line Relationship as follows:

$R_s = \alpha + \beta R_m$

Where,

α = Alpha

β = Beta

R_m= Market Return

For Aggressive Stock

$4\% = \alpha + \beta(7\%)$

$40\% = \alpha + \beta(25\%)$

$36\% = \beta(18\%)$

$\beta = 2$

For Defensive Stock

$9\% = \alpha + \beta(7\%)$

$18\% = \alpha + \beta(25\%)$

$9\% = \beta(18\%)$

$\beta = 0.50$

(ii) Expected returns of the two stocks:-

Aggressive stock - 0.5 x 4% + 0.5 x 40% = 22%

Defensive stock - 0.5 x 9% + 0.5 x 18% = 13.5%

(iii) Expected return of market portfolio = 0.5 x 7% + 0.5% x 25% = 16%

∴ Market risk prem. = 16% - 7.5% = 8.5%

∴ SML is, required return = 7.5% + βi 8.5%

(iv) $R_s = \alpha + \beta R_m$

For Aggressive Stock

$22\% = \alpha_A + 2(16\%)$

$\alpha_A = -10\%$

For Defensive Stock

$13.5\% = \alpha_D + 0.50(16\%)$

$\alpha_D = 5.5\%$

14. An investor has decided to invest to invest Rs. 1,00,000 in the shares of two companies, namely, ABC and XYZ. The projections of returns from the shares of the two companies along with their probabilities are as follows:

Probability	ABC(%)	XYZ(%)
20	12	16
25	14	10
25	-7	28
30	28	-2

You are required to

(i) Comment on return and risk of investment in individual shares.

(ii) Compare the risk and return of these two shares with a Portfolio of these shares in equal proportions.
(iii) Find out the proportion of each of the above shares to formulate a minimum risk portfolio.
[RTP MAY 2019]
Answer:

(i)

Probability	ABC (%)	XYZ (%)	1X2 (%)	1X3 (%)
(1)	(2)	(3)	(4)	(5)
0.20	12	16	2.40	3.2
0.25	14	10	3.50	2.5
0.25	-7	28	-1.75	7.0
0.30	28	-2	8.40	-0.6
Average return			12.55	12.1

Hence the expected return from ABC = 12.55% and XYZ is 12.1%

Probability	(ABC- $\overline{ABC}$)	(ABC- $\overline{ABC}$)²	1X3	(XYZ- $\overline{XYZ}$)	(XYZ- $\overline{XYZ}$)²	(1)X(6)
(1)	(2)	(3)	(4)	(5)	(6)	
0.20	-0.55	0.3025	0.06	3.9	15.21	3.04
0.25	1.45	2.1025	0.53	-2.1	4.41	1.10
0.25	-19.55	382.2025	95.55	15.9	252.81	63.20
0.30	15.45	238.7025	71.61	-14.1	198.81	59.64
			167.75			126.98

σ^2_{ABC} = 167.75(%)² ; σ_{ABC} = 12.95%

σ^2_{XYZ} = 126.98(%)² ; σ_{XYZ} = 11.27%

(ii) In order to find risk of portfolio of two shares, the covariance between the two is necessary here.

Probability	(ABC- $\overline{ABC}$)	(XYZ- $\overline{XYZ}$)	2X3	1X4
(1)	(2)	(3)	(4)	(5)
0.20	-0.55	3.9	-2.145	-0.429
0.25	1.45	-2.1	-3.045	-0.761
0.25	-19.55	15.9	-310.845	-77.71
0.30	15.45	-14.1	-217.845	-65.35
				-144.25

σ^2_P = (0.5² x 167.75) + (0.5² x 126.98) + 2 x (-144.25) x 0.5 x 0.5

σ^2_P = 41.9375 + 31.745 – 72.125

σ^2_P = 1.5575 or 1.56(%)

$\sigma_P = \sqrt{1.56}$ = 1.25%

E (R_p) = (0.5 x 12.55) + (0.5 x 12.1) = 12.325%

Hence, the return is 12.325% with the risk of 1.25% for the portfolio. Thus the portfolio results in the reduction of risk by the combination of two shares.

(iii) For constructing the minimum risk portfolio the condition to be satisfied is

$$X_{ABC} = \frac{\sigma_X^2 - r_{AX}\sigma_A\sigma_X}{\sigma_A^2 + \sigma_X^2 - 2r_{AX}\sigma_A\sigma_X} \text{ or } = \frac{\sigma_X^2 - Cov._{AX}}{\sigma_A^2 + \sigma_X^2 - 2Cov._{AX}}$$

σ_X = Std. Deviation of XYZ

σ_A = Std. Deviation of ABC

r_{AX}= Coefficient of Correlation between XYZ and ABC

$Cov._{AX}$ = Covariance between XYZ and ABC.

Therefore,

$$\% \text{ ABC} = \frac{126.98-(-144.25)}{126.98+167.75-[2\times(-144.25)]} = \frac{271.23}{583.23} = 0.46 \text{ or } 46\%$$

% ABC = 46%, XYZ = 54%

(1 – 0.46) =0.54

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

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

Required:

(i) If the company invests 20% of its investment in each of the first two mutual funds and an equal amount in the mutual funds C, D and E, what is the beta of the portfolio?

(ii) If the company invests 15% of its investment in C, 15% in A, 10% in E and the balance in equal amount in the other two mutual funds, what is the beta of the portfolio?

(iii) If the expected return of market portfolio is 12% at a beta factor of 1.0, what will be the portfolios expected return in both the situations given above?

[RTP NOV 2019]

Answer:

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

(i)

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

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

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

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

= 12% × 1.22 i.e. 14.64%

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

16. A Portfolio Manager (PM) has the following four stocks in his portfolio:

Security	No. of Shares	Market Price per share (₹)	β
VSL	10,000	50	0.9
CSL	5,000	20	1.0
SML	8,000	25	1.5
APL	2,000	200	1.2

Compute the following:

(i) Portfolio beta.

(ii) If the PM seeks to reduce the beta to 0.8, how much risk free investment should he bring in?

(iii) If the PM seeks to increase the beta to 1.2, how much risk free investment should he bring in?

[RTP -MAY 2020]

Answer:

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.4167	0.9	0.375
CSL	5000	20	100000	0.0833	1	0.083
SML	8000	25	200000	0.1667	1.5	0.250
APL	2000	200	400000	0.3333	1.2	0.400
			1200000	1		1.108

Portfolio beta 1.108

(i) Required Beta 0.8

It should become (0.8 / 1.108) 72.2 % of present portfolio

If ₹ 12,00,000 is 72.20%, the total portfolio should be
₹ 12,00,000 × 100/72.20 or ₹ 16,62,050

Additional investment in zero risk should be (₹ 16,62,050 – ₹ 12,00,000) = ₹ 4,62,050

Revised Portfolio will be

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.3008	0.9	0.271
CSL	5000	20	100000	0.0602	1	0.060
SML	8000	25	200000	0.1203	1.5	0.180
APL	2000	200	400000	0.2407	1.2	0.289
Risk free asset	46205	10	462050	0.2780	0	0
			1662050	1		0.800

(ii) To increase Beta to 1.2

Required beta 1.2

It should become 1.2 / 1.108 108.30% of present beta

If 1200000 is 108.30%, the total portfolio should be

1200000 × 100/108.30 or 1108033 say 1108030

Additional investment should be (-) 91967 i.e. Divest ₹ 91970 of Risk Free Asset

Revised Portfolio will be

Security	No. of shares (1)	Market Price of Per Share (2)	(1) × (2)	% to total (w)	ß (x)	wx
VSL	10000	50	500000	0.4513	0.9	0.406
CSL	5000	20	100000	0.0903	1	0.090
SML	8000	25	200000	0.1805	1.5	0.271
APL	2000	200	400000	0.3610	1.2	0.433
Risk free asset	-9197	10	-91970	-0.0830	0	0
			1108030	1		1.20

Portfolio beta 1.20

17.

A study by a Mutual fund has revealed the following data in respect of three securities:

Security	σ (%)	Correlation with Index, Pm
A	20	0.60
B	18	0.95
C	12	0.75

The standard deviation of market portfolio (BSE Sensex) is observed to be 15%.

(i) What is the sensitivity of returns of each stock with respect to the market?

(ii) What are the covariances among the various stocks?

(iii) What would be the risk of portfolio consisting of all the three stocks equally?

(iv) What is the beta of the portfolio consisting of equal investment in each stock?

(v) What is the total, systematic and unsystematic risk of the portfolio in (iv) ?

(RTP-NOV 2020)

Answer:

(i) Sensitivity of each stock with market is given by its beta.

Standard deviation of market Index = 15%

Variance of market Index = 0.0225

Beta of stocks = $\sigma_i r / \sigma_m$

A = 20 × 0.60/15 = 0.80

B = 18 × 0.95/15 = 1.14

C = 12 × 0.75/15 = 0.60

(ii) Covariance between any 2 stocks = $\beta_1 \beta_2 \sigma^2_m$

Covariance matrix

Stock/Beta	0.80	1.14	0.60
A	400.000	205.200	108.000
B	205.200	324.000	153.900
C	108.000	153.900	144.000

(iii) Total risk of the equally weighted portfolio (Variance) = $400(1/3)^2 + 324(1/3)^2 + 144(1/3)^2 + 2(205.20)(1/3)^2 + 2(108.0)(1/3)^2 + 2(153.900)(1/3)^2 = 200.244$

(iv) β of equally weighted portfolio $= \beta_p = \sum \beta_i / N = \frac{0.80+1.14+0.60}{3}$

$= 0.8467$

(v) Systematic Risk $\beta_P^2 \sigma_m^2$ $= (0.8467)^2 (15)^2 = 161.303$

Unsystematic Risk = Total Risk – Systematic Risk

$= 200.244 - 161.303 = 38.941$

18.(MTP-OCT 2020) Mr. A, a HNI invested on 1.4.2014 in certain equity shares as below:

Name of Co.	No. of shares	Cost (₹)
X Ltd.	1,00,000 (₹ 100 each)	2,00,00,000
Y Ltd.	50,000 (₹ 10 each)	1,50,00,000

In September 2014, 10% dividend was paid out by X Ltd. and in October 2014, 30% dividend paid out by Y Ltd. On 31.3.2015 market quotations showed a value of ₹ 220 and ₹ 290 per share for X Ltd. and Y Ltd. respectively.

On 1.4.2015, a technical analyst indicated as follows:

(1) that the probabilities of dividends from X Ltd. and Y Ltd. for the year ending 31.3.2016 are as below:

Probability factor	Dividend from X Ltd. (%)	Dividend from Y Ltd. (%)
0.2	10	15
0.3	15	20
0.5	20	35

(2) that the probabilities of market quotations on 31.3.2016 are as below:

Probability factor	Price/share of X Ltd.	Price/share of Y Ltd.
0.2	220	290
0.5	250	310
0.3	280	330

You are required to:

(i) Analyze the average return from the portfolio for the year ended 31.3.2015;

(ii) Analyze the expected average return from the portfolio for the year 2015-16; and

(iii) Advise Mr. A, of the comparative risk in the two investments. **(12 Marks)**

Answer:

(i) Average return from the portfolio for the year ended 31.3.2015

Calculation of return on portfolio for 2014-15	(Calculation in ₹ / share)		
	X Ltd.	Y Ltd.	
Dividend received during the year	10	3	
Capital gain/loss by 31.03.15			
Market value by 31.03.15	220	290	
Cost of investment	200	300	
Gain/loss	20	(-)10	
Yield	30	(-)7	
Cost	200	300	

% return	15%	(-)2.33%	
Weight in the portfolio	57	43	
Weighted average return			7.55%

(ii) Average return from the portfolio for the year ended 2015-16 shall be calculated using the concept of joint probability as follows:

X Ltd.

Path	*Income from Dividend (₹)*	*Gain from Market Price (₹)*	*Total Yield (₹)*	*Joint Prob.*	*Exp. Yield (₹)*
1	10	220 – 220 = 0	10	0.20 x 0.20 = 0.04	0.40
2	10	250 – 220 = 30	40	0.20 x 0.50 = 0.10	4.00
3	10	280 – 220 = 60	70	0.20 x 0.30 = 0.06	4.20
4	15	220 – 220 = 0	15	0.30 x 0.20 = 0.06	0.90
5	15	250 – 220 = 30	45	0.30 x 0.50 = 0.15	6.75
6	15	280 – 220 = 60	75	0.30 x 0.30 = 0.09	6.75
7	20	220 – 220 = 0	20	0.50 x 0.20 = 0.10	2.00
8	20	250 – 220 = 30	50	0.50 x 0.50 = 0.25	12.50
9	20	280 – 220 = 60	80	0.50 x 0.30 = 0.15	12.00
Expected Yield (₹)					49.50
Market Value on 01.04.2015 (₹)					220
% Return					22.50

Y Ltd.

Path	*Income from Dividend (₹)*	*Gain from Market Price (₹)*	*Total Yield (₹)*	*Joint Prob.*	*Exp. Yield (₹)*
1	1.50	290 – 290 = 0	1.50	0.20 x 0.20 = 0.04	0.06
2	1.50	310 – 290 = 20	21.50	0.20 x 0.50 = 0.10	2.15
3	1.50	330 – 290 = 40	41.50	0.20 x 0.30 = 0.06	2.49
4	2.00	290 – 290 = 0	2.00	0.30 x 0.20 = 0.06	0.12
5	2.00	310 – 290 = 20	22.00	0.30 x 0.50 = 0.15	3.30
6	2.00	330 – 290 = 40	42.00	0.30 x 0.30 = 0.09	3.78
7	3.50	290 – 290 = 0	3.50	0.50 x 0.20 = 0.10	0.35
8	3.50	310 – 290 = 20	23.50	0.50 x 0.50 = 0.25	5.88
9	3.50	330 – 290 = 40	43.50	0.50 x 0.30 = 0.15	6.52
Expected Yield (₹)					24.65
Market Value on 01.04.2015 (₹)					290
% Return					8.50

Weight in portfolio (1,00,000 x 220): (50,000 x 290) 60.30 : 39.70

Weighted average (Expected) return (0.6030 x 22.50 + 0.3970 x 8.50) 16.94%

(iii) To analyze the risk of each investment we need to calculate the Standard Deviation of each investment as follows:

X Ltd.

Path	*Prob. (1)*	*Yield (₹)*	*Dev.* $(P_X - \overline{P_X})$	*Square of dev. (2)*	(1) X (2)
1	0.04	10	-39.50	1560.25	62.41
2	0.10	40	-9.50	90.25	9.03
3	0.06	70	20.50	420.25	25.22
4	0.06	15	-34.50	1190.25	71.42
5	0.15	45	-4.50	20.25	3.04
6	0.09	75	25.50	650.25	58.52
7	0.10	20	-29.50	870.25	87.03
8	0.25	50	0.50	0.25	0.06
9	0.15	80	30.50	930.25	139.54
					σ^2_M = 456.27

Standard Deviation (σ_X) 21.36

Y Ltd.

Path	*Prob. (1)*	*Yield (₹)*	*Dev.* $(P_Y - \overline{P_Y})$	*Square of dev. (2)*	(1) X (2)
1	0.04	1.50	-23.15	535.92	21.44
2	0.10	21.50	-3.15	9.92	0.99
3	0.06	41.50	16.85	283.92	17.04
4	0.06	2.00	-22.65	513.02	30.78
5	0.15	22.00	-2.65	7.02	1.05
6	0.09	42.00	17.35	301.02	27.09
7	0.10	3.50	-21.15	447.32	44.73
8	0.25	23.50	-1.15	1.32	0.33
9	0.15	43.50	18.85	355.32	53.30
					σ^2_N = 196.75

Standard Deviation (σ_Y) 14.03

(iv) Although Expected Return is higher in case of X Ltd. but it also has higher risk due to High S.D.

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CHAPTER-6
SECURITIZATION

QUESTIONS FROM STUDY MATERIAL

1. What are the main problems faced in securitization especially in Indian context?
[ALSO ASKED IN MTP OCTOBER 2019- 4 MARKS]
Answer:

Following are main problems faced in growth of Securitization of instruments especially in Indian context:

1. Stamp Duty

Stamp Duty is one of the obstacle in India. Under Transfer of Property Act, 1882, a mortgage debt stamp duty which even goes upto 12% in some states of India and this impeded the growth of securitization in India. It should be noted that since pass through certificate does not evidence any debt only able to receivable, they are exempted from stamp duty. Moreover, in India, recognizing the special nature of securitized instruments in some states has reduced the stamp duty on them.

2. Taxation

Taxation is another area of concern in India. In the absence of any specific provision relating to securitized instruments in Income Tax Act experts' opinion differ a lot. Some are of opinion that SPV as a trustee is liable to be taxed in a representative capacity then others are of view that instead of SPV, investors will be taxed on their share of income. Clarity is also required on the issues of capital gain implications on passing payments to the investors.

3. Accounting

Accounting and reporting of securitized assets in the books of originator is another area of concern. Although securitization is slated to be an off-balance sheet instrument but in true sense receivables are removed from originator's balance sheet. Problem arises especially when assets are transferred without recourse.

4. Lack of standardization- Every originator following his own format for documentation and administration having lack of standardization is another obstacle in the growth of securitization.

5. Inadequate Debt Market

Lack of existence of a well-developed debt market in India is another obstacle that hinders the growth of secondary market of securitized or asset backed securities.

6. Ineffective Foreclosure laws

For many years efforts are on for effective foreclosure but still foreclosure laws are not supportive to lending institutions and this makes securitized instruments especially mortgaged backed securities less attractive as lenders face difficulty in transfer of property in event of default by the borrower.

2. DIFFERENTIATE between PTS and PTC.

Answer:

Difference between Pass Through Certificates (PTCs) and Pay Through Security (PTS) Pass Through Certificates (PTCs)

As the title suggests originator (seller of eh assets) transfers the entire receipt of cash in form of interest or principal repayment from the assets sold. Thus, these securities represent direct claim of the investors on all the assets that has been securitized through SPV Since all cash flows are transferred the investors carry proportional beneficial interest in the asset held in the trust by SPV.

It should be noted that since it is a direct route any prepayment of principal is also proportionately distributed among the securities holders. Further, due to these characteristics on completion of securitization by the final payment of assets, all the securities are terminated simultaneously. Skewness of cash flows occurs in early stage if principals are repaid before the scheduled time.

Pay Through Security (PTS)

As mentioned earlier, since, in PTCs all cash flows are passed to the performance of the securitized assets. To overcome this limitation and limitation to single mature there is another structure i.e. PTS.

In contrast to PTC in PTS, SPV debt securities backed by the assets and hence it can restructure different tranches from varying maturities of receivables.

In other words, this structure permits desynchronization of servicing of securities issued from cash flow generating from the asset. Further, this structure also permits the SPV to reinvest surplus funds for short term as per their requirement.

Since, in Pass Through, all cash flow immediately in PTS in case of early retirement of receivables plus cash can be used for short term yield. This structure also provides the freedom to issue several debt trances with varying maturities.

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Discuss briefly the steps involved in the Securitization mechanism.

OR

Explain the benefits of Securitization from the perspective of both originator as well as the investor

[MAY 2018 -4 MARKS | MTP- APRIL 2019 - 6 MARKS | MAY 2019 - 4 MARKS]

Answer:

The steps involved in securitization mechanism are as follows:

Creation of Pool of Assets: The process of securitization begins with creation of pool of assets by segregation of assets backed by similar type of mortgages in terms of interest rate, risk, maturity and concentration units.

Transfer to SPV: One assets have been pooled, they are transferred to Special Purpose Vehicle (SPV) especially created for this purpose.

Sale of Securitized Papers: SPV designs the instruments based on nature of interest, risk, tenure etc. based on pool of assets. These instruments can be Pass Through Security or Pay Through Certificates.

Administration of assets: The administration of assets in subcontracted back to originator which collects principal and interest from underlying assets and transfer it to SPV, which works as a conduct.

Recourse to Originator: Performance of securitized papers depends on the performance of underlying assets and unless specified in case of default they go back to originator from SPV.
Repayment of funds: SPV will repay the funds in form of interest and principal that arises from the assets pooled.
Credit Rating of Instruments: Sometime before the sale of securitized instruments credit rating can be done to assess the risk of the issuer.

OR

The benefits of securitization can be viewed from the angle of various parties involved as follows:
(A) From the angle of originator: Originator (entity which sells assets collectively to Special Purpose Vehicle) achieves the following benefits from securitization.
(i) Off – Balance Sheet Financing: When loan/receivables are securitized it release a portion of capital tied up in these assets resulting in off Balance Sheet financing leading to improved liquidity position which helps expanding the business of the company.
(ii) More specialization in main business: By transferring the assets the entity could concentrate more on core business as servicing of loan is transferred to SPV. Further, in case of non-recourse arrangement even the burden of default is shifted.
(iii) Helps to improve financial ratios: Especially in case of Financial Institutions and Banks, it helps to manage Capital –To-Weighted Asset Ratio effectively.
(iv) Reduced borrowing Cost: Since securitized papers are rated due to credit enhancement even they can also be issued at reduced rate as of debts and hence the originator earns a spread, resulting in reduced cost of borrowings.
(B) From the angle of investor: Following benefits accrues to the investors of securitized securities.
1. Diversification of Risk: Purchase of securities backed by different types of assets provides the diversification of portfolio resulting in reduction of risk.
2. Regulatory requirement: Acquisition of asset backed belonging to a particular industry say micro industry helps banks to meet regulatory requirement of investment of fund in industry specific.
3. Protection against default: In case of recourse arrangement if there is any default by any third party then originator shall make good the least amount. Moreover, there can be insurance arrangement for compensation for any such default.

2. Discuss about the Primary Participants in the process of Securitization
[NOV 2018 -4 MARKS | MTP - AUGUST 2018 -4 MARKS]
Answer:
Primary Participants are main parties to the process of securitization. The primary participants in the process of securitization are as follows:
(i) Originator: It is the initiator of deal or can be termed as securitizer. It is an entity which sells the assets lying in its books and receives the funds generated through the sale of such assets. The originator transfers both legal as well as beneficial interest to the Special Purpose Vehicle.
(ii) Special Purpose Vehicle: Also, called SPV, it is created for the purpose of executing the deal. Since issuer originator transfers all rights in assets to SPV, it holds the legal title of these assets. It is created especially for the purpose of securitization only and normally could be in form of a company, a firm, a society or a trust. The main objective of creating SPV is to remove the asset from the Balance Sheet of Originator.

Since, SPV makes an upfront payment to the originator, it holds the key position in the overall process of securitization. Further, it also issues the securities (called Asset Based Securities or Mortgage Based Securities) to the investors.

(iii) The Investors: Investors are the buyers of securitized papers which may be an individual, an institutional investor such as mutual funds, provident funds, insurance companies, Financial Institutions etc.

Since, they acquire a participating share in the total pool of assets/receivable, they receive their money back in the form of interest and principal as per the agreed terms.

3. Describe various securitization instruments.

[MTP - MARCH 2018 / APRIL 2019 - 5 MARKS / 6 MARKS]

Answer:

Securitization Instruments

On the basis of different maturity characteristics, the securitized instruments can be divided into following three categories:

(i) Pass Through Certificates (PTCs): As the title suggests originator (seller of the assets) transfers the entire receipt of cash in form of interest or principal repayment from the assets sold. Thus, these securities represent direct claim of the investors on all the assets that has been securitized through SPV.

Since all cash flows are transferred the investors carry proportional beneficial interest in the asset held in the trust by SPV.

It should be noted that since it is a direct route any prepayment of principal is also proportionately distributed among the securities holders. Further, due to these characteristics on completion of securitization by the final payment of assets, all the securities are terminated simultaneously.

Skewness of cash flows occurs in early stage if principals are repaid before the scheduled time.

(ii) Pay Through Security (PTS): As mentioned earlier, since, in PTCs all cash flows are passed to the performance of the securitized assets. To overcome this limitation and limitation to single mature there is another structure i.e. PTS. In contrast to PTC in PTS, SPV debt securities backed by the assets and hence it can restructure different tranches from varying maturities of receivables. In other words, this structure permits desynchronization of servicing of securities issued from cash flow generating from the asset. Further, this structure also permits the SPV to reinvest surplus funds for short term as per their requirement.

Since, in Pass Through, all cash flow immediately in PTS in case of early retirement of receivables plus cash can be used for short term yield. This structure also provides the freedom to issue several debt trances with varying maturities.

(iii) Stripped Securities: Stripped Securities are created by dividing the cash flows associated with underlying securities into two or more new securities. Those two securities are as follows:

(i) Interest Only (IO) Securities

(ii) Principle Only (PO) Securities

As each investor receives a combination of principal and interest, it can be stripped into two portions of Interest and Principle. Accordingly, the holder of IO securities receives only interest while PO security holder receives only principal. Being highly volatile in nature these securities are less preferred by investors. In case yield to maturity in market rises, PO price tends to fall as borrower prefers to postpone the payment on cheaper loans. Whereas if interest rate in market falls, the borrower tends to repay the loans as they prefer to borrow fresh at lower rate of interest. In contrast, value of IO's securities increases when interest rate goes up in the market as more interest is calculated on borrowings. However, when interest rate due to prepayments

of principals, IO's tends to fall. Thus, from the above, it is clear that it is mainly perception of investors that determines the prices of IOs and POs.

4. Explain the features of 'Securitization'.
[MTP - AUGUST 2018 - 4 MARKS]
Answer:
The securitization has the following features:
(i) Creation of Financial Instruments – The process of securities can be viewed as process of creation of additional financial product of securities in market backed by collaterals.
(ii) Bundling and Unbundling – When all the assets are combined in one pool it is bundling and when these are broken into instruments of fixed denomination it is unbundling.
(iii) Tool of Risk Management – In case of assets are securitized on non-recourse basis, then securitization process acts as risk management as the risk of default is shifted.
(iv) Structured Finance – In the process of securitization, financial instruments are tailor structured to meet the risk return trade of profile of investor, and hence, these securitized instruments are considered as best examples of structured finance.
(v) Trenching – Portfolio of different receivable or loan or asset are split into several parts based on risk and return they carry called 'Trenche'. Each Trench carries a different level of risk and return.
(vi) Homogeneity – Under each trenche the securities are issued of homogenous nature and even meant for small investors the who can afford to invest in small amounts.

5. Calculate the value of share from the following information:

Profit of the company	**Rs. 290 crores**
Equity capital of company	**Rs. 1,300 crores**
Par value of share	**Rs. 40 each**
Debt ratio of company (Debt/ Debt + Equity)	**27%**
Long run growth rate of the company	**8%**
Beta 0.1; risk free interest rate	**8.7%**
Market returns	**10.3%**
Capital expenditure per share	**Rs. 47**
Depreciation per share	**Rs. 39**
Change in Working capital	**Rs. 3.45 per share**

[MTP - AUGUST 2018 - 4 MARKS | RTP - MAY 2020]
Answer:

$$\text{No. of Shares} = \frac{\text{Rs. 1,300 crores}}{\text{Rs. 40}} = 32.5 \text{ Crores}$$

$$\text{EPS} = \frac{\text{PAT}}{\text{No.of shares}}$$

$$\text{EPS} = \frac{₹\ 290 \text{crores}}{32.5 \text{crores}} = \text{Rs. } 8.923$$

FCFE = Net income – [(1-b) (capex – dep) + (1-b) (ΔWC)]

FCFE = 8.923 – [(1-0.27) (47-39) + (1-0.27) (3.45)]

= 8.923 – [5.84 + 2.5185] = 0.5645

Cost of Equity = R_f + ß (R_m – R_f)

= 8.7 + 0.1 (10.3 – 8.7) = 8.86%

$$Po = \frac{FCFE(1+g)}{K_e - g} = \frac{0.5645(1.08)}{0.0886 - .08} = \frac{0.60966}{0.0086} = \text{Rs. } 70.89$$

6. EXPLAIN securitization in India.
[MTP - AUGUST 2018 - 4 MARKS]

Answer: It is the Citi Bank who pioneered the concept of securitization in India by bundling of auto loans in securitized instruments. Thereafter many organizations securitized their receivables. Although started with securitization of auto loans it moved to other types of receivables such as sales tax deferrals, aircraft receivable etc. In order to encourage securitization, the Government has come out with Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act, 2002, to tackle menace of Non-Performing Assets (NPAs) without approaching to Court. With growing sophistication of financial products in Indian Capital Market, securitization has occupied an important place. As mentioned above, though, initially started with auto loan receivables, it has become an important source of funding for micro finance companies and NBFCs and even now a days commercial mortgage backed securities are also emerging. The important highlight of the scenario of securitization in Indian Market is that it is dominated by a few players e.g. ICICI Bank, HDFC Bank, NHB etc.
As per a report of CRISIL, securitization transactions in India scored to the highest level of approximately Rs. 70000 crores, in Financial Year 2016. (Business Line, 15th June, 2016) In order to further enhance the investor base in securitized.

7. Explain the pricing of the securitized Instruments
[MTP - MARCH 2019 - 4 MARKS]
Answer:
Pricing of the securitized Instruments
Pricing of securitized instruments in an important aspect of securitization. While pricing the instruments, it is important that it should be acceptable to both originators as well as to the investors. On the same basis pricing of securities can be divided into following two categories:s
From Originator's Angle

From originator's point of view, the instruments can be priced at a rate at which originator has to incur an outflow and if that outflow can be amortized over a period of time by investing the amount raised through securitization.

From Investor's Angle

From an investor's angle security price can be determined by discounting best estimate of expected future cash flows using rate of yield to maturity of a security of comparable security with respect to credit quality and average life of the securities. This yield can also be estimated by referring the yield curve available for marketable securities, though some adjustments is needed on account of spread points, because of credit quality of the securitized instruments.

8. Describe the concept of 'Stripped Securities'.
[MTP - MARCH 2019 - 4 MARKS]
Answer:

Stripped Securities

Stripped Securities are created by dividing the cash flows associated with underlying securities into two or more new securities. Those two securities are as follows:

(i) Interest Only (IO) Securities

(ii) Principle Only (PO) Securities

As each investor receives a combination of principal and interest, it can be stripped into two portion of Interest and Principle. Accordingly, the holder of IO securities receives only interest while PO security holder receives only principal. Being highly volatile in nature these securities are less preferred by investors.

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In contrast, value of IO's securities increases when interest rate goes up in the market as more interest is calculated on borrowings. However, when interest rate due to prepayments of principals, IO's tends to fall.

Thus, from the above, it is clear that it is mainly perception of investors that determines the prices of IOs and POs.

CHAPTER-7 MUTUAL FUNDS

QUESTIONS FROM STUDY MATERIAL

Theoretical Questions

1. Explain how to establish a Mutual Fund.

Answer:

Establishment of a Mutual Fund: A mutual fund is required to be registered with the Securities and Exchange Board of India (SEBI) before it can collect funds from the public. All mutual funds are governed by the same set of regulations and are subject to monitoring and inspections by the SEBI.

The Mutual Fund has to be established through the medium of a sponsor. A sponsor means anybody corporate who, acting alone or in combination with another body corporate, establishes a mutual fund after completing the formalities prescribed in the SEBI's Mutual Fund Regulations. The role of sponsor is akin to that of a promoter of a company, who provides the initial capital and appoints the trustees. The sponsor should be a body corporate in the business of financial services for a period not less than 5 years, be financially sound and be a fit party to act as sponsor in the eyes of SEBI.

The Mutual Fund has to be established as either a trustee company or a Trust, under the Indian Trust Act and the instrument of trust shall be in the form of a deed. The deed shall be executed by the sponsor in favour of the trustees named in the instrument of trust. The trust deed shall be duly registered under the provisions of the Indian Registration Act, 1908. The trust deed shall contain clauses specified in the Third Schedule of the Regulations.

An Asset Management Company, who holds an approval from SEBI, is to be appointed to manage the affairs of the Mutual Fund and it should operate the schemes of such fund. The Asset Management Company is set up as a limited liability company, with a minimum net worth of Rs. 10 crores.

The sponsor should contribute at least 40% to the networth of the Asset Management Company.

The Trustee should hold the property of the Mutual Fund in trust for the benefit of the unit holders. SEBI regulations require that at least two-thirds of the directors of the Trustee Company or board of trustees must be independent, that is, they should not be associated with the sponsors. Also, 50 per cent of the directors of AMC must be independent. The appointment of the AMC can be terminated by majority of the trustees or by 75% of the unit holders of the concerned scheme.

The AMC may charge the mutual fund with Investment Management and Advisory fees subject to prescribed ceiling. Additionally, the AMC may get the expenses on operation of the mutual fund reimbursed from the concerned scheme. The Mutual fund also appoints a custodian, holding valid certificate of registration issued by SEBI, to have custody of securities held by the mutual fund under different schemes. In case of dematerialized securities, this is done by Depository Participant. The custodian must be independent of the sponsor and the AMC.

2. What are the advantages of investing in Mutual Funds?

Answer:

(a) Professional Management: The funds are managed by skilled and professionally experienced managers with a back up of a Research team.
(b) Diversification: Mutual Funds offer diversification in portfolio which reduces the risk.
(c) Convenient Administration: There are no administrative risks of share transfer, as many of the Mutual Funds offer services in a demat form which save investor's time and delay.
(d) Higher Returns: Over a medium to long-term investment, investors always get higher returns in Mutual Funds as compared to other avenues of investment. This is already seen from excellent returns, Mutual Funds have provided in the last few years. However, investors are cautioned that such high returns riding on the IT boom should not be taken as regular returns and therefore one should look at the average returns provided by the Mutual Funds particularly in the equity schemes during the last couple of years.
(e) Low Cost of Management: No Mutual Fund can increase the cost beyond prescribed limits of 2.5% maximum and any extra cost of management is to be borne by the AMC.
(f) Liquidity: In all the open ended funds, liquidity is provided by direct sales / repurchase by the Mutual Fund and in case of close ended funds, the liquidity is provided by listing the units on the Stock Exchange.
(g) Transparency: The SEBI Regulations now compel all the Mutual Funds to disclose their portfolios on a half-yearly basis. However, many Mutual Funds disclose this on a quarterly or monthly basis to their investors. The NAVs are calculated on a daily basis in case of open ended funds and are now published through AMFI in the newspapers.
(h) Other Benefits: Mutual Funds provide regular withdrawal and systematic investment plans according to the need of the investors. The investors can also switch from one scheme to another without any load.
(i) Highly Regulated: Mutual Funds all over the world are highly regulated and in India all Mutual Funds are registered with SEBI and are strictly regulated as per the Mutual Fund Regulations which provide excellent investor protection.
(j) Economies of scale: The way mutual funds are structured gives it a natural advantage. The "pooled" money from a number of investors ensures that mutual funds enjoy economies of scale; it is cheaper compared to investing directly in the capital markets which involves higher charges. This also allows retail investors access to high entry level markets like real estate, and also there is a greater control over costs.
(k) Flexibility: There are a lot of features in a regular mutual fund scheme, which imparts flexibility to the scheme. An investor can opt for Systematic Investment Plan (SIP), Systematic Withdrawal Plan etc. to plan his cash flow requirements as per his convenience. The wide range of schemes being launched in India by different mutual funds also provides an added flexibility to the investor to plan his portfolio accordingly.

Practical Questions

1. Mr. A can earn a return of 16 per cent by investing in equity shares on his own. Now he is considering a recently announced equity based mutual fund scheme in which initial expenses are 5.5 per cent and annual recurring expenses are 1.5 per cent. How much should the mutual fund earn to provide Mr. A return of 16 per cent?
Answer:-

Personal earnings of Mr. A = R_1 = 16%

Mutual Fund earnings = R_2

$$R_2 = \frac{1}{1 - \text{Initial expenses}(\%)} R_1 + \text{Recurring expenses}(\%)$$

$$= \frac{1}{1-0.055} \times 16\% + 1.5\%$$

= 18.43%

Mutual Fund earnings = 18.43%

2. The unit price of Equity Linked Savings Scheme (ELSS) of a mutual fund is Rs. 10/-. The public offer price (POP) of the unit is Rs. 10.204 and the redemption price is Rs. 9.80.
Calculate:
(i) Front-end Load
(ii) Back end Load
Answer:

Public Offer Price = NAV/ (1 – Front end Load)

Public Offer Price: ₹ 10.204 and NAV: ₹ 10

Accordingly,

10.204 = 10/(1 – F)

F = 0.0199 say 2%

Redemption Price = NAV/ (1 – Back End Load)

₹ 9.80 = 10/ (1 – Back End Load)

B = 0.0204 i.e. 2.04%

Alternative

(i) Front End Load = $\frac{10.204 - 10.00}{10.00}$ = 0.0204 or 2.04%

(ii) Exit Load = $\frac{10.00 - 9.80}{10.00}$ = 0.020 or 2.00%

3. A mutual fund that had a net asset value of Rs. 20 at the beginning of month - made income and capital gain distribution of Rs. 0.0375 and Rs. 0.03 per share respectively during the month, and then ended the month with a net asset value of Rs. 20.06. Calculate monthly return.
Answer:

Calculation of Monthly Return on the Mutual Funds

$$r = \left[\frac{(NAV_t - NAV_{t-1}) + I_t + G_t}{NAV_{t-1}}\right]$$

Where,

r = Return on the mutual fund

NAV_t = Net assets value at time period t

NAV_{t-1} = Net assets value at time period t – 1

I_t = Income at time period t

G_t = Capital gain distribution at time period t

$$= \left[\frac{(₹\ 20.06 - ₹\ 20.00) + (₹\ 0.0375 + ₹\ 0.03)}{20}\right]$$

$$= \frac{0.06 + 0.0675}{20}$$

$$= \frac{0.1275}{20} = 0.006375$$

Or, $r = 0.6375\%$ p.m.

Or = 7.65% p.a.

4. An investor purchased 300 units of a Mutual Fund at Rs. 12.25 per unit on 31st December, 2009. As on 31st December, 2010 he has received Rs. 1.25 as dividend and Rs. 1.00 as capital gains distribution per unit.
Required :
(i) The return on the investment if the NAV as on 31st December, 2010 is Rs. 13.00.
(ii) The return on the investment as on 31st December, 2010 if all dividends and capital gains distributions are reinvested into additional units of the fund at Rs. 12.50 per unit. [ALSO IN MTP - OCT 2019 - 8 MARKS]
Answer:-

Return for the year (all changes on a per year basis)

Particulars	₹ /Unit
Change in price (₹ 13.00 – ₹ 12.25)	0.75
Dividend received	1.25
Capital gain distribution	1.00
Total Return	3.00

Return on investment = $\frac{3.00}{12.25} \times 100 = 24.49\%$

Alternatively, it can also be computed as follows:

$$\frac{(NAV_1 - NAV_0) + D_1 + CG_1}{NAV_0} X 100$$

$$= \frac{(13 - 12.25) + 1.25 + 1.00}{12.25} X 100$$

= 24.49%

If all dividends and capital gain are reinvested into additional units at ₹ 12.50 per unit the position would be.

Total amount reinvested = ₹ 2.25 × 300 = ₹ 675

Additional units added = $\frac{₹\ 675}{12.50}$ = 54 units

Value of 354 units as on 31-12-2010 = ₹ 4,602

Price paid for 300 units on 31-12-2009 (300 × ₹ 12.25) = ₹ 3,675

Return = $\frac{₹\ 4,602 - ₹\ 3,675}{₹\ 3,675} = \frac{₹\ 927}{₹\ 3,675}$ = 25.22%

5. SBI mutual fund has a NAV of Rs. 8.50 at the beginning of the year. At the end of the year NAV increases to Rs. 9.10. Meanwhile fund distributes Rs. 0.90 as dividend and Rs. 0.75 as capital gains.
(i) What is the fund's return during the year?
(ii) Had these distributions been re-invested at an average NAV of Rs. 8.75 assuming 200 units were purchased originally. What is the return?

Answer:

(i) **Normal Return for the year (all changes on a per year basis)**

Particulars	₹ /Unit
Change in price (₹ 9.10 – ₹ 8.50)	0.60
Dividend received	0.90
Capital gain distribution	0.75
Total Return	2.25

Return on investment = $\frac{2.25}{8.50} \times 100 = 26.47\%$

(ii) If all dividends and capital gain are reinvested into additional units at ₹ 8.75 per unit the position would be.

Total amount reinvested = ₹ 1.65 × 200 = ₹ 330

Additional units added = $\frac{₹\,330}{8.75}$ = 37.71 units

Value of 237.71 units at end of year = ₹ 2,163.16

Price paid for 200 units in beginning of the year (200 × ₹ 8.50) = ₹ 1,700

Return = $\frac{₹\ 2,163.16 - ₹\ 1,700}{₹\,1,700} = \frac{₹\,463.16}{₹\,1,700} = 27.24\%$

6. The following information is extracted from Steady Mutual Fund's Scheme:
- Asset Value at the beginning of the month - Rs. 65.78
- Annualised return -15 %
- Distributions made in the nature of Income - Rs. 0.50 and Rs. 0.32 & Capital gain (per unit respectively).
You are required to:
(i) Calculate the month end net asset value of the mutual fund scheme (limit your answers to two decimals).
(ii) Provide a brief comment on the month end NAV.
Answer:

(i) Calculation of NAV at the end of month:

Given Annual Return = 15%

Hence Monthly Return = 1.25% (r)

$$r = \frac{(NAV_t - NAV_{t-1}) + I_t + G_t}{NAV_{t-1}}$$

$$0.0125 = \frac{(NAV_t - ₹\ 65.78) + ₹\ 0.50 + ₹\ 0.32}{₹\ 65.78}$$

$0.82 = NAV_t - ₹\ 64.96$

$NAV_t = ₹\ 65.78$

(ii) There is no change in NAV.

7. Cinderella Mutual Fund has the following assets in Scheme Rudolf at the close of business on 31stMarch,2014.

Company	No. of Shares	Market Price Per Share
Nairobi Ltd.	25000	₹ 20
Dakar Ltd.	35000	₹ 300
Senegal Ltd.	29000	₹ 380
Cairo Ltd.	40000	₹ 500

The total number of units of Scheme Rudol fare 10 lacs. The Scheme Rudolf has accrued expenses of Rs. 2,50,000 and other liabilities of Rs. 2,00,000. Calculate the NAV per unit of the Scheme Rudolf.
Answer:

Shares	No. of shares	Price	Amount (₹)
Nairobi Ltd.	25,000	20.00	5,00,000
Dakar Ltd.	35,000	300.00	1,05,00,000
Senegal Ltd.	29,000	380.00	1,10,20,000
Cairo Ltd.	40,000	500.00	2,00,00,000
			4,20,20,000
Less: Accrued Expenses			2,50,000
Other Liabilities			2,00,000
Total Value			4,15,70,000
No. of Units			10,00,000
NAV per Unit (4,15,70,000/10,00,000)			41.57

8. A Mutual Fund Co. has the following assets under it on the close of business as on:

Company	No. of Shares	1st February 2012 Market price per share ₹	2nd February 2012 Market price per share ₹
L Ltd	20,000	20.00	20.50
M Ltd	30,000	312.40	360.00
N Ltd	20,000	361.20	383.10
P Ltd	60,000	505.10	503.90

Total No. of Units 6,00,000
(i) Calculate Net Assets Value (NAV) of the Fund.
(ii) Following information is given:
Assuming one Mr. A, submits a cheque of Rs. 30,00,000 to the Mutual Fund and the Fund manager of this company purchases 8,000 shares of M Ltd; and the balance amount is held in Bank. In such a case, what would be the position of the Fund?
(iii) Find new NAV of the Fund as on 2nd February 2012.

Answer:

(i) **NAV of the Fund**

$$= \frac{₹\ 4,00,000 + ₹\ 93,72,000 + ₹\ 72,24,000 + ₹\ 3,03,06,000}{6,00,000}$$

$$= \frac{₹\ 4,73,02,000}{6,00,000} = ₹\ 78.8366 \text{ rounded to } ₹\ 78.84$$

(ii) **The revised position of fund shall be as follows:**

Shares	No. of shares	Price	Amount (₹)
L Ltd.	20,000	20.00	4,00,000
M Ltd.	38,000	312.40	1,18,71,200
N Ltd.	20,000	361.20	72,24,000
P Ltd.	60,000	505.10	3,03,06,000
Cash			5,00,800
			5,03,02,000

$$\text{No. of units of fund} = 6,00,000 + \frac{30,00,000}{78.8366} = 6,38,053$$

(iii) **On 2nd February 2012, the NAV of fund will be as follows:**

Shares	No. of shares	Price	Amount (₹)
L Ltd.	20,000	20.50	4,10,000
M Ltd.	38,000	360.00	1,36,80,000
N Ltd.	20,000	383.10	76,62,000
P Ltd.	60,000	503.90	3,02,34,000
Cash			5,00,800
			5,24,86,800

$$\text{NAV as on 2nd February 2012} = \frac{₹\ 5,24,86,800}{6,38,053} = ₹\ 82.26 \text{ per unit}$$

9. On 1st April 2009 Fair Return Mutual Fund has the following assets and prices at 4.00 p.m.

Shares	No. of Shares	Market Price Per Share (₹)
A Ltd.	10000	19.70
B Ltd.	50000	482.60
C Ltd.	10000	264.40
D Ltd.	100000	674.90
E Ltd.	30000	25.90
No. of units of funds		8,00,000

Please calculate:

(a) NAV of the Fund on 1st April 2009.

(b) Assuming that on 1st April 2009, Mr. X, a HNI, send a cheque of Rs. 50,00,000 to the Fund and Fund Manager immediately purchases 18000 shares of C Ltd. and balance is held in bank. Then what will be position of fund.

(c) Now suppose on 2 April 2009 at 4.00 p.m. the market price of shares is as follows:

Shares	Rs.
A Ltd.	20.30
B Ltd.	513.70
C Ltd.	290.80
D Ltd.	671.90
E Ltd.	44.20

Then what will be new NAV. [ALSO IN RTP -INI NOV 2019]

Answer:

(a) NAV of the Fund.

$$= \frac{₹\,1,97,000 + ₹\,2,41,30,000 + ₹\,26,44,000 + ₹\,6,74,90,000 + ₹\,7,77,000}{800000}$$

$$= \frac{₹\,9,52,38,000}{800000} = ₹\ 119.0475 \text{ rounded to } ₹\ 119.05$$

(b) The revised position of fund shall be as follows:

Shares	No. of shares	Price	Amount (Rs.)
A Ltd.	10000	19.70	1,97,000
B Ltd.	50000	482.60	2,41,30,000
C Ltd.	28000	264.40	74,03,200
D Ltd.	100000	674.90	674,90,000
E Ltd.	30000	25.90	7,77,000
Cash			2,40,800
			10,02,38,000

$$\text{No. of units of fund} = 800000 + \frac{5000000}{119.0475} = 842000$$

(c) **On 2nd April 2009, the NAV of fund will be as follows:**

Shares	No. of shares	Price	Amount (₹)
A Ltd.	10000	20.30	2,03,000
B Ltd.	50000	513.70	2,56,85,000
C Ltd.	28000	290.80	81,42,400
D Ltd.	100000	671.90	6,71,90,000
E Ltd.	30000	44.20	13,26,000
Cash			2,40,800
			10,27,87,200

$$\text{NAV as on 2nd April 2009} = \frac{₹\,10,27,87,200}{842000} = ₹\ 122.075 \text{ per unit}$$

10. A has invested in three Mutual Fund Schemes as per details below:

Particulars	MF A	MF B	MF C
Date of investment	01.12.2009	01.01.2010	01.03.2010
Amount of investment	₹ 50,000	₹ 1,00,000	₹ 50,000
Net Asset Value (NAV) at entry date	₹ 10.50	₹ 10	₹ 10
Dividend received upto 31.03.2010	₹ 950	₹ 1,500	Nil
NAV as at 31.03.2010	₹ 10.40	₹ 10.10	₹ 9.80

Required:

What is the effective yield on per annum basis in respect of each of the three schemes to Mr. A upto 31.03.2010?

Answer:

Scheme	*Investment*	*Unit Nos. (Investment/NAV at entry date)*	*Unit NAV 31.3.2010*	*Total NAV 31.3.2010 (Unit Nos. X Unit NAV as on 31.3.2010)*
	₹		₹	₹
MF A	50,000	4761.905	10.40	49,523.812
MF B	1,00,000	10,000	10.10	1,01,000
MF C	50,000	5,000	9.80	49,000

Scheme	*NAV (+) / (–) (NAV as on 31.3.2010 –Investment)*	*Dividend Received*	*Total Yield Change in NAV +Dividend*	*Number of days*	*Effective Yield (% P.A.) (Total Yield/ Investment) X (365/No. of days) X 100*
	₹	₹	₹		
MF A	(–)476.188	950	473.812	121	2.858%
MF B	(+)1,000	1,500	2,500	90	10.139%
MF C	(–)1,000	Nil	(–)1,000	31	(–)24%

11. Mr. Sinha has invested in three Mutual fund schemes as per details below:

	Scheme X	Scheme Y	Scheme Z
Date of Investment	01.12.2008	01.01.2009	01.03.2009
Amount of Investment	₹ 5,00,000	₹ 1,00,000	₹ 50,000
Net Asset Value at entry date	₹ 10.50	₹ 10.00	₹ 10.00
Dividend received upto 31.03.2009	₹ 9,500	₹ 1,500	Nil
NAV as at 31.3.2009	₹ 10.40	₹ 10.10	₹ 9.80

You are required to calculate the effective yield on per annum basis in respect of each of the three schemes to Mr. Sinha upto 31.03.2009.

Answer:

Calculation of effective yield on per annum basis in respect of three mutual fund schemes to Mr. Sinha up to 31-03-2009:

Particulars	MF X	MF Y	MF Z
(a) Investments	₹ 5,00,000	₹ 1,00,000	₹ 50,000
(b) Opening NAV	₹10.50	₹10.00	₹10.00
(c) No. of units (a/b)	47,619.05	10,000	5,000
(d) Unit NAV ON 31-3-2009	₹ 10.40	₹ 10.10	₹ 9.80
(e) Total NAV on 31-3-2009 (c x d)	₹ 4,95,238.12	₹ 1,01,000	₹ 49,000
(f) Increase / Decrease of NAV (e - a)	(₹ 4,761.88)	₹ 1,000	(₹ 1,000)
(g) Dividend Received	₹ 9,500	₹ 1,500	Nil
(h) Total yield (f + g)	₹ 4,738.12	₹ 2,500	(₹ 1,000)
(i) Number of Days	121	90	31
(j) Effective yield p.a. (h/a x 365/i x 100)	2.859%	10.139%	(-) 23.55%

12. Mr. Y has invested in the three mutual funds (MF) as per the following details:

Particulars	MF 'X'	MF 'Y'	MF 'Z'
Amount of Investment (₹)	2,00,000	4,00,000	2,00,000
Net Assets Value (NAV) at the time of purchase (₹)	10.30	10.10	10
Dividend Received up to 31.03.2018 (₹)	6,000	0	5,000
NAV as on 31.03.2018 (₹)	10.25	10	10.20
Effective Yield per annum as on 31.03.2018 (percent)	9.66	-11.66	24.15

Assume 1 Year =365 days

Mr. Y has misplaced the documents of his investment. Help him in finding the date of his original investment after ascertaining the following:

(i) Number of units in each scheme;
(ii) Total NAV;
(iii) Total Yield; and
(iv) Number of days investment held.(ALSO IN MTP OCT 2020)

Answer:

(i) Number of Units in each Scheme

MF 'X'	₹ 2,00,000 / ₹ 10.30	= 19,417.48
MF 'Y'	₹ 4,00,000 / ₹ 10.10	= 39,603.96
MF 'Z'	₹ 2,00,000 / ₹ 10.00	= 20,000.00

(ii) Total NAV on 31.03.2018

MF 'X'	= 19,417.48 x ₹ 10.25	₹ 1,99,029.17
MF 'Y'	= 39,603.96 x ₹ 10.00	₹ 3,96,039.60
MF 'Z'	= 20,000.00 x ₹ 10.20	₹ 2,04,000.00
Total		₹ 7,99,068.77

(iii) Total Yield

	Capital Yield	Dividend Yield	Total
MF 'X'	₹ 1,99,029.17- ₹ 2,00,000 = - ₹ 970.83	₹ 6,000	₹ 5,029.17
MF 'Y'	₹ 3,96,039.60 - ₹ 4,00,000 = - ₹ 3,960.40	Nil	- ₹ 3,960.40
MF 'Z'	₹ 2,04,000 - ₹ 2,00,000 = ₹ 4,000	₹ 5,000	₹ 9,000.00
Total			₹ 10,068.77

$$\text{Total Yield} = \frac{₹10,068.77}{₹\ 8,00,000} \times 100 = 1.2586\%$$

(iv) No. of Days Investment Held

	MF 'X'	MF 'Y'	MF 'Z'
Let No. of days be	X	Y	Z
Initial Investment (₹)	2,00,000	4,00,000	2,00,000
Yield (₹)	5,029.17	-3,960.40	9,000.00
Yield (%)	2.5146	- 0.9901	4.5
Period of Holding (Days)	$\frac{2.5146}{9.66} \times 365$ = 95 Days	$\frac{-0.9901}{-11.66} \times 365$ = 31 Days	$\frac{4.5}{24.15} \times 365$ = 68 Days
Date of Original Investment	26.12.17	28.02.18	22.01.18

13. Mr. X on 1.7.2007, during the initial offer of some Mutual Fund invested in 10,000 units having face value of Rs. 10 for each unit. On 31.3.2008, the dividend paid by the M.F. was 10% and Mr. X found that his annualized yield was 153.33%. On 31.12.2009, 20% dividend was given. On 31.3.2010, Mr. X redeemed all his balance of 11,296.11 units when his annualized yield was 73.52%. What are the NAVs as on 31.3.2008, 31.3.2009 and 31.3.2010?

Answer:

Yield for 9 months = (153.33 x 9/12) = 115%

Market value of Investments as on 31.03.2008 = 1,00,000/- + (1,00,000x 115%)

= ₹2,15,000/-

Therefore, NAV as on 31.03.2008 = (2,15,000-10,000)/10,000= ₹20.50

(NAV would stand reduced to the extent of dividend payout, being (10,000x10x10%) = ₹10,000)

Since dividend was reinvested by Mr. X, additional units acquired = $\frac{₹10,000}{₹\ 20.50}$ = 487.80 units

Therefore, units as on 31.03.2008 = 10, 000+ 487.80 = 10,487.80

[Alternately, units as on 31.03.2008 = (2,15,000/20.50) = 10,487.80]

Dividend as on 31.03.2009 = 10,487.80 x 10 x 0.2 = ₹20,975.60

Let X be the NAV on 31.03.2009, then number of new units reinvested will be ₹ 20,975.60/X. Accordingly 11296.11 units shall consist of reinvested units and 10487.80 (as on 31.03.2008). Thus, by way of equation it can be shown as follows:

$$11296.11 = \frac{20975.60}{X} + 10487.80$$

Therefore, NAV as on 31.03.2009 = 20,975.60/(11,296.11- 10,487.80)

= ₹25.95

NAV as on 31.03.2010 = ₹ 1,00,000 (1+0.7352x33/12)/11296.11

= ₹ 26.75

14. Mr. X on 1.7.2012, during the initial public offer of a Mutual Fund (MF) invested Rs. 1,00,000 at Face Value of Rs. 10. On 31.3.2013, the MF declared a dividend of 10% when Mr. X calculated that his holding period return was 115%. On 31.3.2014, MF again declared a dividend of 20%. On 31.3.2015, Mr. X redeemed all his investment which had accumulated to 11,296.11 units when his holding period return was 202.17%. Calculate the NAVs as on 31.03.2013, 31.03.2014 and 31.03.2015.

Answer:

Yield for 9 months	= 115%
Market value of Investments as on 31.03.2013	= 1,00,000/- + (1,00,000x 115%)
	= ₹ 2,15,000/-
Therefore, NAV as on 31.03.2013	= (2,15,000 -10,000)/10,000 = ₹ 20.50
(NAV would stand reduced to the extent of dividend payout, being (₹100,000 x 10%)	
	= ₹ 10,000)

Since dividend was reinvested by Mr. X, additional units acquired

$$= \frac{₹\ 10,000}{₹\ 20.50} = 487.80 \text{ units}$$

Therefore, units as on 31.03.2013	= 10,000+ 487.80 = 10,487.80
[Alternately, units as on 31.03.2013	= (2,15,000/20.50) = 10,487.80]
Dividend as on 31.03.2014	= 10,487.80 x 10 x 0.2 = ₹ 20,975.60

Let X be the NAV on 31.03.2014, then number of new units reinvested will be ₹ 20,975.60/X. Accordingly 11296.11 units shall consist of reinvested units and 10487.80 (as on 31.03.2013). Thus, by way of equation it can be shown as follows:

$$11296.11 = \frac{20975.60}{X} + 10487.80$$

Therefore, NAV as on 31.03.2014	= 20,975.60/(11,296.11- 10,487.80)
	= ₹ 25.95
NAV as on 31.03.2015	= ₹ 1,00,000 (1+2.0217)/11296.11
	= ₹ 26.75

15. A Mutual Fund having 300 units has shown its NAV of Rs. 8.75 and Rs. 9.45 at the beginning and at the end of the year respectively. The Mutual Fund has given two options:
(i) Pay Rs. 0.75 per unit as dividend and Rs. 0.60 per unit as a capital gain, or
(ii) These distributions are to be reinvested at an average NAV of Rs. 8.65 per unit.
What difference it would make in terms of return available and which option is preferable?
[ALSO IN NOV 2018 - 8 MARKS | MTP - MARCH 2018 - 8 MARKS]
Answer:

(i) Returns for the year

(All changes on a Per -Unit Basis)

Change in Price:	₹ 9.45 – ₹8.75 = ₹ 0.70
Dividends received:	₹ 0.75
Capital gains distribution	₹ 0.60
Total reward	₹ 2.05

Holding period reward: $\frac{₹2.05}{₹8.75} \times 100 = 23.43\%$

(ii) When all dividends and capital gains distributions are re-invested into additional units of the fund @ (₹ 8.65/unit)

Dividend + Capital Gains per unit

= ₹ 0.75 + ₹ 0.60 = ₹ 1.35

Total received from 300 units = ₹1.35 x 300 = ₹405/-.

Additional Units Acquired

= ₹405/₹8.65 = 46.82 Units.

Total No.of Units_ = 300 units + 46.82 units = 346.82 units.

Value of 346.82 units held at the end of the year

= 346.82 units x ₹9.45 = ₹3277.45

Price Paid for 300 Units at the beginning of the year

= 300 units x ₹8.75 = ₹2,625.00

Holding Period Reward

₹ (3277.45 – 2625.00) = ₹652.45

Holding Period Reward = $\frac{₹652.45}{₹2625.00} \times 100 = 24.85\%$

Conclusion: Since the holding period reward is more in terms of percentage in option-two i.e., reinvestment of distributions at an average NAV of ₹8.65 per unit, this option is preferable.

16. On 1-4-2012 ABC Mutual Fund issued 20 lakh units at Rs. 10 per unit. Relevant initial expenses involved were Rs. 12 lakhs. It invested the fund so raised in capital market instruments to build a portfolio of Rs. 185 lakhs. During the month of April 2012 it disposed off some of the instruments costing Rs. 60 lakhs for Rs. 63 lakhs and used the proceeds in purchasing securities for Rs. 56 lakhs. Fund management expenses for the month of April 2012 was Rs. 8 lakhs of which 10% was in arrears. In April 2012 the fund earned dividends amounting to Rs. 2 lakhs and it distributed 80% of the realized earnings. On 30-4-2012 the market value of the portfolio was Rs. 198 lakhs.

Mr. Akash, an investor, subscribed to 100 units on 1-4-2012 and disposed off the same at closing NAV on 30-4-2012. What was his annual rate of earning?

Answer:

	Amount in ₹ lakhs	Amount in ₹ lakhs	Amount in ₹ lakhs
Opening Bank (200 - 185 -12)	3.00		
Add: Proceeds from sale of securities	63.00		
Add: Dividend received	2.00	68.00	
Deduct:			
Cost of securities purchased	56.00		
Fund management expenses paid (90% of 8)	7.20		
Capital gains distributed = 80% of (63 – 60)	2.40		
Dividend distributed =80% of 2.00	1.60	67.20	
Closing Bank			0.80
Closing market value of portfolio			198.00
			198.80
Less: Arrears of expenses			0.80
Closing Net Assets			198.00
Number of units (Lakhs)			20
Closing NAV per unit (198.00/20)			9.90

Rate of Earning (Per Unit)

	Amount
Income received (₹ 2.40 + ₹ 1.60)/20	₹ 0.20
Loss: Loss on disposal (₹ 200 - ₹ 198)/20	₹ 0.10
Net earning	₹ 0.10
Initial investment	₹ 10.00
Rate of earning (monthly)	1%
Rate of earning (Annual)	12%

17. Sun Moon Mutual Fund (Approved Mutual Fund) sponsored open-ended equity oriented scheme "Chanakya Opportunity Fund". There were three plans viz. 'A' – Dividend Re-investment Plan, 'B' – Bonus Plan & 'C' – Growth Plan.
At the time of Initial Public Offer on 1.4.1999, Mr. Anand, Mr. Bacchan & Mrs. Charu, three investors invested Rs. 1,00,000 each & chosen 'B', 'C' & 'A' Plan respectively.
The History of the Fund is as follows:

Date	Dividend %	Bonus Ratio	Net Asset Value per Unit (F.V. ₹ 10)		
			Plan A	Plan B	Plan C
28.07.2003	20		30.70	31.40	33.42
31.03.2004	70	5 : 4	58.42	31.05	70.05
31.10.2007	40		42.18	25.02	56.15
15.03.2008	25		46.45	29.10	64.28
31.03.2008		1 : 3	42.18	20.05	60.12
24.03.2009	40	1 : 4	48.10	19.95	72.40
31.07.2009			53.75	22.98	82.07

On 31st July all three investors redeemed all the balance units.
Calculate annual rate of return to each of the investors.
Consider:
1. Long-term Capital Gain is exempt from Income tax.
2. Short-term Capital Gain is subject to 10% Income tax.
3. Security Transaction Tax 0.2 per cent only on sale/redemption of units.
4. Ignore Education Cess. [ALSO IN RTP - MAY 2018]
Answer:

Mrs. Charu Plan A Dividend Reinvestment

(Amount in ₹)

Date	*Investment*	*Dividend payout (%)*	*Dividend Re-invested (Closing Units X Face value of '10 X Dividend Payout %)*	*NAV*	*Units*	*Closing Unit Balance ∑ Units*
01.04.1999	1,00,000.00			10.00	10,000.00	10,000.00
28.07.2003		*20*	20,000.00	30.70	651.47	10,651.47
31.03.2004		*70*	74,560.29	58.42	1,276.28	11,927.75
30.10.2007		*40*	47,711.00	42.18	1,131.13	13,058.88
15.03.2008		*25*	32,647.20	46.45	702.85	13,761.73
24.03.2009		40	55,046.92	48.10	1,144.43	14,906.16

Redemption value 14,906.16 × 53.75	8,01,206.10
Less: Security Transaction Tax (STT) is 0.2%	1,602.41
Net amount received	7,99,603.69
Less: Short term capital gain tax @ 10% on 1,144.43 (53.64* – 48.10≈) = 6,340	634
Net of tax	7,98,969.69
Less: Investment	1,00,000.00
	6,98,969.69

*(53.75 – STT @ 0.2%)

≈ This value can also be taken as zero

Annual average return (%) $\frac{6,98,969.69}{1,00,000} \times \frac{12}{124} \times 100 = 67.64\ \%$

Mr. Anand Plan B – Bonus

				(Amount in ₹)
Date	**Units**	**Bonus units**	**Total Balance**	**NAV per unit**
01.04.1999	10,000		10,000	10
31.03.2004		12,500	22,500	31.05
31.03.2008		7,500	30,000	20.05
24.03.2009		7,500	37,500	19.95

Redemption value 37,500 × 22.98	8,61,750.00
Less: Security Transaction Tax (STT) is 0.2%	1,723.50
Net amount received	8,60,026.50
Less: Short term capital gain tax @ 10%	
7,500 × (22.93† – 19.95) = 22,350	2,235.00
Net of tax	8,57,791.50
Less: Investment	1,00,000.00
Net gain	7,57,791.50

†(22.98 – STT @ 0.2%)

Annual average return (%) $\frac{7,57,791.50}{1,00,000} \times \frac{12}{124} \times 100 = 73.33\ \%$

Mr. Bacchan Plan C – Growth

Particulars	**(Amount in ₹)**
Redemption value 10,000 × 82.07	8,20,700.00
Less: Security Transaction Tax (S.T.T) is .2%	1,641.40
Net amount received	8,19,058.60
Less: Short term capital gain tax @ 10%	0.00
Net of tax	8,19,058.60
Less: Investment	1,00,000.00
Net gain	7,19,058.60

Annual average return (%) $\frac{7,19,058}{1,00,000} \times \frac{12}{124} \times 100 = 69.59\ \%$

Note: Alternatively, figure of * and † can be taken as without net of Tax because, as per Proviso 5 of Section 48 of IT Act, no deduction of STT shall be allowed in computation of Capital Gain.

18. A mutual fund company introduces two schemes i.e. Dividend plan (Plan-D) and Bonus plan (Plan-B). The face value of the unit is Rs. 10. On 1-4-2005 Mr. K invested Rs. 2,00,000 each in Plan-D and Plan-B when the NAV was Rs. 38.20 and Rs. 35.60 respectively. Both the plans matured on 31-3-2010.
Particulars of dividend and bonus declared over the period are as follows:

Date	Dividend %	Bonus Ratio	Net Asset Value (₹) Plan D	Plan B
30-09-2005	10		39.10	35.60
30-06-2006		1:5	41.15	36.25
31-03-2007	15		44.20	33.10
15-09-2008	13		45.05	37.25
30-10-2008		1:8	42.70	38.30
27-03-2009	16		44.80	39.10
11-04-2009		1:10	40.25	38.90
31-03-2010			40.40	39.70

What is the effective yield per annum in respect of the above two plans?
Answer:

Plan – D

$$\text{Unit acquired} = \frac{2,00,000}{38.20} = 5235.60$$

Date	Units held	Dividend %	Dividend Amount	Reinvestment Rate	New Units	Total Units
01.04.2005						5235.60
30.09.2005	5235.60	10	5235.60	39.10	133.90	5369.50
31.03.2007	5369.50	15	8054.25	44.20	182.22	5551.72
15.09.2008	5551.72	13	7217.24	45.05	160.20	5711.92
27.03.2009	5711.92	16	9139.07	44.80	204	5915.92
31.03.2010	Maturity Value		(₹ 40.40 X 5915.92)			₹ 2,39,003.17
	Less: Cost of Acquisition					₹ 2,00,000.00
	Total Gain					₹ 39,003.17

$$\therefore \text{Effective Yield} = \frac{₹39,003.17}{₹2,00,000} \times \frac{1}{5} \times 100 = 3.90\%$$

Alternatively, it can be computed by using the IRR method as follows:

NPV at 4% = -2,00,000 + 1,96,443 = -3,557

NPV at 2% = -2,00,000 + 2,16,473 = 16,473

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} (\text{HR} - \text{LR}) = 2\% + \frac{16473}{16473 - (-3557)} (4\% - 2\%) = 3.645\%$$

Plan – B

Date	Particulars	Calculation Working	No. of Units	NAV (₹)
1.4.05	Investment	₹2,00,000/35.60=	5617.98	35.60
30.6.06	Bonus	5617.98/5 =	1123.60	36.25
			6741.58	
30.10.08	"	6741.58/8 =	842.70	38.30
			7584.28	
11.4.09	"	7584.28/10 =	758.43	38.90
			8342.71	
31.3.10	Maturity Value	8342.71 x ₹ 39.70=		3,31,205.59
	Less: Investment			2,00,000.00
	Gain			1,31,205.59

$$\therefore \text{Effective Yield } \frac{1,31,205.59}{2,00,000} \times \frac{1}{5} \times 100 = 13.12\%$$

Alternatively, it can be computed by using the IRR method as follows:

NPV at 13% = -2,00,000 + 1,79,765 = -20,235

NPV at 8% = -2,00,000 + 2,25,413 = 25,413

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} (\text{HR} - \text{LR}) = 8\% + \frac{25413}{25413 - (-20235)} (13\% - 8\%) = 10.78\%$$

19. A mutual fund made an issue of 10,00,000 units of Rs. 10 each on January 01, 2008. No entry load was charged. It made the following investments:

Particulars	₹
50,000 Equity shares of ₹ 100 each @ ₹ 160	80,00,000
7% Government Securities	8,00,000
9% Debentures (Unlisted)	5,00,000
10% Debentures (Listed)	5,00,000
	98,00,000

During the year, dividends of Rs. 12,00,000 were received on equity shares. Interest on all types of debt securities was received as and when due. At the end of the year equity shares and 10% debentures are quoted at 175% and 90% respectively. Other investments are at par.
Find out the Net Asset Value (NAV) per unit given that operating expenses paid during the year amounted to Rs. 5,00,000. Also find out the NAV, if the Mutual fund had distributed a dividend of Rs. 0.80 per unit during the year to the unit holders.
Answer:

In order to find out the NAV, the cash balance at the end of the year is calculated as follows-

Particulars	₹
Cash balance in the beginning	
(₹ 100 lakhs – ₹ 98 lakhs)	2,00,000
Dividend Received	12,00,000
Interest on 7% Govt. Securities	56,000
Interest on 9% Debentures	45,000
Interest on 10% Debentures	50,000
	15,51,000
(-) Operating expenses	5,00,000
Net cash balance at the end	10,51,000
Calculation of NAV	₹
Cash Balance	10,51,000
7% Govt. Securities (at par)	8,00,000
50,000 equity shares @ ₹ 175 each	87,50,000
9% Debentures (Unlisted) at cost	5,00,000
10% Debentures @90%	4,50,000
Total Assets	1,15,51000
No. of Units	10,00,000
NAV per Unit	₹ 11.55

Calculation of NAV, if dividend of ₹ 0.80 is paid –

Net Assets (₹ 1,15,51,000 – ₹ 8,00,000)	₹ 1,07,51,000
No. of Units	10,00,000
NAV per unit	₹ 10.75

20. Based on the following information, determine the NAV of a regular income scheme on per unit basis:

Particulars	₹ Crores
Listed shares at Cost (ex-dividend)	20
Cash in hand	1.23
Bonds and debentures at cost	4.3
Of these, bonds not listed and quoted	1
Other fixed interest securities at cost	4.5
Dividend accrued	0.8
Amount payable on shares	6.32
Expenditure accrued	0.75
Number of units (₹ 10 face value)	20 lacs
Current realizable value of fixed income securities of face value of ₹ 100	106.5
The listed shares were purchased when Index was	1,000
Present index is	2,300
Value of listed bonds and debentures at NAV date	8

There has been a diminution of 20% in unlisted bonds and debentures. Other fixed interest securities are at cost.

Answer:

Particulars	Adjusted Values ₹ crores
Equity Shares	46.00
Cash in hand	1.23
Bonds and debentures not listed	0.80
Bonds and debentures listed	8.00
Dividends accrued	0.80
Fixed income securities	4.50
Sub total assets (A)	**61.33**
***Less:* Liabilities**	
Amount payable on shares	6.32
Expenditure accrued	0.75
Sub total liabilities (B)	**7.07**
Net Assets Value (A) – (B)	**54.26**
No. of units	20,00,000
Net Assets Value per unit (₹ 54.26 crore / 20,00,000)	₹ 271.30

21. On 1st April, an open ended scheme of mutual fund had 300 lakh units outstanding with Net Assets Value (NAV) of Rs. 18.75. At the end of April, it issued 6 lakh units at opening NAV plus 2% load, adjusted for dividend equalization. At the end of May, 3 Lakh units were repurchased at opening NAV less 2% exit load adjusted for dividend equalization. At the end of June, 70% of its available income was distributed.
In respect of April-June quarter, the following additional information are available:

	₹ in lakh
Portfolio value appreciation	425.47
Income of April	22.950
Income for May	34.425
Income for June	45.450

You are required to calculate
(i) Income available for distribution;
(ii) Issue price at the end of April;
(iii) repurchase price at the end of May; and
(iv) net asset value (NAV) as on 30th June. [ALSO IN MTP - AUGUST 2018 / APRIL 2019 - 10 MARKS / 8 MARKS]
Answer:

Calculation of Income available for Distribution

	Units (Lakh)	Per Unit (₹)	Total (₹ In lakh)
Income from April	300	0.0765	22.9500
Add: Dividend equalization collected on issue	6	0.0765	0.4590
	306	0.0765	23.4090
Add: Income from May		0.1125	34.4250
	306	0.1890	57.8340
Less: Dividend equalization paid on repurchase	3	0.1890	(0.5670)
	303	0.1890	57.2670
Add: Income from June		0.1500	45.4500
	303	0.3390	102.7170
Less: Dividend Paid		0.2373	(71.9019)
	303	0.1017	30.8151

Calculation of Issue Price at the end of April

	₹
Opening NAV	18.750
Add: Entry Load 2% of ₹ 18.750	(0.375)
	19.125
Add: Dividend Equalization paid on Issue Price	0.0765
	19.2015

Calculation of Repurchase Price at the end of May

	₹
Opening NAV	18.750
Less: Exit Load 2% of ₹ 18.750	(0.375)
	18.375
Add: Dividend Equalization paid on Issue Price	0.1890
	18.564

Closing NAV

		₹ (Lakh)
Opening Net Asset Value (₹ 18.75 × 300)		5625.0000
Portfolio Value Appreciation		425.4700
Issue of Fresh Units (6 × 19.2015)		115.2090
Income Received (22.950 + 34.425 + 45.450)		102.8250
		6268.504
Less: Units repurchased (3 × 18.564)	-55.692	
Income Distributed	-71.9019	(-127.5939)
Closing Net Asset Value		6140.9101
Closing Units (300 + 6 – 3) lakh		303 lakh
∴ Closing NAV as on 30th June		₹ 20.2670

22. Five portfolios experienced the following results during a 7- year period

Portfolio	Average Annual Return (R_p) (%)	Standard Deviation (S_p)	Correlation with the market returns (r)
A	19.0	2.5	0.840
B	15.0	2.0	0.540
C	15.0	0.8	0.975
D	17.5	2.0	0.750
E	17.1	1.8	0.600
Market Risk (σ_m)		1.2	
Market rate of Return (R_m)	14.0		
Risk-free Rate (R_f)	9.0		

Rank the portfolios using (a) Sharpe's method, (b) Treynor's method and (c) Jensen's Alpha
Answer:

Let portfolio standard deviation be σ_p

Market Standard Deviation = σ_m

Coefficient of correlation = r

Portfolio beta (β_p) = $\frac{\sigma_p r}{\sigma_m}$

Required portfolio return (R_p) = $R_f + \beta_p (R_m - R_f)$

Portfolio	*Beta*	*Return from the portfolio (R_p) (%)*
A	1.75	17.75
B	0.90	13.50
C	0.65	12.25
D	1.25	15.25
E	0.90	13.50

Portfolio	*Sharpe Method*		*Treynor Method*		*Jensen's Alpha*	
	Ratio	*Rank*	*Ratio*	*Rank*	*Ratio*	*Rank*
A	4.00	IV	5.71	V	1.25	V
B	3.00	V	6.67	IV	1.50	IV
C	7.50	I	9.23	I	2.75	II
D	4.25	III	6.80	III	2.25	III
E	4.50	II	9.00	II	3.60	I

23. There are two Mutual Funds viz. D Mutual Fund Ltd. and K Mutual Fund Ltd. Each having close ended equity schemes.
NAV as on 31-12-2014 of equity schemes of D Mutual Fund Ltd. is Rs. 70.71 (consisting 99% equity and remaining cash balance) and that of K Mutual Fund Ltd. is 62.50 (consisting 96% equity and balance in cash). Following is the other information:

Particular	Equity Schemes	
	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Sharpe Ratio	2	3.3
Treynor Ratio	15	15
Standard deviation	11.25	5

There is no change in portfolios during the next month and annual average cost is Rs. 3 per unit for the schemes of both the Mutual Funds. If Share Market goes down by 5% within a month, calculate expected NAV after a month for the schemes of both the Mutual Funds. For calculation, consider 12 months in a year and ignore number of days for particular month. [ALSO IN RTP - MAY 2019, RTP-NOV 2020]
Answer:

Working Notes:

(i) Decomposition of Funds in Equity and Cash Components

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
NAV on 31.12.14	₹ 70.71	₹ 62.50
% of Equity	99%	96%
Equity element in NAV	₹ 70	₹ 60
Cash element in NAV	₹ 0.71	₹ 2.50

(ii) Calculation of Beta

(a) D Mutual Fund Ltd.

$$\text{Sharpe Ratio} = 2 = \frac{E(R) - R_f}{\sigma_D} = \frac{E(R) - R_f}{11.25}$$

$$E(R) - R_f = 22.50$$

$$\text{Treynor Ratio} = 15 = \frac{E(R) - R_f}{\beta_D} = \frac{22.50}{\beta_D}$$

$$\beta_D = 22.50/15 = 1.50$$

(b) K Mutual Fund Ltd.

$$\text{Sharpe Ratio} = 3.3 = \frac{E(R) - R_f}{\sigma_K} = \frac{E(R) - R_f}{5}$$

$$E(R) - R_f = 16.50$$

$$\text{Treynor Ratio} = 15 = \frac{E(R) - R_f}{\beta_K} = \frac{16.50}{\beta_K}$$

$$\beta_K = 16.50/15 = 1.10$$

(iii) Decrease in the Value of Equity

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Market goes down by	5.00%	5.00%
Beta	1.50	1.10
Equity component goes down	7.50%	5.50%

(iv) Balance of Cash after 1 month

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Cash in Hand on 31.12.14	₹ 0.71	₹ 2.50
Less: Exp. Per month	₹ 0.25	₹ 0.25
Balance after 1 month	₹ 0.46	₹ 2.25

NAV after 1 month

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Value of Equity after 1 month		
70 x (1 - 0.075)	₹ 64.75	-
60 x (1 - 0.055)	-	₹ 56.70
Cash Balance	0.46	2.25
	65.21	58.95

24. ANP Plan, a hedge fund currently has assets of Rs. 20 crore. CA. X, the manager of fund charges fee of 0.10% of portfolio asset. In addition to it he charges incentive fee of 2%. The incentive will be linked to gross return each year in excess of the portfolio maximum value since the inception of fund. The maximum value the fund achieved so far since inception of fund about one and half year ago was Rs. 21 crores.

You are required to compute the fee payable to CA. X, if return on the fund this year turns out to be (a) 29%, (b) 4.5%, (c) -1.8%

Answer:

(a) If return is 29%

	₹
Fixed fee (A) 0.10% of ₹ 20 crore	2,00,000
New Fund Value (1.29 x ₹ 20 crore)	25.80 crore
Excess Value of best achieved (25.8 crore – 21.0 crore)	4.80 crore
Incentive Fee (2% of 4.80 crores) (B)	9,60,000
Total Fee (A)+(B)	11,60,000

(b) If return is 4.5%

	₹
Fixed (A) 0.10% of ₹ 20 crore	2,00,000
New Fund Value (1.045 x ₹ 20 crore)	20.90 crore
Excess Value of best achieved (20.90 crore –21.00 crore)	(₹ 0.10 crore)
Incentive Fee (as does not exceed best achieved) (B)	Nil
Total Fee (A)+(B)	2,00,000

(c) If return is (-1.8%)

No incentive only fixed fee of ₹ 2,00,000 will be paid

25. Ms. Sunidhi is working with an MNC at Mumbai. She is well versant with the portfolio management techniques and wants to test one of the techniques on an equity fund she has constructed and compare the gains and losses from the technique with those from a passive buy and hold strategy. The fund consists of equities only and the ending NAVs of the fund he constructed for the last 10 months are given below:

Month Ending	NAV (Rs./unit)	Month Ending	NAV (Rs./unit)
December 2008	40.00	May 2009	37.00
January 2009	25.00	June 2009	42.00
February 2009	36.00	July 2009	43.00
March 2009	32.00	August 2009	50.00
April 2009	38.00	September 2009	52.00

Assume Sunidhi had invested a notional amount of Rs. 2 lakhs equally in the equity fund and a conservative portfolio (of bonds) in the beginning of December 2008 and the total portfolio was being rebalanced each time the NAV of the fund increased or decreased by 15%.

You are required to determine the value of the portfolio for each level of NAV following the Constant Ratio Plan.

Answer:

Constant Ratio Plan:

Stock Portfolio NAV (₹)	Value of Conservative Portfolio (₹)	Value of aggressive Portfolio (₹)	Total value of Constant Ratio Plan (₹)	Revaluation Action	Total No. of units in aggressive portfolio
40.00	1,00,000	1,00,000	2,00,000	-	2500
25.00	1,00,000	62,500	1,62,500	-	2500
	81,250	81,250	1,62,500	Buy 750 units	3250
36.00	81,250	1,17,000	1,98,250	-	3250
	99,125	99,125	1,98,250	Sell 496.53 units	2753.47
32.00	99,125	88,111.04	1,87,236.04	-	2753.47
38.00	99,125	1,04,631.86	2,03,756.86	-	2753.47
	1,01,878.43	1,01,878.43	2,03,756.86	Sell 72.46 units	2681.01
37.00	1,01,878.50	99,197.37	2,01,075.87	-	2681.01
42.00	1,01,878.50	1,12,602.42	2,14,480.92	-	2681.01
43.00	1,01,878.50	1,15,283.43	2,17,161.93	-	2681.01
50.00	1,01,878.50	1,34,050.50	2,35,929	-	2681.01
	1,17,964.50	1,17,964.50	2,35,929	Sell 321.72 units	2359.29
52.00	1,17,964.50	1,22,683.08	2,40,647.58	-	2359.29

Hence, the ending value of the mechanical strategy is ₹ 2,40,647.58 and buy & hold strategy is ₹ 2,60,000.

PAST EXAMINATION, RTP, MTP QUESTIONS

1. A Mutual Fund Company introduces two schemes - Dividend Plan and Bonus Plan. The face value of the Unit is Rs.10 on 1-4-2014. Mr. R invested Rs. 5 lakh in Dividend Plan and Rs. 10 lakh in Bonus Plan. The NAV of Dividend Plan is Rs. 46 and NAV of Bonus Plan is Rs. 42. Both the plans matured on 31-03-2019. The particulars of Dividend and Bonus declared over the period are as follows:

Date	*Dividend %*	*Bonus Ratio*	*NAV of Dividend Plan*	*NAV of Bonus Plan*
			(₹)	*(₹)*
31-12-2014	*12%*	-	*47.0*	*42.0*
30-09-2015	-	*1 : 4*	*48.0*	*43.0*
31-03-2016	*15%*	-	*49.5*	*41.5*
30-09-2017	-	*1 : 6*	*50.0*	*44.0*
31-03-2018	*10%*	-	*48.0*	*43.5*
31-03-2019	-	-	*49.0*	*44.0*

You are required to calculate the effective yield per annum in respect of the above two plans. [MAY 2019 - 8 MARKS]

Answer:

Dividend Plan

Unit acquired = $\frac{5,00,000}{46}$ = 10869.57

Date	Units held	Dividend		Reinvestment	New	Total
		%	Amount	Rate	Units	Units
01.04.2014						10869.57
31.12.2014	10869.57	12	13043.48	47.0	277.52	11147.09
31.03.2016	11147.09	15	16720.64	49.5	337.79	11484.88
31.03.2018	11484.88	10	11484.88	48.0	239.27	11724.15
31.03.2019	Maturity Value (₹ 49.0 X 11724.15)					₹ 5,74,483.35
	Less: Cost of Acquisition					₹ 5,00,000.00
	Total Gain					₹ 74483.35

∴ Effective Yield = $\frac{₹\ 74,483.35}{₹\ 5,00,000} \times \frac{1}{5} \times 100$ = 2.98%

Bonus Plan

Units Acquired = $\frac{10,00,000}{42}$ = 23809.52

Date	Particulars	Calculation Working	No. of Units	NAV (₹)
1.4.14	Investment		23809.52	42
30.9.15	Bonus	23,809.52 / 4 =	5952.38	
			29761.90	43
30.9.17	"	29761.9 / 6 =	4960.32	
			34722.22	44
31.3.19	Maturity Value	34722.22 x ₹ 44 =		15,27,777.68
	Less: Investment			10,00,000.00
	Gain			5,27,777.68

∴ Effective Yield $\frac{5,27,777.68}{10,00,000} \times \frac{1}{5} \times 100$ = 10.56%

2. A Mutual Fund is holding the following assets in Rs. Crores :

Investments in diversified equity shares	90.00
Cash and Bank Balances	10.00
	100.00

The Beta of the portfolio is 1.1. The index future is selling at 4300 level. The Fund Manager apprehends that the index will fall at the most by 10%. Calculate the number of index futures he should short for perfect hedging. One index future consists of 50 units.

Evaluate your answer assuming the Fund Manager's apprehension will materialize.
[MTP - MARCH 2019 - 7 MARKS]
Answer:

Number of index future to be sold by the Fund Manager is:

$$\frac{1.1\times 90,00,00,000}{4,300\times 50} = 4,605$$

Justification of the answer:

Loss in the value of the portfolio if the index falls by 10% is Rs. $\frac{11}{100}$ x90 Crore = Rs. 9.90 Crore.

Gain by short covering of index future is: $\frac{0.1\times 4,300\times 50\times 4,605}{1,00,00,000}$ = 9.90 Crore

This justifies the answer. Further, cash is not a part of the portfolio.

3. Orange purchased 200 units of Oxygen Mutual Fund at Rs. 45 per unit on 31st December, 2009. In 2010, he received Rs. 1.00 as dividend per unit and a capital gains distribution of Rs. 2 per unit.
Required:
(i) Calculate the return for the period of one year assuming that the NAV as on 31st December 2010 was Rs. 48 per unit.
(ii) Calculate the return for the period of one year assuming that the NAV as on 31st December 2010 was Rs. 48 per unit and all dividends and capital gains distributions have been reinvested at an average price of Rs. 46.00 per unit. Ignore taxation.
[MTP - MARCH 2019 -8 MARKS]
Answer:

(i) Returns for the year

(All changes on a Per -Unit Basis)

Change in Price:	Rs. 48 – Rs.45 =	Rs. 3.00
Dividends received:		Rs. 1.00
Capital gains distribution		Rs. 2.00
Total reward		Rs. 6.00

Holding period reward: $\frac{₹6.00}{₹45} \times 100 = 13.33\%$

(ii) When all dividends and capital gains distributions are re-invested into additional units of the fund @ (Rs. 46/unit)

Dividend + Capital Gains per unit = Rs. 1.00 + Rs. 2.00 = Rs. 3.00

Total received from 200 units = Rs. 3.00 x 200 = Rs. 600/-.

Additional Units Acquired = Rs. 600/Rs. 46 = 13.04 Units.

Total No. of Units = 200 units + 13.04 units = 213.04 units.

Value of 213.04 units held at the end of the year

= 213.04 units x Rs.48 = Rs. 10225.92

Price Paid for 200 Units at the beginning of the year = 200 units x Rs. 45 = Rs. 9000.00

Holding Period Reward Rs. (10225.92 – 9000.00) = Rs.1225.92

Holding Period Reward = $\frac{₹1225.92}{₹9000} \times 100 = 13.62\%$

4. Explain about Direct Plan in Mutual Fund
[MTP - APRIL 2019 - 4 MARKS]
Answer:

Direct Plans in Mutual Funds

Asset management companies (AMC) have been permitted to make direct investments in mutual fund schemes even before 2011. But, there were no separate plans for these investments. These investments were made in distributor plan itself and were tracked with single NAV - one of the distributor plans. Therefore, an investor was forced to buy mutual funds based on the NAV of the distributor plans. However, things changed with introduction of direct plans by SEBI on January 1, 2013.

Mutual fund direct plans are those plan where Asset Management Companies or mutual fund Houses do not charge distributor expenses, trail fees and transaction charges. NAV of the direct plan are generally higher in comparison to a regular plan. Studies have shown that the 'Direct Plans' have performed better than the 'Regular Plans' for almost all the mutual fund schemes.

5. Following information is related to XYZ Regular Income Fund:

Particulars	₹ Crores
Listed shares at Cost (ex-dividend)	20
Cash in hand	1.23
Bonds and debentures at cost	4.3
Of these, bonds not listed and quoted	1
Other fixed interest securities at cost	4.5
Dividend accrued	0.8
Amount payable on shares	6.32
Expenditure accrued	0.75
Number of units (₹ 10 face value)	20 lacs
Current realizable value of fixed income securities of face value of ₹ 100	106.5
The listed shares were purchased when Index was	1,000
Present index is	2,300
Value of listed bonds and debentures at NAV date	8

CALCULATE the NAV of scheme on per unit basis if there has been a diminution of 20% in unlisted bonds and debentures and Other fixed interest securities are valued at cost. [RTP - NOV 2018]

Answer:

Particulars	Adjusted Values ₹ crores
Equity Shares	46.00
Cash in hand	1.23
Bonds and debentures not listed	0.80
Bonds and debentures listed	8.00
Dividends accrued	0.80
Fixed income securities	4.50
Sub total assets (A)	**61.33**
***Less:* Liabilities**	
Amount payable on shares	6.32
Expenditure accrued	0.75
Sub total liabilities (B)	**7.07**
Net Assets Value (A) – (B)	**54.26**
No. of units	20,00,000
Net Assets Value per unit (₹ 54.26 crore / 20,00,000)	₹ 271.30

6. On 01-07-2016, Mr. X Invested Rs. 50,000/- at initial offer in Mutual Funds at a face value of Rs. 10 each per unit. On 31-03-2017, a dividend was paid @ 10% and annualized yield was 120%. On 31-03-2018, 20% dividend and capital gain of Rs. 0.60 per unit was given. Mr. X redeemed all his 6271.98 units when his annualized yield was 71.50% over the period of holding. Calculate NAV as on 31-03-2017, 31-03-2018 and 31-03-2019. For calculations consider a year of 12 months.
[RTP - MAY 2020]

Answer:

Yield for 9 months (120% x 9/12) = 90%

Market value of Investments as on 31.03.2017 = ₹ 50,000/- + (₹ 50,000x 90%)= ₹ 95,000/-

Therefore, NAV as on 31.03.2017 = (₹ 95,000 - ₹ 5,000)/5,000 = ₹ 18.00

Since dividend was reinvested by Mr. X, additional units acquired = $\frac{₹\ 5,000}{₹\ 18}$ = 277.78 unit

Therefore, units as on 31.03.2017 = 5,000 + 277.78 = 5,277.78

Alternatively, units as on 31.03.2017 = (₹ 95,000/₹18) = 5,277.78

Dividend as on 31.03.2018 = 5,277.78 x ₹ 10 x 0.2 = ₹10,555.56

Capital Gain (5277.78 x ₹ 0.60) = ₹ 3,166.67

= ₹13,722.23

Let X be the NAV on 31.03.2018, then number of new units reinvested will be ₹13,722.23/X.

Accordingly, 6,271.98 units shall consist of reinvested units and 5277.78 (as on 31.03.2017).

Thus, by way of equation it can be shown as follows:

$$6,271.98 = \frac{₹13,722.23}{X} + 5,277.78$$

Therefore, NAV as on 31.03.2018 = ₹ 13,722.23/(6,271.98 – 5,277.78) = ₹ 13.80

NAV as on 31.03.2019 = ₹ 50,000 (1+0.715x33/12)/6,271.98 = ₹23.656

CHAPTER-8 DERIVATIVES

QUESTIONS FROM STUDY MATERIAL

Theoretical Questions

1. What are the reasons for stock index futures becoming more popular financial derivatives over stock futures segment in India?

Answer:

Stock index futures is most popular financial derivatives over stock futures due to following reasons:

1. It adds flexibility to one's investment portfolio. Institutional investors and other large equity holders prefer the most this instrument in terms of portfolio hedging purpose. The stock systems do not provide this flexibility and hedging.
2. It creates the possibility of speculative gains using leverage. Because a relatively small amount of margin money controls a large amount of capital represented in a stock index contract, a small change in the index level might produce a profitable return on one's investment if one is right about the direction of the market. Speculative gains in stock futures are limited but liabilities are greater.
3. Stock index futures are the most cost efficient hedging device whereas hedging through individual stock futures is costlier.
4. Stock index futures cannot be easily manipulated whereas individual stock price can be exploited more easily.
5. Since, stock index futures consists of many securities, so being an average stock, is much less volatile than individual stock price. Further, it implies much lower capital adequacy and margin requirements in comparison of individual stock futures. Risk diversification is possible under stock index future than in stock futures.
6. One can sell contracts as readily as one buys them and the amount of margin required is the same.
7. In case of individual stocks the outstanding positions are settled normally against physical delivery of shares. In case of stock index futures they are settled in cash all over the world on the premise that index value is safely accepted as the settlement price.
8. It is also seen that regulatory complexity is much less in the case of stock index futures in comparison to stock futures.
9. It provides hedging or insurance protection for a stock portfolio in a falling market.

2. Write short note on Marking to market.

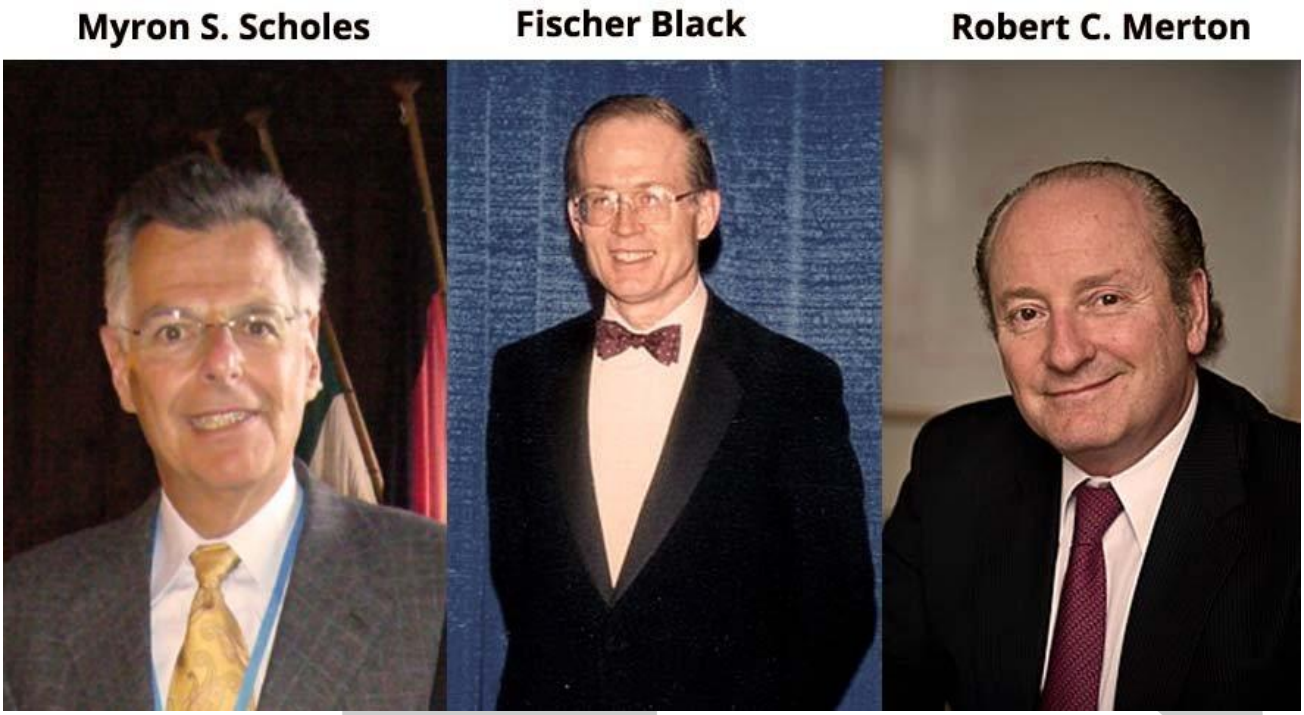
Answer:

It implies the process of recording the investments in traded securities (shares, debt-instruments, etc.) at a value, which reflects the market value of securities on the reporting date. In the context of derivatives trading, the futures contracts are marked to market on periodic (or daily) basis.

Marking to market essentially means that at the end of a trading session, all outstanding contracts are repriced at the settlement price of that session. Unlike the forward contracts, the future contracts are repriced every day. Any loss or profit resulting from repricing would be debited or credited to the margin account of the broker. It, therefore, provides an opportunity to calculate the extent of liability on the basis of repricing. Thus, the futures contracts provide better risk management measure as compared to forward contracts. Suppose on 1st day we take a long position, say at a price of Rs. 100 to be matured on 7th day. Now on 2nd day if the price goes up to Rs. 105, the contract will be repriced at Rs. 105 at the end of the trading session and profit of Rs. 5 will be credited to the account of the buyer. This profit of Rs. 5 may be drawn and thus cash flow also increases. This marking to market will result in three things – one, you will get a cash profit of Rs. 5; second, the existing contract at a price of Rs. 100 would stand cancelled; and third you will receive a new futures contract at Rs. 105. In essence, the marking to market feature implies that the value of the futures contract is set to zero at the end of each trading day.

3. State any four assumptions of Black Scholes Model.

Answer:



The Black-Scholes model is used to calculate a theoretical price of an Option. The Black-Scholes price is nothing more than the amount an option writer would require as compensation for writing a call and completely hedging the risk of buying stock. The important point is that the hedger's view about future stock prices is irrelevant. Thus, while any two investors may strongly disagree on the rate of return they expect on a stock they will, given agreement to the assumptions of volatility and the risk-free rate, always agree on the fair value of the option on that underlying asset. This key concept underlying the valuation of all derivatives -- that fact that the price of an option is independent of the risk preferences of investors -- is called risk-neutral valuation. It means that all derivatives can be valued by assuming that the return from their underlying assets is the risk-free rate.

The model is based on a normal distribution of underlying asset returns.
The following assumptions accompany the model:
1. European Options are considered,
2. No transaction costs,
3. Short term interest rates are known and are constant,
4. Stocks do not pay dividend,
5. Stock price movement is similar to a random walk,
6. Stock returns are normally distributed over a period of time, and
7. The variance of the return is constant over the life of an Option

4. Write short note on Embedded derivatives.
Answer:
Embedded Derivatives: A derivative is defined as a contract that has all the following characteristics:
• Its value changes in response to a specified underlying, e.g. an exchange rate, interest rate or share price;
• It requires little or no initial net investment;
• It is settled at a future date;
• The most common derivatives are currency forwards, futures, options, interest rate swaps etc. An embedded derivative is a derivative instrument that is embedded in another contract - the host contract. The host contract might be a debt or equity instrument, a lease, an insurance contract or a sale or purchase contract. Derivatives require to be marked-to-market through the income statement, other than qualifying hedging instruments. This requirement on embedded derivatives are designed to ensure that mark to-market through the income statement cannot be avoided by including - embedding - a derivative in another contract or financial instrument that is not marked-to market through the income statement.
An embedded derivative can arise from deliberate financial engineering and intentional shifting of certain risks between parties. Many embedded derivatives, however, arise inadvertently through market practices and common contracting arrangements. Even purchase and sale contracts that qualify for executory contract treatment may contain embedded derivatives. An embedded derivative causes modification to a contract's cash flow, based on changes in a specified variable.

5. Define the term Greeks with respect to options.
Answer:
The Greeks are a collection of statistical values (expressed as percentages) that give the investor a better overall view of how a stock has been performing. These statistical values can be helpful in deciding what options strategies are best to use. The investor should remember that statistics show trends based on past performance. It is not guaranteed that the future performance of the stock will behave according to the historical numbers. These trends can change drastically based on new stock performance.

Practical Questions

1. The 6-months forward price of a security is Rs. 208.18. The borrowing rate is 8% per annum payable with monthly rests. What should be the spot price?
Answer:

Calculation of spot price

The formula for calculating forward price is

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

Where A = Forward price
P = Spot Price
r = rate of interest
n = no. of compounding
t = time

Using the above formula,

$208.18 = P\ (1 + 0.08/12)^{6}$

Or $208.18 = P \times 1.0409$

$P = 208.18/1.0409 = 200$

Hence, the spot price should be ₹ 200.

2. The following data relate to Anand Ltd.'s share price:
Current price per share Rs. 1,800
6 months future's price/share Rs. 1,950
Assuming it is possible to borrow money in the market for transactions in securities at 12% per annum, you are required:
(i) to calculate the theoretical minimum price of a 6-months forward purchase; and
(ii) to explain arbitrate opportunity.
Answer:
Anand Ltd
(i) Calculation of theoretical minimum price of a 6 months forward contract-
Theoretical minimum price = Rs. 1,800 + (Rs. 1,800 x 12/100 x 6/12) = Rs. 1,908
(ii) Arbitrage Opportunity-
The arbitrageur can borrow money @ 12 % for 6 months and buy the shares at Rs.1,800. At the same time he can sell the shares in the futures market at Rs. 1,950. On the expiry date 6 months later, he could deliver the share and collect Rs. 1,950 pay off Rs. 1,908 and record a profit of Rs. 42 (Rs. 1,950 – Rs. 1,908)

3. On 31-8-2011, the value of stock index was Rs. 2,200. The risk free rate of return has been 8% per annum. The dividend yield on this Stock Index is as under:

Month	Dividend Paid p.a.
January	3%
February	4%
March	3%
April	3%
May	4%
June	3%
July	3%
August	4%
September	3%
October	3%
November	4%
December	3%

Assuming that interest is continuously compounded daily, find out the future price of contract deliverable on 31-12-2011. Given: e0.01583 = 1.01593

Answer:

The duration of future contract is 4 months. The average yield during this period will be:

$$\frac{3\%+3\%+4\%+3\%}{4} = 3.25\%$$

As per Cost to Carry model the future price will be

$F = Se^{(r_f - D)t}$

Where S = Spot Price

r_f = Risk Free interest

D = Dividend Yield

t = Time Period

Accordingly, future price will be

$= ₹\ 2,200\ e^{(0.08-0.0325)\times 4/12} = ₹\ 2,200\ e^{0.01583}$

= ₹ 2,200 x 1.01593 = ₹ 2235.05

4. Calculate the price of 3 months PQR futures, if PQR (FV Rs.10) quotes Rs.220 on NSE and the three months future price quotes at Rs.230 and the one month borrowing rate is given as 15 percent and the expected annual dividend is 25 percent per annum payable before expiry. Also examine arbitrage opportunities.

Answer:

Future's Price = Spot + cost of carry – Dividend

F = 220 + 220 × 0.15 × 0.25 – 0.25** × 10 = 225.75

** Entire 25% dividend is payable before expiry, which is Rs.2.50.

Thus we see that futures price by calculation is Rs.225.75 which is quoted at Rs.230 in the exchange.

(i) Analysis:

Fair value of Futures less than Actual futures Price:

Futures Overvalued Hence it is advised to sell. Also do Arbitraging by buying stock i n the cash market.

Step I

He will buy PQR Stock at Rs.220 by borrowing at 15% for 3 months. Therefore, his outflows are:

Cost of Stock	220.00
Add: Interest @ 15 % for 3 months i.e. 0.25 years (220 × 0.15 × 0.25)	8.25
Total Outflows (A)	228.25

Step II

He will sell March 2000 futures at Rs.230. Meanwhile he would receive dividend for his stock.

Hence his inflows are	230.00
Sale proceeds of March 2000 futures	2.50
Total inflows (B)	232.50

Inflow – Outflow = Profit earned by Arbitrageur

= 232.50 – 228.25 = 4.25

5.

BSE Rs. 5000
Value of portfolio Rs. 10,10,000
Risk free interest rate 9% p.a.
Dividend yield on Index 6% p.a.
Beta of portfolio 1.5

We assume that a future contract on the BSE index with four months maturity is used to hedge the value of portfolio over next three months. One future contract is for delivery of 50 times the index.
Based on the above information calculate:
(i) Price of future contract.
(ii) The gain on short futures position if index turns out to be 4,500 in three months.
Answer:

(i) Current future price of the index = $5000 + 5000\ (0.09-0.06)\frac{4}{12} = 5000+ 50= 5,050$

$\therefore$ Price of the future contract = ₹ 50 x 5,050 = ₹ 2,52,500

(ii) Hedge ratio = $\frac{1010000}{252500}\times 1.5 = 6$ contracts

Index after there months turns out to be 4500

Future price will be = $4500 + 4500\ (0.09-0.06) \times\frac{1}{12} = 4,511.25$

Therefore, Gain from the short futures position is = 6 x (5050 – 4511.25) x 50

= ₹1,61,625

Note: Alternatively we can also use daily compounding (exponential) formula.

6. The share of X Ltd. is currently selling for Rs. 300. Risk free interest rate is 0.8% per month. A three months futures contract is selling for Rs. 312. Develop an arbitrage strategy and show what your riskless profit will be 3 month hence assuming that X Ltd. will not pay any dividend in the next three months.

Answer:

The appropriate value of the 3 months futures contract is –

Fo = ₹ 300 $(1.008)^3$ = ₹ 307.26

Since the futures price exceeds its appropriate value it pays to do the following:-

Action	Initial Cash flow	Cash flow at time T (3 months)
Borrow ₹ 300 now and repay with interest after 3 months	+ ₹ 300	- ₹ 300 $(1.008)^3$ =- ₹ 307.26
Buy a share	- ₹ 300	ST
Sell a futures contract (Fo = 312/-)	0	₹ 312 – ST
Total	₹ 0	₹ 4.74

Such an action would produce a risk less profit of ₹ 4.74.

7. A Mutual Fund is holding the following assets in **Rs. Crores :**

Investments in diversified equity shares	**90.00**
Cash and Bank Balances	**10.00**
	100.00

The Beta of the equity shares portfolio is 1.1. The index future is selling at 4300 level. The Fund Manager apprehends that the index will fall at the most by 10%. How many index futures he should short for perfect hedging? One index future consists of 50 units.
Substantiate your answer assuming the Fund Manager's apprehension will materialize.
Answer:

Number of index future to be sold by the Fund Manager is:

$$\frac{1.1\times 90,00,00,000}{4,300\times 50} = 4,605$$

Justification of the answer:

Loss in the value of the portfolio if the index falls by 10% is ₹ $\frac{11}{100}$ x90 Crore = ₹ 9.90 Crore.

Gain by short covering of index future is: $\frac{0.1\times 4,300\times 50\times 4,605}{1,00,00,000}$ = 9.90 Crore

This justifies the answer. Further, cash is not a part of the portfolio.

8. A trader is having in its portfolio shares worth Rs. 85 lakhs at current price and cash Rs. 15 lakhs. The beta of share portfolio is 1.6. After 3 months the price of shares dropped by 3.2%.
Determine:
(i) Current portfolio beta
(ii) Portfolio beta after 3 months if the trader on current date goes for long position on Rs. 100 lakhs Nifty futures.
Answer:

(i) **Current Portfolio Beta**

Current Beta for share portfolio	= 1.6
Beta for cash	= 0
Current portfolio beta	= 0.85 x 1.6 + 0 x 0.15 = 1.36

(ii) **Portfolio beta after 3 months:**

$$\text{Beta for portfolio of shares} = \frac{\text{Change in value of portfolio of share}}{\text{Change in value of market portfolio (Index)}}$$

$$1.6 = \frac{0.032}{\text{Change in value of market portfolio (Index)}}$$

Change in value of market portfolio (Index) = (0.032 / 1.6) x 100 = 2%

Position taken on 100 lakh Nifty futures : Long

Value of index after 3 months = ₹ 100 lakh x (1.00 - 0.02)

= ₹ 98 lakh

Mark-to-market paid = ₹ 2 lakh

Cash balance after payment of mark-to-market = ₹ 13 lakh

Value of portfolio after 3 months = ₹85 lakh x (1 - 0.032) + ₹13 lakh

= ₹95.28 lakh

$$\text{Change in value of portfolio} = \frac{₹100 \text{ lakh} - ₹95.28 \text{ lakh}}{₹100 \text{ lakh}} = 4.72\%$$

Portfolio beta = 0.0472/0.02 = 2.36

9. Which position on the index future gives a speculator, a complete hedge against the following transactions:
(i) The share of Right Limited is going to rise. He has a long position on the cash market of Rs. 50 lakhs on the Right Limited. The beta of the Right Limited is 1.25.
(ii) The share of Wrong Limited is going to depreciate. He has a short position on the cash market of Rs. 25 lakhs on the Wrong Limited. The beta of the Wrong Limited is 0.90.
(iii) The share of Fair Limited is going to stagnant. He has a short position on the cash market of Rs. 20 lakhs of the Fair Limited. The beta of the Fair Limited is 0.75.
Answer:

Sl. No. (1)	Company Name (2)	Trend (3)	Amount (₹) (4)	Beta (5)	(₹) (6) [(4) x (5)]	Position (7)
(i)	Right Ltd.	Rise	50 lakh	1.25	62,50,000	Short
(ii)	Wrong Ltd.	Depreciate	25 lakh	0.90	22,50,000	Long
(iii)	Fair Ltd.	Stagnant	20 lakh	0.75	15,00,000	Long
					25,00,000	Short

10. Ram buys 10,000 shares of X Ltd. at a price of Rs. 22 per share whose beta value is 1.5 and sells 5,000 shares of A Ltd. at a price of Rs. 40 per share having a beta value of 2. He obtains a complete hedge by Nifty futures at Rs. 1,000 each. He closes out his position at the closing price of the next day when the share of X Ltd. dropped by 2%, share of A Ltd. appreciated by 3% and Nifty futures dropped by 1.5%.
What is the overall profit/loss to Ram? (ALSO IN MTP OCT 2020)

Answer:

No. of the Future Contract to be obtained to get a complete hedge

$$= \frac{10000 \times ₹22 \times 1.5 - 5000 \times ₹40 \times 2}{₹1000}$$

$$= \frac{₹3,30,000 - ₹4,00,000}{₹1000} = 70 \text{ contracts}$$

Thus, by purchasing 70 Nifty future contracts to be long to obtain a complete hedge.

Cash Outlay

= 10000 x ₹ 22 – 5000 x ₹ 40 + 70 x ₹ 1,000

= ₹ 2,20,000 – ₹ 2,00,000 + ₹ 70,000 = ₹ 90,000

Cash Inflow at Close Out

= 10000 x ₹ 22 x 0.98 – 5000 x ₹ 40 x 1.03 + 70 x ₹ 1,000 x 0.985

= ₹ 2,15,600 – ₹ 2,06,000 + ₹ 68,950 = ₹ 78,550

Gain/ Loss

= ₹ 78,550 – ₹ 90,000 = - ₹ 11,450 (Loss)

11. On January 1, 2013 an investor has a portfolio of 5 shares as given below:

Security	Price	No. of Shares	Beta
A	349.30	5,000	1.15
B	480.50	7,000	0.40
C	593.52	8,000	0.90
D	734.70	10,000	0.95
E	824.85	2,000	0.85

The cost of capital to the investor is 10.5% per annum.
You are required to calculate:
(i) The beta of his portfolio.
(ii) The theoretical value of the NIFTY futures for February 2013.
(iii) The number of contracts of NIFTY the investor needs to sell to get a full hedge until February for his portfolio if the current value of NIFTY is 5900 and NIFTY futures have a minimum trade lot requirement of 200 units. Assume that the futures are trading at their fair value.
(iv) The number of future contracts the investor should trade if he desires to reduce the beta of his portfolios to 0.6.
No. of days in a year be treated as 365.
Given: In (1.105) = 0.0998 and e(0.015858) = 1.01598 [MTP - MARCH 2019 - 8 MARKS | RTP - MAY 2020]

Answer:

(i) Calculation of Portfolio Beta

Security	Price of the Stock	No. of shares	Value	Weightage w_i	Beta B_i	Weighted Beta
A	349.30	5,000	17,46,500	0.093	1.15	0.107
B	480.50	7,000	33,63,500	0.178	0.40	0.071
C	593.52	8,000	47,48,160	0.252	0.90	0.227
D	734.70	10,000	73,47,000	0.390	0.95	0.370
E	824.85	2,000	16,49,700	0.087	0.85	0.074
			1,88,54,860			0.849

Portfolio Beta = 0.849

(ii) Calculation of Theoretical Value of Future Contract

Cost of Capital = 10.5% p.a. Accordingly, the Continuously Compounded Rate of Interest ln (1.105) = 0.0998

For February 2013 contract, t= 58/365= 0.1589

Further $F = Se^{rt}$

$F = ₹\ 5,900e^{(0.0998)(0.1589)}$

$F = ₹\ 5,900e^{0.015858}$

F= ₹ 5,900X1.01598 = ₹ 5,994.28

Alternatively, it can also be taken as follows:

$= ₹\ 5900\ e^{0.105\times 58/365}$

$= ₹\ 5900\ e^{0.01668}$

= ₹ 5900 x 1.01682 = ₹ 5,999.24

(iii) When total portfolio is to be hedged:

$$= \frac{\text{Value of Spot Position requiring hedging}}{\text{Value of Future Contract}} \times \text{Portfolio Beta}$$

$$= \frac{1,88,54,860}{5994.28\times 200} \times 0.849 = 13.35 \text{ contracts say 13 or 14 contracts}$$

(iv) When total portfolio beta is to be reduced to 0.6:

$$\text{Number of Contracts to be sold} = \frac{P(\beta_P - \beta_P')}{F}$$

$$= \frac{1,88,54,860(0.849-0.600)}{5994.28\times 200} = 3.92 \text{ contracts say 4 contracts}$$

12. Details about portfolio of shares of an investor is as below:

The investor thinks that the risk of portfolio is very high and wants to reduce the portfolio beta to 0.91. He is considering two below mentioned alternative strategies: (i) Dispose off a part of his existing portfolio to acquire risk free securities, or (ii) Take appropriate position on Nifty Futures which are currently traded at Rs. 8125 and each Nifty points is worth Rs.200. You are required to determine:

(1) portfolio beta,

(2) the value of risk free securities to be acquired,

(3) the number of shares of each company to be disposed off,

(4) the number of Nifty contracts to be bought/sold; and
(5) the value of portfolio beta for 2% rise in Nifty.
Answer:

Shares	No. of shares (lakhs) (1)	Market Price of Per Share (2)	× (2) (₹ lakhs)	% to total (w)	ß (x)	wx
A Ltd.	3.00	500.00	1500.00	0.30	1.40	0.42
B Ltd.	4.00	750.00	3000.00	0.60	1.20	0.72
C Ltd.	2.00	250.00	500.00	0.10	1.60	0.16
			5000.00	1.00		1.30

(1) Portfolio beta 1.30

(2) Required Beta 0.91

Let the proportion of risk free securities for target beta 0.91 = p

$$0.91 = 0 \times p + 1.30 (1 - p)$$

$$p = 0.30 \text{ i.e. } 30\%$$

Shares to be disposed off to reduce beta (5000 × 30%) ₹ 1,500 lakh and Risk Free securities to be acquired.

(3) Number of shares of each company to be disposed off

Shares	% to total (w)	Proportionate Amount (₹ lakhs)	Market Price Per Share	No. of Shares (Lakh)
A Ltd.	0.30	450.00	500.00	0.90
B Ltd.	0.60	900.00	750.00	1.20
C Ltd.	0.10	150.00	250.00	0.60

(4) Number of Nifty Contract to be sold

$$\frac{(1.30-0.91) \times 5000 \text{ lakh}}{8,125 \times 200} = 120 \text{ contracts}$$

(5) 2% rises in Nifty is accompanied by 2% x 1.30 i.e. 2.6% rise for portfolio of shares

	₹ Lakh
Current Value of Portfolio of Shares	5000
Value of Portfolio after rise	5130
Mark-to-Market Margin paid (8125 × 0.020 × ₹ 200 × 120)	39
Value of the portfolio after rise of Nifty	5091
% change in value of portfolio (5091 – 5000)/ 5000	1.82%
% rise in the value of Nifty	2%
Beta	0.91

13. On April 1, 2015, an investor has a portfolio consisting of eight securities as shown below:

Security	Market Price	No. of Shares	Value
A	29.40	400	0.59
B	318.70	800	1.32
C	660.20	150	0.87
D	5.20	300	0.35
E	281.90	400	1.16
F	275.40	750	1.24
G	514.60	300	1.05
H	170.50	900	0.76

The cost of capital for the investor is 20% p.a. continuously compounded. The investor fears a fall in the prices of the shares in the near future. Accordingly, he approaches you for the advice to protect the interest of his portfolio.

You can make use of the following information:

(1) The current NIFTY value is 8500.

(2) NIFTY futures can be traded in units of 25 only.

(3) Futures for May are currently quoted at 8700 and Futures for June are being quoted at 8850.

You are required to calculate:

(i) the beta of his portfolio.

(ii) the theoretical value of the futures contract for contracts expiring in May and June.

Given (e0.03 =1.03045, e0.04 = 1.04081, e0.05 =1.05127)

(iii) the number of NIFTY contracts that he would have to sell if he desires to hedge until June in each of the following cases:

(A) His total portfolio

(B) 50% of his portfolio

(C) 120% of his portfolio

Answer:

(i) Beta of the Portfolio

Security	Market Price	No. of Shares	Value	β	Value x β
A	29.40	400	11760	0.59	6938.40
B	318.70	800	254960	1.32	336547.20
C	660.20	150	99030	0.87	86156.10
D	5.20	300	1560	0.35	546.00
E	281.90	400	112760	1.16	130801.60
F	275.40	750	206550	1.24	256122.00
G	514.60	300	154380	1.05	162099.00
H	170.50	900	153450	0.76	116622.00
			994450		1095832.30

$$\text{Portfolio Beta} = \frac{10,95,832.30}{9,94,450} = 1.102$$

(ii) **Theoretical Value of Future Contract Expiring in May and June**

$F = Se^{rt}$

$F_{May} = 8500 \times e^{0.20 \times (2/12)} = 8500 \times e^{0.0333}$

$e^{0.0333}$ shall be computed using Interpolation Formula as follows:

$e^{0.03}$	= 1.03045
$e^{0.04}$	= 1.04081
$e^{0.01}$	= 0.01036
$e^{0.0033}$	= 0.00342
$e^{0.0067}$	= 0.00694

$e^{0.0333}$ = 1.03045 + 0.00342 = 1.03387 or 1.04081 – 0.00694 = 1.03387

According the price of the May Contract

8500 X 1.03387 = ₹ 8788

Price of the June Contract

$F_{May} = 8500 \times e^{0.20 \times (3/12)} = 8500 \times e^{0.05} = 8500 \times 1.05127 = 8935.80$

(iii) **No. of NIFTY Contracts required to sell to hedge until June**

$$= \frac{\text{Value of Position to be hedged}}{\text{Value of Future Contract}} \times \beta$$

(A) Total portfolio

$$\frac{994450}{8850 \times 25} \times 1.102 = 4.953 \text{ say } 5 \text{ contracts}$$

(B) 50% of Portfolio

$$\frac{994450 \times 0.50}{8850 \times 25} \times 1.102 = 2.47 \text{ say } 3 \text{ contracts}$$

(C) 120% of Portfolio

$$\frac{994450 \times 1.20}{8850 \times 25} \times 1.102 = 5.94 \text{ say } 6 \text{ contracts}$$

14. Sensex futures are traded at a multiple of 50. Consider the following quotations of Sensex futures in the 10 trading days during February, 2009:

Day	High	Low	Closing
4-2-09	3306.4	3290.00	3296.50
5-2-09	3298.00	3262.50	3294.40
6-2-09	3256.20	3227.00	3230.40
7-2-09	3233.00	3201.50	3212.30
10-2-09	3281.50	3256.00	3267.50
11-2-09	3283.50	3260.00	3263.80
12-2-09	3315.00	3286.30	3292.00

14-2-09	3315.00	3257.10	3309.30
17-2-09	3278.00	3249.50	3257.80
18-2-09	3118.00	3091.40	3102.60

Abshishek bought one sensex futures contract on February, 04. The average daily absolute change in the value of contract is Rs. 10,000 and standard deviation of these changes is Rs. 2,000. The maintenance margin is 75% of initial margin. You are required to determine the daily balances in the margin account and payment on margin calls, if any. [ALSO ASKED IN RTP - NOV 2019]

Answer:

Initial Margin = $\mu + 3\sigma$

Where μ = Daily Absolute Change

σ = Standard Deviation

Accordingly

Initial Margin = ₹ 10,000 + ₹ 6,000 = ₹ 16,000

Maintenance margin = ₹ 16,000 x 0.75 = ₹ 12,000

Day	Changes in future Values (₹)	Margin A/c (₹)	Call Money (₹)
4/2/09	-	16000	-
5/2/09	50 x (3294.40 - 3296.50) = -105	15895	-
6/2/09	50 x (3230.40 - 3294.40)= -3200	12695	-
7/2/09	50 x (3212.30 - 3230.40)= -905	16000	4210
10/2/09	50x(3267.50 - 3212.30)= 2760	18760	-
11/2/09	50x(3263.80 - 3267.50)= -185	18575	-
12/2/09	50x(3292 - 3263.80) =1410	19985	-
14/2/09	50x(3309.30 - 3292)=865	20850	-
17/2/09	50x(3257.80 - 3309.30)=-2575	18275	-
18/2/09	50x(3102.60 - 3257.80)=-7760	16000	5485

15. Mr. A purchased a 3 month call option for 100 shares in XYZ Ltd. at a premium of Rs. 30 per share, with an exercise price of Rs. 550. He also purchased a 3 month put option for 100 shares of the same company at a premium of Rs. 5 per share with an exercise price of Rs. 450. The market price of the share on the date of Mr. A's purchase of options, is Rs. 500. Calculate the profit or loss that Mr. A would make assuming that the market price falls to Rs. 350 at the end of 3 months.

Answer:

Since the market price at the end of 3 months falls to ₹ 350 which is below the exercise price under the call option, the call option will not be exercised. Only put option becomes viable.

	₹
The gain will be:	
Gain per share (₹450 – ₹ 350)	100
Total gain per 100 shares	10,000
Cost or premium paid (₹ 30 x 100) + (₹ 5 x 100)	3,500
Net gain	6,500

16. The market received rumour about ABC corporation's tie-up with a multinational company. This has induced the market price to move up. If the rumour is false, the ABC corporation stock price will probably fall dramatically. To protect from this an investor has bought the call and put options.

He purchased one 3 months call with a striking price of Rs. 42 for Rs. 2 premium, and paid Re.1 per share premium for a 3 months put with a striking price of Rs. 40.

(i) Determine the Investor's position if the tie up offer bids the price of ABC Corporation's stock up to Rs. 43 in 3 months.
(ii) Determine the Investor's ending position, if the tie up programme fails and the price of the stocks falls to Rs. 36 in 3 months. [ALSO IN RTP - MAY 2019]

Answer:

Cost of Call and Put Options

= (₹ 2 per share) x (100 share call) + (₹ 1 per share) x (100 share put)

= ₹ 2 x 100 + 1 x 100

= ₹ 300

(i) Price increases to ₹43. Since the market price is higher than the strike price of the call, the investor will exercise it.

Ending position = (- ₹ 300 cost of 2 option) + (₹ 1 per share gain on call) x 100

= - ₹ 300 + 100

Net Loss = - ₹ 200

(ii) The price of the stock falls to ₹36. Since the market price is lower than the strike price, the investor may not exercise the call option.

Ending Position = (- ₹300 cost of 2 options) + (₹4 per stock gain on put) x 100

= - ₹300 + 400

Gain = ₹100

17. Equity share of PQR Ltd. is presently quoted at Rs. 320. The Market Price of the share after 6 months has the following probability distribution:

Market Price Rs.	**180**	**260**	**280**	**320**	**400**
Probability	**0.1**	**0.2**	**0.5**	**0.1**	**0.1**

A put option with a strike price of Rs. 300 can be written.
You are required to find out expected value of option at maturity (i.e. 6 months)

Answer:

Expected Value of Option
(300 – 180) X 0.1 12
(300 – 260) X 0.2 8
(300 – 280) X 0.5 10
(300 – 320) X 0.1 Not Exercised*
(300 – 400) X 0.1 Not Exercised*
30

* If the strike price goes beyond Rs. 300, option is not exercised at all.
In case of Put option, since Share price is greater than strike price Option Value would be zero.

18. You as an investor had purchased a 4 month call option on the equity shares of X Ltd. of Rs. 10, of which the current market price is Rs. 132 and the exercise price Rs. 150. You expect the price to range between Rs. 120 to Rs. 190. The expected share price of X Ltd. and related probability is given below:

Expected Price (₹)	120	140	160	180	190
Probability	.05	.20	.50	.10	.15

Compute the following:
(i) Expected Share price at the end of 4 months.
(ii) Value of Call Option at the end of 4 months, if the exercise price prevails.
(iii) In case the option is held to its maturity, what will be the expected value of the call option?
[ALSO IN MTP - APRIL 2018]
Answer:
(i) Expected Share Price
= Rs.120X 0.05 + Rs.140X 0.20 + Rs.160X 0.50 + Rs.180X 0.10 + Rs.190X 0.15
= Rs.6 + Rs.28 + Rs.80 + Rs.18 + Rs.28.50 = Rs.160.50
(ii) Value of Call Option
= Rs.150 - Rs.150 = Nil
(iii) If the option is held till maturity the expected Value of Call Option

Expected price (X)	Value of call (C)	Probability (P)	CP
₹ 120	0	0.05	0
₹ 140	0	0.20	0
₹ 160	₹ 10	0.50	₹ 5
₹ 180	₹ 30	0.10	₹ 3
₹ 190	₹ 40	0.15	₹ 6
Total			₹ 14

19. Mr. X established the following strategy on the Delta Corporation's stock :
(1) Purchased one 3-month call option with a premium of Rs. 30 and an exercise price of Rs. 550.
(2) Purchased one 3-month put option with a premium of Rs. 5 and an exercise price of Rs. 450.
Delta Corporation's stock is currently selling at Rs. 500. Determine profit or loss, if the price of Delta Corporation's :

(i) remains at Rs. 500 after 3 months.
(ii) falls at Rs. 350 after 3 months.
(iii) rises to Rs. 600.
Assume the size option is 100 shares of Delta Corporation. [ALSO ASKED IN MTP – OCT-2018 - 8 MARKS]
Answer:
(i) Total premium paid on purchasing a call and put option
= (Rs. 30 per share × 100) + (Rs. 5 per share × 100).
= 3,000 + 500 = Rs. 3,500
In this case, X exercises neither the call option nor the put option as both will result in a loss for him.
Ending value = - Rs. 3,500 + zero gain = - Rs. 3,500 i.e
Net loss = Rs. 3,500
(ii) Since the price of the stock is below the exercise price of the call, the call will not be exercised.

Only put is valuable and is exercised.
Total premium paid = Rs. 3,500
Ending value = – Rs. 3,500 + Rs. [(450 – 350) × 100] = – Rs. 3,500 + Rs. 10,000 = Rs. 6,500
- Net gain = Rs.6,500
(iii) In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.
Total premium paid = Rs. 3,500
Ending value = -3,500 + [(600 – 550) × 100]

20. The equity share of VCC Ltd. is quoted at Rs. 210. A 3-month call option is available at a premium of Rs. 6 per share and a 3-month put option is available at a premium of Rs. 5 per share. Ascertain the net payoffs to the option holder of a call option and a put option separately.
(i) the strike price in both cases in Rs. 220; and
(ii) the share price on the exercise day is Rs. 200,210,220,230,240.
Also indicate the price range at which the call and the put options may be gainfully exercised.
[ALSO ASKED IN NOV 2018 EXAMS - 8 MARKS & MTP - OCTOBER 2019 - 7 MARKS]
Answer:

Net payoff for the holder of the call option

					(₹)
Share price on exercise day	200	210	220	230	240
Option exercise	No	No	No	Yes	Yes
Outflow (Strike price)	Nil	Nil	Nil	220	220
Out flow (premium)	6	6	6	6	6
Total Outflow	6	6	6	226	226
Less inflow (Sales proceeds)	-	-	-	230	240
Net payoff	-6	-6	-6	4	14

Net payoff for the holder of the put option

					(₹)
Share price on exercise day	200	210	220	230	240
Option exercise	Yes	Yes	No	No	No
Inflow (strike price)	220	220	Nil	Nil	Nil
Less outflow (purchase price)	200	210	-	-	-
Less outflow (premium)	5	5	5	5	5
Net Payoff	15	5	-5	-5	-5

The call option can be exercised gainfully for any price above ₹226 (₹220 + ₹6) and put option for any price below ₹215 (₹220 - ₹5).

21. Sumana wanted to buy shares of EIL which has a range of Rs. 411 to Rs. 592 a month later. The present price per share is Rs. 421. Her broker informs her that the price of this share can sore up to Rs. 522 within a month or so, so that she should buy a one-month CALL of EIL. In order to be prudent in buying the call, the share price should be more than or at least Rs. 522 the assurance of which could not be given by her broker. Though she understands the uncertainty of the market, she wants to know the probability of attaining the share price Rs. 592 so that buying of a one-month CALL of EIL at the execution price of Rs. 522 is justified. Advice her. Take the risk-free interest to be 3.60% and e0.036 = 1.037. [MTP - AUGUST 2018 - 4 MARKS]
Answer:

$$p = \frac{e^{rt} - d}{u - d}$$

$e^{rt} = e^{0.036}$

$d = 411/421 = 0.976$

$u = 592/421 = 1.406$

$$p = \frac{e^{0.036} - 0.976}{1.406 - 0.976} = \frac{1.037 - 0.976}{0.43} = \frac{0.061}{0.43} = 0.1418$$

Thus probability of rise in price 0.1418

22. Mr. Dayal is interested in purchasing equity shares of ABC Ltd. which are currently selling at Rs. 600 each. He expects that price of share may go upto Rs. 780 or may go down to Rs. 480 in three months. The chances of occurring such variations are 60% and 40% respectively. A call option on the shares of ABC Ltd. can be exercised at the end of three months with a strike price of Rs. 630.
(i) What combination of share and option should Mr. Dayal select if he wants a perfect hedge?
(ii) What should be the value of option today (the risk free rate is 10% p.a.)?
(iii) What is the expected rate of return on the option? [ALSO IN MTP - MARCH 2018]
Answer:

(i) To compute perfect hedge we shall compute Hedge Ratio (Δ) as follows:

$$\Delta = \frac{C_1 - C_2}{S_1 - S_2} = \frac{150 - 0}{780 - 480} = \frac{150}{300} = 0.50$$

Mr. Dayal should purchase 0.50 share for every 1 call option.

(ii) Value of Option today

If price of share comes out to be ₹780 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x ₹ 780)	₹ 390
Loss on account of Short Position (₹ 780 – ₹ 630)	₹ 150
	₹ 240

If price of share comes out to be ₹ 480 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x ₹ 480)	₹ 240

Accordingly, Premium say P shall be computed as follows:

(₹ 300 – P) 1.025 = ₹ 240

P = ₹65.85

(iii) Expected Return on the Option

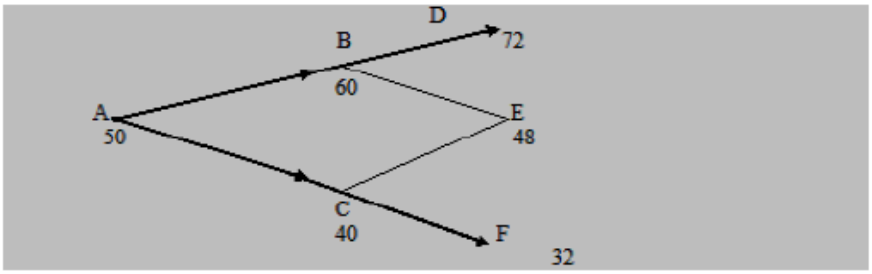
Expected Option Value = (₹ 780 – ₹ 630) × 0.60 + ₹ 0 × 0.40 = ₹ 90

$$\text{Expected Rate of Return} = \frac{90 - 65.85}{65.85} \times 100 = 36.67\%$$

23. Consider a two-year call option with a strike price of Rs. 50 on a stock the current price of which is also Rs. 50. Assume that there are two-time periods of one year and in each year the stock price can move up or down by equal percentage of 20%. The risk-free interest rate is 6%. Using binominal option model, calculate the probability of price moving up and down. Also draw a two-step binomial tree showing prices and payoffs at each node. [ALSO IN RTP - NOV 2019]

Answer:

Stock prices in the two step Binominal tree

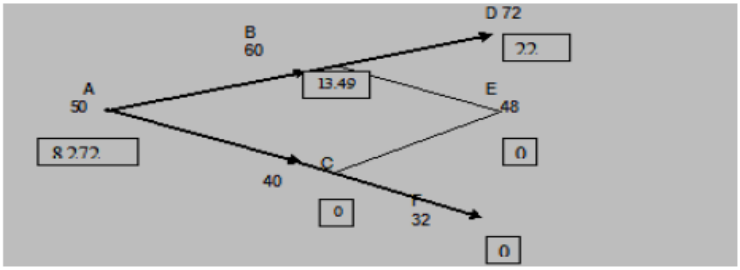


Using the single period model, the probability of price increase is

$$P = \frac{R-d}{u-d} = \frac{1.06-0.80}{1.20-0.80} = \frac{0.26}{0.40} = 0.65$$

therefore the p of price decrease = 1-0.65 = 0.35

The two step Binominal tree showing price and pay off



The value of an American call option at nodes D, E and F will be equal to the value of European option at these nodes and accordingly the call values at nodes D, E and F will be 22, 0 and 0 using the single period binomial model the value of call option at node B is

$$C = \frac{Cup+Cd(1-p)}{R} = \frac{22\times0.65+0\times0.35}{1.06} = 13.49$$

The value of option at node 'A' is

$$\frac{13.49\times0.65+0\times0.35}{1.06} = 8.272$$

24. The current market price of an equity share of Penchant Ltd is Rs.r420. Within a period of 3 months, the maximum and minimum price of it is expected to be Rs. 500 and Rs. 400 respectively. If the risk free rate of interest be 8% p.a., what should be the value of a 3 months Call option under the "Risk Neutral" method at the strike rate of Rs. 450?

Given e0.02 = 1.0202

Answer:

Let the probability of attaining the maximum price be p

(500 - 420) x p+(400 - 420) x (1-p) = 420 x ($e^{0.02}$-1)

or, 80p - 20(1 - p) = 420 x 0.0202

or, 80p – 20 + 20p = 8.48

or, 100p = 28.48

p = 0.2848

The value of Call Option in ₹ $= \frac{0.2848x(500-450)}{1.0202} = \frac{0.2848x50+0.7152\times0}{1.0202} = 13.96$

25. From the following data for certain stock, find the value of a call option:

Price of stock now	=	₹ 80
Exercise price	=	₹ 75
Standard deviation of continuously compounded annual return	=	0.40
Maturity period	=	6 months
Annual interest rate	=	12%

Given

Number of S.D. from Mean, (z)	Area of the left or right (one tail)
0.25	0.4013
0.30	0.3821
0.55	0.2912
0.60	0.2743

$e^{0.12 \times 0.5} = 1.062$

In 1.0667 = 0.0646

[ALSO IN RTP - MAY 2020]

Answer:

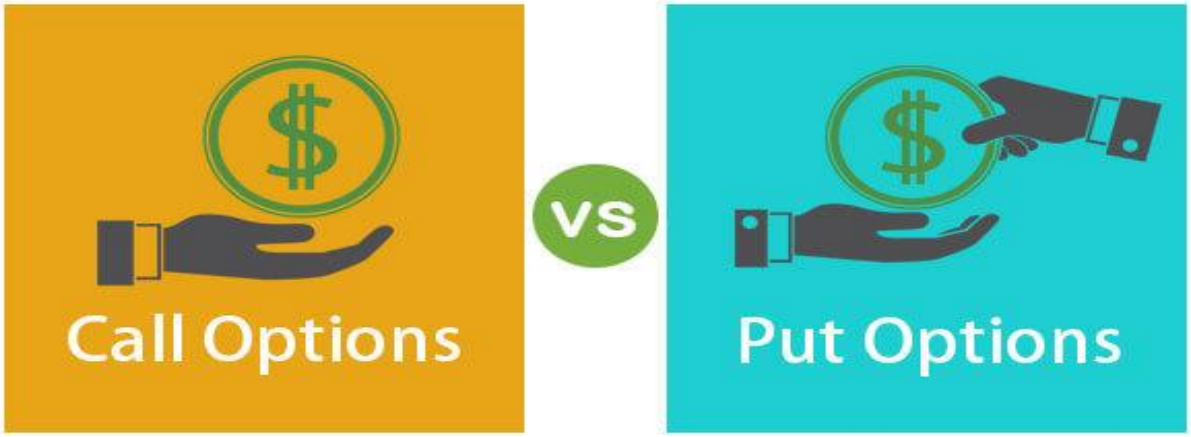
Applying the Black Scholes Formula,

Value of the Call option now:

The Formula $C = SN(d_1) - Ke^{(-rt)} N(d_2)$

$$d_1 = \frac{\ln(S/K) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$$

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



Where,

C = Theoretical call premium

S = Current stock price

t = time until option expiration

K = option striking price

r = risk-free interest rate

N = Cumulative standard normal distribution

e = exponential term

σ = Standard deviation of continuously compounded annual return.

In = natural logarithim

$$d_1 = \frac{\ln(1.0667) + (12\% + 0.08)0.5}{0.40\sqrt{0.5}}$$

$$= \frac{0.0646 + (0.2)0.5}{0.40 \times 0.7071}$$

$$= \frac{0.1646}{0.2828}$$

$$= 0.5820$$

$d_2 = 0.5820 - 0.2828 = 0.2992$

$N(d_1) = N(0.5820)$

$N(d_2) = N(0.2992)$

$$\text{Price} = SN(d_1) - Ke^{(-rt)}N(d_2)$$

$= 80 \times N(d_1) - (75/1.062) \times N(d_2)$

$= 80 \times N(d_1) - (75/1.062) \times N(d_2)$

Value of option

$$= 80\, N(d_1) - \frac{75}{1.062} \times N(d_2)$$

$N(d_1) = N(0.5820) = 0.7197$

$N(d_2) = N(0.2992) = 0.6176$

$$\text{Price} = 80 \times 0.7197 - \frac{75}{1.062} \times 0.6176$$

$= 57.57 - 70.62 \times 0.6176$

= 57.57 – 43.61

= ₹13.96

Teaching Notes:

Students may please note following important point:

Values of $N(d_1)$ and $N(d_2)$ have been computed by interpolating the values of areas under respective numbers of SD from Mean (Z) given in the question.

It may also be possible that in question paper areas under Z may be mentioned otherwise e.g. Cumulative Area or Area under Two tails. In such situation the areas of the respective Zs given in the question will be as follows:

Cumulative Area

Number of S.D. from Mean, (z)	*Cumulative Area*
0.25	*0.5987*
0.30	*0.6179*
0.55	*0.7088*
0.60	*0.7257*

Two tail area

Number of S.D. from Mean, (z)	*Area of the left and right (two tail)*
0.25	*0.8026*
0.30	*0.7642*
0.55	*0.5823*
0.60	*0.5485*

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Sabanam Ltd. has issued convertible debentures with coupon rate 11%. Each debenture has an option to convert to 16 equity shares at any time until the date of maturity. Debentures will be redeemed at Rs. 100 on maturity of 5 years. An investor generally requires a rate of return of 8% p.a. on a 5-year security. As an advisor, when will you advise the investor to exercise conversion for given market prices of the equity share of (i) Rs. 5, (ii) Rs. 6 and (iii) Rs. 7.10.
Cumulative PV factor for 8% for 5 years : 3.993
PV factor for 8% for year 5 : 0.681
[MAY 2018 - 6 MARKS]
Answer:

If Debentures are not converted its value is as under: -

	PVF @ 8 %	₹
Interest - ₹ 11 for 5 years	3.993	43.923
Redemption - ₹ 100 in 5th year	0.681	68.100
		112.023

Value of equity shares:-

Market Price	No.	Total
₹ 5	16	₹ 80
₹ 6	16	₹ 96
₹ 7.10	16	₹ 113.60

Hence, unless the market price is ₹ 7.10 conversion should not be exercised.

2. Mr. KK purchased a 3-month call option for 100 shares in PQR Ltd. at a premium of Rs. 40 per share, with an exercise price of Rs. 560. He also purchased a 3-month put option for 100 shares of the same company at a premium of Rs. 10 per share with an exercise price of Rs. 460. The market price of the share on the date of Mr. KK's purchase of options, is Rs. 500. Compute the profit or loss that Mr. KK would make assuming that the market price falls to Rs. 360 at the end of 3 months.
[MAY 2018 - 4 MARKS]
Answer:
Since the market price at the end of 3 months falls to Rs. 360 which is below the exercise price under the call option, the call option will not be exercised. Only put option becomes viable.

	₹
The gain will be:	
Gain per share (₹460 – ₹ 360)	100
Total gain per 100 shares	10,000
Cost or premium paid (₹ 40 x 100) + (₹ 10 x 100)	5,000
Net gain	5,000

3. Mr. John established the following spread on the TTK Ltd.'s stock:
1. Purchased one 3-month put option with a premium of Rs. 15 and an exercise price of Rs. 900.
2. Purchased one 3-month call option with a premium of Rs. 90 and an exercise price of Rs. 1100.
TTK Ltd.'s stock is currently selling) at Rs. 1000. Calculate gain or loss, if the price of stock of TTK Ltd. –
(i) Remains at Rs. 1000 after 3 months.
(ii) Falls to Rs. 700 after 3 months.
(iii) Raises to Rs. 1200 after 3 months.
Assume the size of option is 200 shares of TTK Ltd
[MAY 2019 - 8 MARKS]
Answer:
(i) Total premium paid on purchasing a call and put option
= (Rs. 15 per share × 200) + (Rs. 90 per share × 200).
= Rs. 3,000 + Rs. 18,000 = Rs. 21000

In this case, Mr. John exercises neither the call option nor the put option as both will result in a loss for him.
Ending value = – Rs. 21000 + zero gain = - Rs. 21000
i.e. Net loss = Rs. 21000
(ii) Since the price of the stock is below the exercise price of the call, the call will not be exercised. Only put is valuable and is exercised.
Net Gain = (Exercise Price – Current Price) x No of Shares – Premium Paid
Total premium paid = Rs. 21000
Ending value = – Rs. 21000 + Rs. [(900 – 700) × 200] = Rs. 19,000
 Net gain = Rs. 19,000
(iii) In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.
Total premium paid = Rs. 21000
Ending value = – Rs. 21000 + Rs. [(1200 – 1100) × 200] = -Rs. 1000
Net Loss = Rs. 1,000

4. A Rice Trader has planned to sell 22000 kg of Rice after 3 months from now. The spot price of the Rice is Rs. 60 per kg and 3 months future on the same is trading at Rs. 59 per kg. Size of the contract is 1000 kg. The price is expected to fall as low as Rs. 56 per kg, 3 months hence. What the trader can do to mitigate its risk of reduced profit? If he decides to make use of future market, what would be the effective realized price for its sale when after 3 months, spot price is Rs. 57 per kg and future contract price for 3 months is Rs. 58p kg? [MAY 2019 - 8 MARKS, RTP-NOV 2020]

Answer:

In order to hedge its position trader would go short on future at current future price of ₹ 59/kg. This will help the trade to realize sure ₹ 59 per kg. after 3 months.

Particulars		
(a)	Quantity of Rice to be hedged	22000 kg.
(b)	Contract Size	1000 kg.
(c)	No. of Contracts to be sold (a/b)	22
(d)	Future Price	₹ 59/kg.
(e)	Exposure in the future market (a x d)	₹ 12,98,000

After 3 months, trader would cancel its position in the future by buying a future contract of same quantity and will sell Rice in the spot market and position shall be as follows:

Particulars		₹
(a)	Price of Future Contract	58/kg.
(b)	Amount bought = 22000 x 58	12,76,000
(c)	Gain(Loss) on future position (12,98,000 – 12,76,000)	22,000
(d)	Spot Price	57/kg
(e)	Amount realized by selling in the spot market (22000 x 57)	12,54,000
(f)	Effective Selling Amount (c + e)	12,76,000
(g)	Effective Selling Price (12,76,000/22000)	58/kg.

5. Explain Random Walk theory [MTP - APRIL 2018 - 6 MARKS]
Answer:

Random Walk Theory

Random Walk hypothesis states that the behavior of stock market prices is unpredictable and that there is no relationship between the present prices of the shares and their future prices. Basic premises of the theory are as follows:

: Prices of shares in stock market can never be predicted. The reason is that the price trends are not the result of any underlying factors, but that they represent a statistical expression of past data.

: There may be periodical ups or downs in share prices, but no connection can be established between two successive peaks (high price of stocks) and troughs (low price of stocks).

6. Describe the characteristics of financial instruments
[MTP - MARCH 2019 - 4 MARKS]
Answer:

Characteristics of Financial Instruments

The important characteristics of financial instruments are enumerated as below:

(a) **Liquidity**: Financial instruments provide liquidity. These can be easily and quickly converted into cash.

(b) **Marketing**: Financial instruments facilitate easy trading on the market. They have a ready market.

(c) **Collateral value**: Financial instruments can be pledged for getting loans.

(d) **Transferability**: Financial instruments can be transferred from one person to another.

(e) **Maturity period**: The maturity period of financial instruments may be short term, medium term or long term.

(f) **Transaction cost**: Financial instruments involve buying and selling cost. The buying and selling costs are called transaction costs.

(g) **Risk**: Financial instruments carry risk. Equity based instruments are riskier in comparison to debt based instruments because the payment of dividend is uncertain. A company may not declare dividend in a particular year. However, payment of principle or interest is more or less certain unless the company gets insolvent.

(h) **Future trading**: Financial instruments facilitate future trading so as to cover risks arising out of price fluctuations, interest rate fluctuations etc.

7. A Ltd. has issued convertible bonds, which carries a coupon rate of 14%. Each bond is convertible into 20 equity shares of the company A Ltd. The prevailing interest rate for similar credit rating bond is 8%. The convertible bond has 5 years maturity. It is redeemable at par at Rs. 100. The relevant present value table is as follows.

Present values	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.14, t}$	0.877	0.769	0.675	0.592	0.519
$PVIF_{0.08, t}$	0.926	0.857	0.794	0.735	0.681

You are required to estimate:
(Calculations be made upto 3 decimal places)
(i) current market price of the bond, assuming it being equal to its fundamental value,
(ii) minimum market price of equity share at which bond holder should exercise conversion option; and
(iii) duration of the bond.

[MTP - OCTOBER 2019- 8 MARKS]

Answer:

(i) Current Market Price of Bond

Time	CF	PVIF 8% PV (CF)	PV (CF)
1	14	0.926	12.964
2	14	0.857	11.998
3	14	0.794	11.116
4	14	0.735	10.290
5	114	0.681	77.634
		∑ PV (CF) i.e. P_0 =	124.002

Say Rs. 124.00

(ii) Minimum Market Price of Equity Shares at which Bondholder should exercise conversion option:

$\frac{124.00}{20.00}$ = Rs. 6.20

(iii) Duration of the Bond

Year	Cash flow	P.V. @ 8%		Proportion of bond value	Proportion of bond value x time (years)
1	14	0.926	12.964	0.105	0.105
2	14	0.857	11.998	0.097	0.194
3	14	0.794	11.116	0.089	0.267
4	14	0.735	10.290	0.083	0.332
5	114	0.681	77.634	0.626	3.130
			124.002	1.000	4.028

8. The following market data is available:

Spot USD/JPY 116.00

Deposit rates p.a.	USD	JPY
3 months	4.50%	0.25%
6 months	5.00%	0.25%

Forward Rate Agreement (FRA) for Yen is Nil.

Required:

(i) CALCULATE 3 months FRA rate at 3 months forward?

(ii) RECOMMEND arbitrage strategy, when 6 & 12 months LIBORS are 5% & 6.5% respectively and X Ltd. bank is quoting 6/12 USD FRA at 6.50 – 6.75%.?

[RTP - MAY 2018]

Answer:

(i) 3 Months Interest rate is 4.50% & 6 Months Interest rate is 5% p.a.

Future Value 6 Months from now is a product of Future Value 3 Months now & 3 Months

Future Value from after 3 Months.

$(1+0.05*6/12) = (1+0.045*3/12) \times (1+i_{3,6} *3/12)$

$i_{3,6} = [(1+0.05* 6/12) /(1+0.045 *3/12) – 1] *12/3$

i.e. 5.44% p.a.

(ii) To find arbitrage opportunity first we shall find out the 6 Months forward 6 month rate as follows:

$(1+0.065) = (1+0.05*6/12) \times (1+i_{6,6} *6/12)$

$i_{6,6} = [(1+0.065/1.025) – 1] *12/6$

6 Months forward 6 month rate is 7.80% p.a.

The Bank is quoting 6/12 USD FRA at 6.50 – 6.75%

Therefore, there is an arbitrage Opportunity of earning interest @ 7.80% p.a. & Paying @ 6.75%

Strategy: Borrow for 6 months, buy an FRA & invest for 12 months

To get $ 1.065 at the end of 12 months for $ 1 invested today

To pay$ 1.060# at the end of 12 months for every $ 1 Borrowed today

Net gain $ 0.005 i.e. risk less profit for every $ borrowed

(1+0.05/2) (1+.0675/2) = (1.05959) say 1.060

9. TMC Holding Ltd. has a portfolio of shares of diversified companies valued at Rs. 400 crore enters into a swap arrangement with None Bank on the terms that it will get 1.15% quarterly on notional principal of Rs. 400 crore in exchange of return on portfolio which is exactly tracking the Sensex which is presently 21600. CALCULATE the net payment to be received/ paid at the end of each quarter if Sensex turns out to be 21,860, 21,780, 22,080 and 21,960.
[RTP - MAY 2018]
Answer:

Qtrs. (1)	Sensex (2)	Sensex Return (%) (3)	Amount Payable (₹ Crore) (4)	Fixed Return (Receivable) (₹ Crore) (5)	Net (₹ Crore) (5) – (4)
0	21,600	-	-	-	-
1	21,860	1.2037	4.8148	4.6000	- 0.2148
2	21,780	-0.3660	-1.4640	4.6000	6.0640
3	22,080	1.3774	5.5096	4.6000	- 0.9096
4	21,960	-0.5435	-2.1740	4.6000	6.7740

10 . Ram holding shares of Reliance Industries Ltd. which is currently selling at Rs. 1000. He is expecting that this price will further fall due to lower than expected level of profits to be announced after one month. As on following option contract are available in Reliance Share.

Strike Price (₹)	Option	Premium (₹)
1030	Call	40
1010	Call	35
1000	Call	30
990	Put	35
970	Put	20
950	Put	8
930	Put	5

Ram is interested in selling his stock holding as he cannot afford to lose more than 5% of its value. RECOMMEND a hedging strategy with option and show how his position will be protected.
[RTP - NOV 2018]
Answer:
Instead of selling the stock of Reliance Ltd., Ram must cover his Risk by buying or long position in Put Option with appropriate strike price. Since Ram's risk appetite is 5%, the most suitable strike price in Put Option shall be Rs. 950 (Rs. 1000 – 5% of Rs. 1000). If Ram does so, the overall position will be as follows:

Spot Price after 1 month	Stock Value	Put Payoff	Initial Cash Flow	Total
S < 950	S	950 – S	-8	942 - S
S > 950	S	-	-8	S – 8

Thus, from the above, it can be seen that the value of holding of Ram shall never be less than Rs. 942 as Put Option will compensate for loss below spot price of Rs. 950. However, this strategy will involve a cost of Rs. 8.

11. Indira has a fund of Rs. 3 lacs which she wants to invest in share market with rebalancing target after every 10 days to start with for a period of one month from now. The present NIFTY is 5326. The minimum NIFTY within a month can at most be 4793.4. She wants to know as to how she should rebalance her portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:
(1) Immediately to start with.
(2) 10 days later-being the 1st day of rebalancing if NIFTY falls to 5122.96.
(3) 10 days further from the above date if the NIFTY touches 5539.04.
For the sake of simplicity, assume that the value of her equity component will change in tandem with that of the NIFTY and the risk free securities in which she is going to invest will have no Beta.
[RTP - MAY 2019]
Answer:

Maximum decline in one month = $\frac{5326-4793.40}{5326} \times 100 = 10\%$

(1) Immediately to start with

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (3,00,000 – 2,70,000) = ₹ 60,000

Indira may invest ₹ 60,000 in equity and balance in risk free securities.

(2) After 10 days

Value of equity = 60,000 x 5122.96/5326	=	₹ 57,713
Value of risk free investment	=	₹ 2,40,000
Total value of portfolio	=	₹ 2,97,713

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (2,97,713 – 2,70,000) = ₹ 55,426

Revised Portfolio:

Equity	=	₹ 55,426
Risk free Securities = ₹ 2,97,713 – ₹ 55,426	=	2,42,287

(3) After another 10 days

Value of equity = 55,426 x 5539.04/5122.96	=	₹ 59,928
Value of risk free investment	=	₹ 2,42,287
Total value of portfolio	=	₹ 3,02,215

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (3,02,215 – 2,70,000) = ₹ 64,430

Revised Portfolio:

Equity	=	₹ 64,430
Risk Free Securities = ₹ 3,02,215 – ₹ 64,430	=	₹ 2,37,785

The investor should off-load ` 4502 of risk free securities and divert to Equity.

12.

Mr. SG sold five 4-Month Nifty Futures on 1st February 2020 for ₹ 9,00,000. At the time of closing of trading on the last Thursday of May 2020 (expiry), Index turned out to be 2100. The contract multiplier is 75.

Based on the above information calculate:

(i) The price of one Future Contract on 1st February 2020.

(ii) Approximate Nifty Sensex on 1st February 2020 if the Price of Future Contract on same date was theoretically correct. On the same day Risk Free Rate of Interest and Dividend Yield on Index was 9% and 6% p.a. respectively.

(iii) The maximum Contango/ Backwardation.

(iv) The pay-off of the transaction.

Note: Carry out calculation on month basis.

(RTP-NOV 2020

Answer:

(i) The price of one Future Contract

Let X be the Price of Future Contract. Accordingly,

$$5 = \frac{₹9,00,000}{X}$$

X (Price of One Future Contract) = ₹ 1,80,000

(ii) Current Future price of the index = $\frac{₹1,80,000}{75}$ = 2400

Let Y be the current Nifty Index (on 1st February 2020) then

Accordingly, $Y + Y\,(0.09 - 0.06)\frac{4}{12} = 2400$

and $Y = \frac{2400}{1.01} = 2376.24$

Hence Nifty Index on 1st February 2020 shall be approximately 2376.

(iii) To determine whether the market is in Contango/ Backwardation first we shall compute Basis as follows:

Basis = Spot Price – Future Price

If Basis is negative the market is said to be in Contango and when it is positive the market is said to be Backwardation.

Since current Spot Price is 2400 and Nifty Index is 2376, the Basis is negative and hence there is Contango Market and maximum Contango shall be 24 (2400 – 2376).

(iv) Pay off on the Future transaction shall be [(2400-2100) x 375] ₹ 112500

The Future seller gains if the Spot Price is less than Futures Contract price as position shall be reversed at same Spot price. Therefore, Mr. SG has gained ₹ 1,12,500/- on the Short position taken.

13. TRC Cables Ltd. (an Indian Company) is in the business of manufacturing Electrical Cables and Data Cables including Fiber Optics cables. While mainly it exports the manufactured cables to other countries it has also established its production facilities at some African countries' due availability of raw material and cheap labour there. Some of the major raw material such as copper, aluminum and other non-ferrous

metals are also imported from foreign countries. Hence overall TRC has frequent receipts and expenditure items denominated in Non-INR currencies.
Though TRC make use of Long-Term Debts and Equity to meet its long term fund requirements but to finance its operations it make use of short-term financial instruments such as Commercial Papers, Bank Credit and Term Loans from the banks etc. If any surplus cash is left with TRC it is invested in interest yielding securities. Recently due to stiff competition from its competitors TRC has relaxed its policy for granting credit and to manage receivables it has formed a separate credit division.
Further to hedge itself against the various risk it has entered into various OTC Derivatives Contracts settled outside the Exchange.
Required:
Evaluate the major risks to which TRC Ltd. is exposed to. (MTP-OCT 2020-6 Marks)
Answer:
Following are main categories of risks to which TRC Cables is exposed to:
(i) **Financial Risks:** TRC is exposed to following financial risks:
(1) **Currency Risk**: Since most of the Receipts and Payments of TRC are denominated in Non-INR currencies it is exposed to Currency Risk.
(2) **Commodity Risk:** As major constituents of production of TRC are commodities such copper, aluminum etc. it is subject to Commodity Risk.
(3) **Interest Rate Risk**: As TRC borrows and invest money in short-term instruments it is exposed to Interest Rate Risk.
(4) **Counter Party Risk:** Due to relaxation of norms for granting credits certainly the receivable amount must have increased resulting in increased in Credit Risk.
(5) **Liquidity Risk:** Since for short-term funding requirements TRC is using Commercial Papers etc. they are exposed to Liquidity Risk as in time of need if funds are not available from these sources then securities shall be sold at discounted price.
(6) **Political Risk:** As TRC is operating in various other countries it is also exposed to Political Risks such as Restriction on Conversion of local earnings into foreign currency, restrictions on remittance etc.
(ii) **Settlement Risk:** The use of OTC Derivatives by TRC also expose it to the settlement risk as the parties with whom it has entered into the contract may not honor the same.

14. A company is long on 10 MT of copper @ Rs. 534 per kg (spot) and intends to remain so for the ensuing quarter. The variance of change in its spot and future prices are 16% and 36% respectively, having correlation coefficient of 0.75. The contract size of one contract is 1,000 kgs.
Required:
(i)Calculate the Optimal Hedge Ratio for perfect hedging in Future Market.
(ii)Advice the position to be taken in Future Market for perfect hedging.
(iii)Determine the number and the amount of the copper futures to achieve a perfect hedge.
(MTP-OCT 2020-6 Marks)
Answer:

(i) The optional hedge ratio to minimize the variance of Hedger's position is given by:

$$H = \rho \frac{\sigma S}{\sigma F}$$

Where

σ_S= Standard deviation of ΔS (Change in Spot Prices)

σ_F=Standard deviation of ΔF (Change in Future Prices)

ρ= coefficient of correlation between ΔS and ΔF

H= Hedge Ratio

ΔS = change in Spot price.

ΔF= change in Future price.

Accordingly

Standard deviation of ΔS = $\sqrt{16\%}$ = 4% and

Standard deviation of ΔF = $\sqrt{36\%}$ = 6% and

$$H = 0.75 \times \frac{0.04}{0.06} = 0.5$$

(ii) Since the company is long position in Spot (Cash) Market it shall take Short Position in Futur Market.

(iii) Since contact size of one contract is 1,000 Kg, the

$$\text{No. of contract to be short} = \frac{10{,}000 \text{ Kgs}}{1{,}000 \text{ Kgs}} \times 0.50 = 5 \text{ Contracts}$$

Amount = 5000 x ₹ 534 = ₹ 26,70,000

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CHAPTER-9 FOREIGN EXCHANGE EXPOSURE AND RISK MANAGEMENT

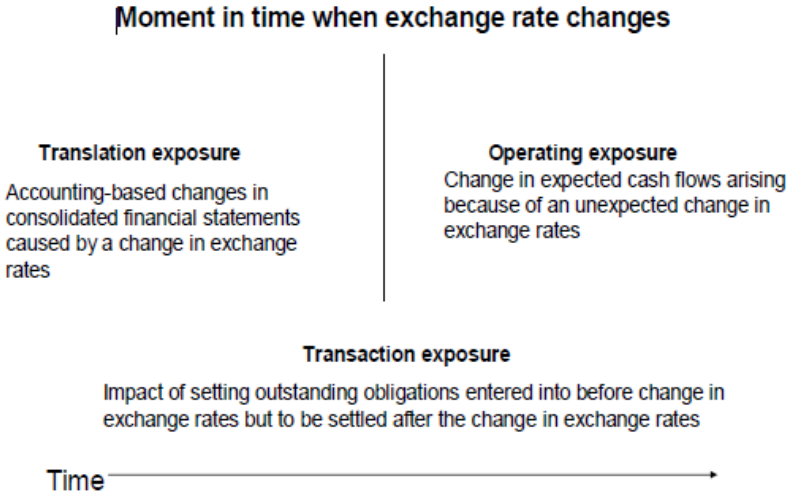
QUESTIONS FROM STUDY MATERIAL

Theoretical Questions

1. What do you mean by Nostro, Vostro and Loro Accounts?
Answer:

In interbank transactions, foreign exchange is transferred from one account to another account and from one centre to another centre. Therefore, the banks maintain three types of current accounts in order to facilitate quick transfer of funds in different currencies. These accounts are Nostro, Vostro and Loro accounts meaning "our", "your" and "their". A bank's foreign currency account maintained by the bank in a foreign country and in the home currency of that country is known as Nostro Account or "our account with you". For example, An Indian bank's Swiss franc account with a bank in Switzerland. Vostro account is the local currency account maintained by a foreign bank/branch. It is also called "your account with us". For example, Indian rupee account maintained by a bank in Switzerland with a bank in India. The Loro account is an account wherein a bank remits funds in foreign currency to another bank for credit to an account of a third bank.

2. "Operations in foreign exchange market are exposed to a number of risks." Discuss.
Answer:



Transaction Exposure

It measures the changes in the value of outstanding financial obligation incurred prior to a change in exchange rates but not due to be settled until after the exchange rates change. Thus, it deals with the

changes in the cashflow which arise from existing contractual obligation. In fact, the transaction exposures are the most common ones amongst all the exposures. Let's take an example of a company which exports to US and the export receivables are also denominated in USD. While doing budgeting the company had assumed USD/INR rate of Rs. 62 per USD. By the time the exchange inward remittance arrives. USD/INR could move down to Rs. 57 leading to wiping off of commercial profit for exporter. Such transaction exposures arise whenever a business has foreign currency denominated receipts or payments. The risk is an adverse movement of the exchange rate from the time the transaction is budgeted till the time the exposure is extinguished by sale or purchase of the foreign currency against the domestic currency.

Translation Exposure

It refers to gains or losses caused by the translation of foreign currency assets and liabilities into the currency of the parent company for consolidation purposes. Translation exposures arise due to the need to "translate" foreign currency assets and liabilities into the home currency for the purpose of finalizing the accounts for any given period. A typical example of translation exposure is the treatment of foreign currency loans. It will be readily seen that both transaction and translation exposures affect the bottom line of a company. The effect could be positive as well if the movement is favorable – i.e., in the cited examples, in case the USD would have appreciated and the USD would have depreciated against the rupee.

An important observation is that the translation exposure, of course, becomes a transaction exposure at some stage: the dollar loan has to be repaid by undertaking the transaction of purchasing dollars.

Economic Exposure

It refers to the extent to which the economic value of a company can decline due to changes in exchange rate. It is the overall impact of exchange rate changes on the value of the firm. The essence of economic exposure is that exchange rate changes significantly alter the cost of a firm's inputs and the prices of its outputs and thereby influence its competitive position substantially.

Practical Illustrations

1. 1. Suppose you are a dealer of ABC Bank and on 20.10.2014 you found that balance in your Nostro account with XYZ Bank in London is £65,000 and you had overbought £35,000. During the day following transaction have taken place:

	£
DD purchased	12,500
Purchased a Bill on London	40,000
Sold forward TT	30,000
Forward purchase contract cancelled	15,000
Remitted by TT	37,500
Draft on London cancelled	15,000

What steps would you take, if you are required to maintain a credit Balance of £7,500 in the Nostro A/c and keep as overbought position on £7,500?

Answer:

Exchange Position:

Particulars	Purchase £	Sale £
Opening Balance Overbought	35,000	—
DD Purchased	12,500	—
Purchased a Bill on London	40,000	—
Sold forward TT	—	30,000
Forward purchase contract cancelled	—	15,000
TT Remittance		37,500
Draft on London cancelled	15,000	—
	1,02,500	82,500
Closing Balance Overbougt	—	20,000
	1,02,500	1,02,500

Cash Position (Nostro A/c)

	Credit £	Debit £
Opening balance credit	65,000	—
TT Remittance	—	37,500
	65,000	37,500
Closing balance (credit)	—	27,500
	65,000	65,000

To maintain Cash Balance in Nostro Account at £7,500 you have to sell £20,000 in Spot which will bring Overbought exchange position to Nil. Since bank require Overbought position of £7,500 it has to buy the same in forward market.

2. If the Indian rupee is the home currency and the foreign currency is the US Dollar then what is the exchange rate between the rupee and the US dollar?

Answer:

US$ 0.0217/Rs. 1 reads "0.0217 US dollar per rupee." This means that for one Indian rupee one can buy 0.0217 US dollar. In this method, known as the European terms, the rate is quoted in terms of the number of units of the foreign currency for one unit of the domestic currency. This is called an indirect quote.

The alternative method, called the American terms, expresses the home currency price of one unit of the foreign currency. This is called a direct quote. This means the exchange rate between the US dollar and rupee can be expressed as: Rs. 46.08/US$ reads "Rs. 46.08 per US dollar."

Hence, a relationship between US dollar and rupee can be expressed in two different ways which have the same meaning:

: One can buy 0.0217 US dollars for one Indian rupee.

: Rs. 46.08 Indian rupees are needed to buy one US dollar.

3. 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.

Answer:

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.

4. On 1 October 2015 Mr. X an exporter enters into a forward contract with a BNP Bank to sell US$ 1,00,000 on 31 December 2015 at Rs. 65.40/$. However, due to the request of the importer, Mr. X received amount on 28 November 2015. Mr. X requested the bank the take delivery of the remittance on 30 November 2015 i.e. before due date. The interbanking rates on 28 November 2015 was as follows:

Spot Rs. 65.22/65.27

One Month Premium 10/15

If bank agrees to take early delivery then what will be net inflow to Mr. X assuming that the prevailing prime lending rate is 18% [ALSO ASKED IN MAY 2019 EXAMS - 8 MARKS | MTP OCTOBER 2018 - 8 MARKS]

Answer:

Bank will buy from customer at the agreed rate of Rs. 65.40. In addition to the same if bank will charge/ pay swap difference and interest on outlay funds.

(a) Swap Difference

Bank Sells at Spot Rate on 28 November 2015	Rs. 65.22
Bank Buys at Forward Rate of 31 December 2015 (65.27 + 0.15)	Rs. 65.42
Swap Loss per US$	Rs. 00.20
Swap loss for US$ 1,00,000	Rs. 20,000

(b) Interest on Outlay Funds

On 28th November Bank sells at	Rs. 65.22
It buys from customer at	Rs. 65.40
Outlay of Funds per US$	Rs. 00.18
Interest on Outlay fund for US$ 1,00,000 for 31 days (US$100000 x 00.18 x 31/365 x 18%)	Rs. 275.00

(c) Charges for early delivery

Swap loss	Rs. 20,000.00
Interest on Outlay fund for US$ 1,00,000 for 31 days	Rs. 275.00
	Rs. 20,275.00

(d) Net Inflow to Mr. X

Amount received on sale (Rs. 65.40 x 1,00,000)	Rs. 65,40,000
Less: Charges for early delivery payable to bank	(Rs. 20,275)
	Rs. 65,19,725

5. On 15th January 2015 you as a banker booked a forward contract for US$ 250000 for your import customer deliverable on 15th March 2015 at Rs. 65.3450. On due date customer request you to cancel the contract. On this date quotation for US$ in the inter-bank market is as follows:

Spot Rs. 65.2900/2975 per US$

Spot/ April 3000/ 3100

Spot/ May 6000/ 6100

Assuming that the flat charges for the cancellation is Rs. 100 and exchange margin is 0.10%, then determine the cancellation charges payable by the customer.

Answer:

Bank will buy from customer at the agreed rate of Rs. 65.40.
Since this is sale contract the contract shall be cancelled at ready buying rate on the date of cancellation as follows:

Spot Buying Rate on 15 March 2015	Rs. 65.2900
Less: Exchange Margin	Rs. 0.0653
	Rs. 65.2247
Rounded to Rs. 65.2250	
Dollar sold to customer at	Rs. 65.3450
Dollar bought from customer	Rs. 65.2250
Net amount payable by the customer per US$	Rs. 0.1200
Amount payable by the customer	
Flat Charges	Rs. 100.00
Cancellation Charges (Rs. 0.12 x 250000)	Rs. 30,000.00
	Rs. 30,100.00

6. You as a banker has entered into a 3 month's forward contract with your customer to purchase AUD 1,00,000 at the rate of Rs. 47.2500. However after 2 months your customer comes to you and requests cancellation of the contract. On this date quotation for AUD in the market is as follows:

Spot	**Rs. 47.3000/3500 per AUD**
1 month forward	**Rs. 47.4500/5200 per AUD**

Determine the cancellation charges payable by the customer

Answer:

The contract shall be cancelled at the 1 month forward sale rate of Rs. 47.5200 as follows:

AUD bought from customer under original forward contract at	Rs. 47.2500
On cancellation it is sold to him at	Rs. 47.5200
Net amount payable by customer per AUD	Rs. 00.2700

Thus total cancellation charges payable by the customer Rs. 27,000

7. Suppose you are a banker and one of your export customer has booked a US$ 1,00,000 forward sale contract for 2 months with you at the rate of Rs. 62.5200 and simultaneously you covered yourself in the interbank market at Rs. 62.5900. However on due date, after 2 months your customer comes to you and requests for cancellation of the contract and also requests for extension of the contract by one month. On this date quotation for US$ in the market was as follows:

Spot	**Rs. 62.7200/62.6800**
1 month forward	**Rs. 62.6400/62.7400**

Determine the extension charges payable by the customer assuming exchange margin of 0.10% on buying as well as selling.

Answer:

Cancellation

First the original contract shall be cancelled as follows:

US$/Rs. Spot Selling Rate	Rs. 62.7200
Add: Margin @ 0.10%	Rs. 0.06272
Net amount payable by customer per US$	Rs. 62.78272
Rounded off Rs. 62.7825	
Bank buys US$ under original contract at	Rs. 62.5200

Bank Sells at	Rs. 62.7825
	Rs. 0.2675

Thus total cancellation charges payable by the customer for US$ 1,00,000 is Rs. 26,750.

Rebooking

Forward US$/Rs. Buying Rate	Rs. 62.6400
Less: Margin @ 0.10%	Rs. 0.06264
Net amount payable by customer per US$	Rs. 62.57736

Rounded off Rs. 62.5775

8. Suppose you as a banker entered into a forward purchase contract for US$ 50,000 on 5th March with an export customer for 3 months at the rate of Rs. 59.6000. On the same day you also covered yourself in the market at Rs. 60.6025. However on 5th May your customer comes to you and requests extension of the contract to 5thJuly. On this date (5th May) quotation for US$ in the market is as follows:

Spot	**Rs. 59.1300/1400 per US$**
Spot/ 5th June	**Rs. 59.2300/2425 per US$**
Spot/ 5th July	**Rs. 59.6300/6425 per US$**

Assuming a margin 0.10% on buying and selling, determine the extension charges payable by the customer and the new rate quoted to the customer.

Answer:

(a) Cancellation of Original Contract

The forward purchase contract shall be cancelled at the for the forward sale rate for delivery June.

Interbank forward selling rate	Rs. 59.2425
Add: Exchange Margin	Rs. 0.0592
Net amount payable by customer per US$	Rs. 59.3017

Rounded off, the rate applicable is Rs. 59.3000

Buying US$ under original contract at original rate	Rs. 59.6000
Selling rate to cancel the contract	Rs. 59.3000
Difference per US$	Rs. 00.3000

Exchange difference for US$ 50,000 payable to the customer is Rs. 15,000.

(b) Rate for booking new contract

The forward contract shall be rebooked with the delivery 15th July as follows:

Forward buying rate (5 th July)	Rs. 59.6300
Less: Exchange Margin	Rs. 0.0596
Net amount payable by customer per US$	Rs. 59.5s704

Rounded off to Rs. 59.5700

9. An importer booked a forward contract with his bank on 10th April for USD 2,00,000 due on 10th June @ Rs. 64.4000. The bank covered its position in the market at Rs. 64.2800. The exchange rates for dollar in the interbank market on 10th June and 20th June were:

	10th June	20th June
Spot USD 1=	₹ 63.8000/8200	₹ 63.6800/7200
Spot/June	₹ 63.9200/9500	₹ 63.8000/8500
July	₹ 64.0500/0900	₹ 63.9300/9900
August	₹ 64.3000/3500	₹ 64.1800/2500
September	₹ 64.6000/6600	₹ 64.4800/5600

Exchange Margin 0.10% and interest on outlay of funds @ 12%. The importer requested on 20th June for extension of contract with due date on 10th August. Rates rounded to 4 decimal in multiples of 0.0025. On 10th June, Bank Swaps by selling spot and buying one month forward. Calculate:

(i) Cancellation rate
(ii) Amount payable on $ 2,00,000
(iii) Swap loss
(iv) Interest on outlay of funds, if any
(v) New contract rate
(vi) Total Cost
[ALSO ASKED IN RTP - MAY 2018]

Answer:

(i) **Cancellation Rate:**

The forward sale contract shall be cancelled at Spot TT Purchase for $ prevailing on the date of cancellation as follows:

$/ ₹ Market Buying Rate	₹ 63.6800
Less: Exchange Margin @ 0.10%	₹ 0.0636
	₹ 63.6163

Rounded off to ₹ 63.6175

(ii) **Amount payable on $ 2,00,000**

Bank sells $2,00,000 @ ₹ 64.4000	₹ 1,28,80,000
Bank buys $2,00,000 @ ₹ 63.6163	₹ 1,27,23,260
Amount payable by customer	₹ 1,56,740

(iii) **Swap Loss**

On 10th June the bank does a swap sale of $ at market buying rate of ₹ 63.8000 and forward purchase for June at market selling rate of ₹ 63.9500.

Bank buys at	₹ 63.9500
Bank sells at	₹ 63.8000
Amount payable by customer	₹ 0.1500

Swap Loss for $ 2,00,000 in ₹ = ₹ 30,000

(iv) **Interest on Outlay of Funds**

On 10th April, the bank receives delivery under cover contract at ₹ 64.2800 and sell spot at ₹ 63.8000.

Bank buys at	₹ 64.2800
Bank sells at	₹ 63.8000
Amount payable by customer	₹ 0.4800

Outlay for $ 2,00,000 in ₹ 96,000

Interest on ₹ 96,000 @ 12% for 10 days ₹ 320

(v) **New Contract Rate**

The contract will be extended at current rate

$/ ₹ Market forward selling Rate for August	₹ 64.2500
Add: Exchange Margin @ 0.10%	₹ 0.0643
	₹ 64.3143

Rounded off to ₹ 64.3150

(vi) **Total Cost**

Cancellation Charges	₹ 1,56,740.00
Swap Loss	₹ 30,000.00
Interest	₹ 320.00
	₹ 1,87,060.00

Practical Questions

1. 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.

Answer:

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.

First we shall compute return on bond which will be common for both investors.

$$\text{Return} = \frac{(\text{Price at end} - \text{Price at begining}) + \text{Interest}}{\text{Price at begining}}$$

$$= \frac{(5250-5000)+350}{5000}$$

$$= \frac{250+350}{5000} = 0.12 \text{ say } 12\%$$

(i) 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:

Return x 1.02 = 0.12 x 1.02=0.1224 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 =1.12X1.02 - 1 = 0.1424 i.e. 14.24%

2. ABN-Amro Bank, Amsterdam, wants to purchase Rs. 15 million against US$ for funding their Nostro account with Canara Bank, New Delhi. Assuming the inter-bank, rates of US$ is Rs. 51.3625/3700, what would be the rate Canara Bank would quote to ABN-Amro Bank? Further, if the deal is struck, what would be the equivalent US$ amount.

Answer:

Here Canara Bank shall buy US$ and credit ₹ to Vostro account of ABN-Amro Bank. Canara Bank's buying rate will be based on the Inter-bank Buying Rate (as this is the rate at which Canara Bank can sell US$ in the Interbank market)

Accordingly, the Interbank Buying Rate of US$ will be ₹ 51.3625 (lower of two) i.e. (1/51.3625) = $ 0.01947/₹

Equivalent of US$ for ₹ 15 million at this rate will be

$$= \frac{15,000,000}{51.3625} = \text{US\$ } 2,92,041.86$$

or $= 15,000,000 \times \$\ 0.01947 = \text{US\$ } 2,92,050$

3. XYZ Bank, Amsterdam, wants to purchase Rs. 25 million against £ for funding their Nostro account and they have credited LORO account with Bank of London, London.
Calculate the amount of £'s credited. Ongoing inter-bank rates are per $, Rs. 61.3625/3700 & per £, $ 1.5260/70.

Answer:

To purchase Rupee, XYZ Bank shall first sell £ and purchase $ and then sell $ to purchase Rupee. Accordingly, following rate shall be used:

$(£/₹)_{ask}$

The available rates are as follows:

$(\$/£)_{bid}$ = $1.5260

$(\$/£)_{ask}$ = $1.5270

$(₹/\$)_{bid}$ = ₹ 61.3625

$(₹/\$)_{ask}$ = ₹ 61.3700

From above available rates we can compute required rate as follows:

$(£/₹)_{ask} = (£/\$)_{ask} \times (\$/₹)_{ask}$

$= (1/1.5260) \times (1/61.3625)$

= £ 0.01068 or £ 0.0107

Thus, amount of £ to be credited

= ₹ 25,000,000 x £ 0.0107

= £ 267,500

4. ABC Ltd. of UK has exported goods worth Can $ 5,00,000 receivable in 6 months. The exporter wants to hedge the receipt in the forward market. The following information is available:
Spot Exchange Rate Can $ 2.5/£
Interest Rate in UK 12%
Interest Rate In Canada 15%
The forward rates truly reflect the interest rates differential. Find out the gain/loss to UK exporter if Can $ spot rates (i) declines 2%, (ii) gains 4% or (iii) remains unchanged over next 6 months.
Answer:

$$\text{Forward Rate} = \frac{2.50\,(1+0.075)}{(1+0.060)} = \text{Can\$ } 2.535/£$$

(i) If spot rate decline by 2%

Spot Rate = Can$ 2.50 x 1.02 = Can$ 2.55/£

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239

£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.55)	1,96,078
Gain due to forward contract	1,161

(ii) If spot rate gains by 4%

Spot Rate = Can$ 2.50 x 0.96 = Can$ 2.40/£

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239
£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.40)	2,08,333
Loss due to forward contract	11,094

(iii) If spot rate remains unchanged

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239
£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.50)	2,00,000
Loss due to forward contract	2,761

5. On April 3, 2016, a Bank quotes the following:
Spot exchange Rate (US $ 1) INR 66.2525 INR 67.5945
2 months' swap points 70 90
3 months' swap points 160 186
In a spot transaction, delivery is made after two days.
Assume spot date as April 5, 2016.

Assume 1 swap point = 0.0001,
You are required to:
(i) ascertain swap points for 2 months and 15 days. (For June 20, 2016),
(ii) determine foreign exchange rate for June 20, 2016, and
(iii) compute the annual rate of premium/discount of US$ on INR, on an average rate.
[ALSO IN MTP - MARCH 2019 -- 8 MARKS]
Answer:

(i) Swap Points for 2 months and 15 days

	Bid	Ask
Swap Points for 2 months (a)	70	90
Swap Points for 3 months (b)	160	186
Swap Points for 30 days (c) = (b) – (a)	90	96
Swap Points for 15 days (d) = (c)/2	45	48
Swap Points for 2 months & 15 days (e) = (a) + (d)	115	138

(ii) Foreign Exchange Rates for 20th June 2016

	Bid	Ask
Spot Rate (a)	66.2525	67.5945
Swap Points for 2 months & 15 days (b)	0.0115	0.0138
	66.2640	67.6083

(iii) Annual Rate of Premium

	Bid	Ask
Spot Rate (a)	66.2525	67.5945
Foreign Exchange Rates for 20th June 2016 (b)	66.2640	67.6083
Premium (c)	0.0115	0.0138
Total (d) = (a) + (b)	132.5165	135.2028
Average (d) / 2	66.2583	67.6014
Premium	$\frac{0.0115}{66.2583} \times \frac{12}{2.5} \times 100$ = 0.0833%	$\frac{0.0138}{67.6014} \times \frac{12}{2.5} \times 100$ = 0.0980%

6. JKL Ltd., an Indian company has an export exposure of JPY 10,000,000 receivable August 31, 2014. Japanese Yen (JPY) is not directly quoted against Indian Rupee.
The current spot rates are:
INR/US $ = Rs. 62.22
JPY/US$ = JPY 102.34

It is estimated that Japanese Yen will depreciate to 124 level and Indian Rupee to depreciate against US $ to Rs. 65.

Forward rates for August 2014 are

INR/US $ = Rs. 66.50

JPY/US$ = JPY 110.35

Required:

(i) Calculate the expected loss, if the hedging is not done. How the position will change, if the firm takes forward cover?

(ii) If the spot rates on August 31, 2014 are:

INR/US $= Rs. 66.25

JPY/US$ = JPY 110.85

Is the decision to take forward cover justified?

Answer:

Since the direct quote for ¥ and Rs. is not available it will be calculated by cross exchange rate as follows:

₹/$ x $/¥ = ₹/¥

62.22/102.34 = 0.6080

Spot rate on date of export 1¥ = ₹ 0.6080

Expected Rate of ¥ for August 2014 = ₹ 0.5242 (₹ 65/¥124)

Forward Rate of ¥ for August 2014 = ₹ 0.6026 (₹ 66.50/¥110.35)

(i) Calculation of expected loss without hedging

Value of export at the time of export (₹ 0.6080 x ¥10,000,000)	₹ 60,80,000
Estimated payment to be received on Aug. 2014 (₹ 0.5242 x ¥10,000,000)	₹ 52,42,000
Loss	₹ 8,38,000

Hedging of loss under Forward Cover

₹ Value of export at the time of export (₹ 0.6080 x ¥10,000,000)	₹ 60,80,000
Payment to be received under Forward Cover (₹ 0.6026 x ¥10,000,000)	₹ 60,26,000
Loss	₹ 54,000

By taking forward cover loss is reduced to ₹ 54,000.

(ii) Actual Rate of ¥ on August 2014 = ₹ 0.5977 (₹ 66.25/¥110.85)

Value of export at the time of export (₹ 0.6080 x ¥10,000,000)	₹ 60,80,000
Estimated payment to be received on Aug. 2014 (₹ 0.5977 x ¥10,000,000)	₹ 59,77,000
Loss	₹ 1,03,000

The decision to take forward cover is still justified.

7. You sold Hong Kong Dollar 1,00,00,000 value spot to your customer at Rs. 5.70 & covered yourself in London market on the same day, when the exchange rates were
US$ 1 = H.K.$ 7.5880 7.5920
Local inter bank market rates for US$ were
Spot US$ 1 = Rs. 42.70 42.85
Calculate cover rate and ascertain the profit or loss in the transaction. Ignore brokerage.
Answer:

The bank (Dealer) covers itself by buying from the market at market selling rate.

Rupee – Dollar selling rate	= ₹ 42.85
Dollar – Hong Kong Dollar	= HK $ 7.5880
Rupee – Hong Kong cross rate	= ₹ 42.85 / 7.5880
	= ₹ 5.6471

Profit / Loss to the Bank

Amount received from customer (1 crore × 5.70)	₹ 5,70,00,000
Amount paid on cover deal (1 crore × 5.6471)	₹ 5,64,71,000
Profit to Bank	₹ 5,29,000

8. You, a foreign exchange dealer of your bank, are informed that your bank has sold a T.T. on Copenhagen for Danish Kroner 10,00,000 at the rate of Danish Kroner 1 = Rs. 6.5150. You are required to cover the transaction either in London or New York market. The rates on that date are as under:

Mumbai-London	₹ 74.3000	₹ 74.3200
Mumbai-New York	₹ 49.2500	₹ 49.2625
London-Copenhagen	DKK 11.4200	DKK 11.4350
New York-Copenhagen	DKK 07.5670	DKK 07.5840

In which market will you cover the transaction, London or New York, and what will be the exchange profit or loss on the transaction? Ignore brokerages.
Answer:

Amount realized on selling Danish Kroner 10,00,000 at ₹ 6.5150 per Kroner = ₹ 65,15,000.

Cover at London:

Bank buys Danish Kroner at London at the market selling rate.

Pound sterling required for the purchase (DKK 10,00,000 ÷ DKK 11.4200) = GBP 87,565.67

Bank buys locally GBP 87,565.67 for the above purchase at the market selling rate of ₹ 74.3200.

The rupee cost will be = ₹ 65,07,88

Profit (₹ 65,15,000 - ₹ 65,07,881) = ₹ 7,119

Cover at New York:

Bank buys Kroners at New York at the market selling rate.

Dollars required for the purchase of Danish Kroner (DKK10,00,000 ÷ 7.5670) = USD 1,32,152.77

Bank buys locally USD 1,32,152.77 for the above purchase at the market selling rate of ₹ 49.2625.

The rupee cost will be = ₹ 65,10,176.

Profit (₹ 65,15,000 - ₹ 65,10,176) = ₹ 4,824

The transaction would be covered through London which gets the maximum profit of Rs. 7,119 or lower cover cost at London Market by (Rs. 65,10,176 - Rs. 65,07,881) = Rs. 2,295

9. On January 28, 2013 an importer customer requested a Bank to remit Singapore Dollar (SGD) 2,500,000 under an irrevocable Letter of Credit (LC). However, due to unavoidable factors, the Bank could effect the remittances only on February 4, 2013. The inter-bank market rates were as follows:

		January 28, 2013	February 4, 2013
US$ 1=		₹ 45.85/45.90	₹ 45.91/45.97
GBP £ 1	=	US$ 1.7840/1.7850	US$ 1.7765/1.7775
GBP £ 1	=	SGD 3.1575/3.1590	SGD 3. 1380/3.1390

The Bank wishes to retain an exchange margin of 0.125%
Required:
How much does the customer stand to gain or lose due to the delay?
(Note: Calculate the rate in multiples of 0.0001)

Answer:

On January 28, 2013 the importer customer requested to remit SGD 25 lakhs.

To consider sell rate for the bank:

US $	=	₹45.90
Pound 1	=	US$ 1.7850
Pound 1	=	SGD 3.1575
Therefore, SGD 1	=	₹ 45.90 * 1.7850 / SGD 3.1575
SGD 1	=	₹25.9482
Add: Exchange margin (0.125%)		₹ 0.0324
		₹ 25.9806

On February 4, 2013 the rates are

US $	=	₹ 45.97
Pound 1	=	US$ 1.7775
Pound 1	=	SGD 3.1380
Therefore, SGD 1	=	₹ 45.97 * 1.7775 / SGD 3.1380
SGD 1	=	₹ 26.0394
Add: Exchange margin (0.125%)		₹ 0.0325
		₹ 26.0719

Hence, loss to the importer

= SGD 25,00,000 (₹26.0719 – ₹25.9806)= ₹2,28,250

10. Following are the details of cash inflows and outflows in foreign currency denominations of MNP Co. an Indian export firm, which have no foreign subsidiaries:

Currency	Inflow	Outflow	Spot rate	Forward rate
US $	4,00,00,000	2,00,00,000	48.01	48.82
French Franc (FFr)	2,00,00,000	80,00,000	7.45	8.12
U.K. £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese Yen	1,50,00,000	2,50,00,000	3.20	2.40

(i) Determine the net exposure of each foreign currency in terms of Rupees.
(ii) Are any of the exposure positions offsetting to some extent?
Answer:

(i) Net exposure of each foreign currency in Rupees

	Inflow (Millions)	Outflow (Millions)	Net Inflow (Millions)	Spread	Net Exposure (Millions)
US$	40	20	20	0.81	16.20
FFr	20	8	12	0.67	8.04
UK£	30	20	10	0.41	4.10
Japan Yen	15	25	-10	-0.80	8.00

(ii) The exposure of Japanese yen position is being offset by a better forward rate

11. The following 2-way quotes appear in the foreign exchange market:

	Spot	2-months forward
RS/US $	**Rs.46.00/Rs.46.25**	**Rs.47.00/Rs.47.50**

Required:

(i) How many US dollars should a firm sell to get Rs. 25 lakhs after 2 months?

(ii) How many Rupees is the firm required to pay to obtain US $ 2,00,000 in the spot market?

(iii) Assume the firm has US $ 69,000 in current account earning no interest. ROI on Rupee investment is 10% p.a. Should the firm encash the US $ now or 2 months later?

Answer:

(i) US $ required to get ₹ 25 lakhs after 2 months at the Rate of ₹ 47/$

$$\therefore \frac{₹\ 25,00,000}{₹\ 47} = \text{US \$ } 53191.489$$

(ii) ₹ required to get US$ 2,00,000 now at the rate of ₹ 46.25/$

∴ US $ 200,000 × ₹ 46.25 = ₹ 92,50,000

(iii) Encashing US $ 69000 Now Vs 2 month later

Proceed if we can encash in open mkt $ 69000 × ₹46 = ₹ 31,74,000

Opportunity gain

$$= 31{,}74{,}000 \times \frac{10}{100} \times \frac{2}{12} \qquad ₹\ \ 52{,}900$$

Likely sum at end of 2 months 32,26,900

Proceeds if we can encash by forward rate :

$ 69000 × ₹47.00 32,43,000

It is better to encash the proceeds after 2 months and get opportunity gain.

12. Z Ltd. importing goods worth USD 2 million, requires 90 days to make the payment. The overseas supplier has offered a 60 days interest free credit period and for additional credit for 30 days an interest of 8% per annum.

The bankers of Z Ltd offer a 30 days loan at 10% per annum and their quote for foreign exchange is as follows:

	₹
Spot 1 USD	56.50
60 days forward for 1 USD	57.10
90 days forward for 1 USD	57.50

You are required to evaluate the following options:
(i) Pay the supplier in 60 days, or
(ii) Avail the supplier's offer of 90 days credit.

Answer:

(i) Pay the supplier in 60 days

If the payment is made to supplier in 60 days the applicable forward rate for 1 USD	₹ 57.10
Payment Due	USD 2,000,000
Outflow in Rupees (USD 2000000 × ₹57.10)	₹114,200,000
Add: Interest on loan for 30 days@10% p.a.	₹ 9,51,667
Total Outflow in ₹	₹11,51,51,667

(ii) Availing supplier's offer of 90 days credit

Amount Payable	USD 2,000,000
Add: Interest on credit period for 30 days@8% p.a.	USD 13,333
Total Outflow in USD	USD 2,013,333
Applicable forward rate for 1 USD	₹57.50
Total Outflow in ₹ (USD 2,013,333 ×₹57.50)	₹115,766,648

Alternative 1 is better as it entails lower cash outflow.

13. Followings are the spot exchange rates quoted at three different forex markets:

USD/INR	**48.30 in Mumbai**
GBP/INR	**77.52 in London**
GBP/USD	**1.6231 in New York**

The arbitrageur has USD1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates. [ALSO IN RTP - MAY 2020]

Answer:

The arbitrageur can proceed as stated below to realize arbitrage gains.

(i) Buy Rs. from USD 10,000,000 At Mumbai 48.30 × 10,000,000 Rs.483,000,000

(ii) Convert these ₹ to GBP at London $\left(\frac{₹\ 483,000,000}{₹\ 77.52}\right)$ GBP 6,230,650.155

(iii) Convert GBP to USD at New York GBP 6,230,650.155 × 1.6231 USD 10,112,968.26

There is net gain of USD 10,112968.26 less USD 10,000,000 i.e. USD 112,968.26

14. The US dollar is selling in India at Rs. 55.50. If the interest rate for 6 months borrowing in India is 10% per annum and the corresponding rate in USA is 4%.
(i) Do you expect that US dollar will be at a premium or at discount in the Indian Forex Market?
(ii) What will be the expected 6-months forward rate for US dollar in India? and
(iii) What will be the rate of forward premium or discount?
Answer:
(i) Under the given circumstances, the USD is expected to quote at a premium in India as the interest rate is higher in India.

(ii) Calculation of the forward rate:

$$\frac{1+R_h}{1+R_f}=\frac{F_1}{E_o}$$

Where: R_h is home currency interest rate, R_f is foreign currency interest rate, F_1 i end of the period forward rate, and E_o is the spot rate.

Therefore $\frac{1+(0.10/2)}{1+(0.04/2)}=\frac{F_1}{55.50}$

$$\frac{1+0.05}{1+0.02}=\frac{F_1}{55.50}$$

or $\frac{1.05}{1.02}\times 55.50 = F_1$

or $\frac{58.275}{1.02} = F_1$

or F_1 = ₹57.13

(iii) Rate of premium:

$$\frac{57.13-55.50}{55.50}\times\frac{12}{6}\times 100 = 5.87\%$$

15. In March, 2009, the Multinational Industries make the following assessment of dollar rates per British pound to prevail as on 1.9.2009:

$/Pound	Probability
1.60	0.15
1.70	0.20
1.80	0.25
1.90	0.20
2.00	0.20

(i) What is the expected spot rate for 1.9.2009?
(ii) If, as of March, 2009, the 6-month forward rate is $ 1.80, should the firm sell forward its pound receivables due in September, 2009?
Answer:

(i) Calculation of expected spot rate for September, 2009:

$ for £ *(1)*	*Probability* *(2)*	*Expected $/£* *(1) × (2) = (3)*
1.60	0.15	0.24
1.70	0.20	0.34
1.80	0.25	0.45
1.90	0.20	0.38
2.00	0.20	0.40
	1.00	EV = 1.81

Therefore, the expected spot value of $ for £ for September, 2009 would be $ 1.81.
(ii) If the six-month forward rate is $ 1.80, the expected profits of the firm can be maximised by retaining its pounds receivable.

16. An importer customer of your bank wishes to book a forward contract with your bank on 3rd September for sale to him of SGD 5,00,000 to be delivered on 30th October.
The spot rates on 3rd September are USD 49.3700/3800 and USD/SGD 1.7058/68. The swap points are:

USD /₹		USD/SGD	
Spot/September	0300/0400	1st month forward	48/49
Spot/October	1100/1300	2nd month forward	96/97
Spot/November	1900/2200	3rd month forward	138/140
Spot/December	2700/3100		
Spot/January	3500/4000		

Calculate the rate to be quoted to the importer by assuming an exchange margin of paisa.
Answer:

USD/ ₹ on 3rd September	49.3800
Swap Point for October	0.1300
	49.5100
Add: Exchange Margin	0.0500
	49.5600
USD/ SGD on 3rd September	1.7058
Swap Point for 2nd month Forward	0.0096
	1.7154

Cross Rate for SGD/ ₹ of 30th October

USD/ ₹ selling rate = ₹ 49.5600

SGD/ ₹ buying rate = SGD 1.7154

SGD/ ₹ cross rate = ₹ 49.5600 / 1.7154 = ₹ 28.8912

17. A company operating in Japan has today effected sales to an Indian company, the payment being due 3 months from the date of invoice. The invoice amount is 108 lakhs yen. At today's spot rate, it is equivalent to Rs. 30 lakhs. It is anticipated that the exchange rate will decline by 10% over the 3 months period and in order to protect the yen payments, the importer proposes to take appropriate action in the foreign exchange market. The 3 months forward rate is presently quoted as 3.3 yen per rupee. You are required to calculate the expected loss and to show how it can be hedged by a forward contract.

Answer:

Spot rate of Rs. 1 against yen = 108 lakhs yen/Rs. 30 lakhs = 3.6 yen

3 months forward rate of Re. 1 against yen = 3.3 yen

Anticipated decline in Exchange rate = 10%.

Expected spot rate after 3 months = 3.6 yen – 10% of 3.6 = 3.6 yen – 0.36 yen = 3.24 yen per rupee

	₹ (in lakhs)
Present cost of 108 lakhs yen	30.00
Cost after 3 months: 108 lakhs yen/ 3.24 yen	33.33
Expected exchange loss	3.33
If the expected exchange rate risk is hedged by a Forward contract:	
Present cost	30.00
Cost after 3 months if forward contract is taken 108 lakhs yen/ 3.3 yen	32.73
Expected loss	2.73

Suggestion: If the exchange rate risk is not covered with forward contract, the expected exchange loss is Rs. 3.33 lakhs. This could be reduced to Rs. 2.73 lakhs if it is covered with Forward contract. Hence, taking forward contract is suggested.

18. ABC Co. have taken a 6 month loan from their foreign collaborators for US Dollars 2 millions. Interest payable on maturity is at LIBOR plus 1.0%. Current 6-month LIBOR is 2%.

Enquiries regarding exchange rates with their bank elicits the following information:
Spot USD 1 Rs. 48.5275
6 months forward Rs. 48.4575
(i) What would be their total commitment in Rupees, if they enter into a forward contract?
(ii) Will you advise them to do so? Explain giving reasons.
Answer:
Firstly, the interest is calculated at 3% p.a. for 6 months. That is:
USD 20,00,000 × 3/100 × 6/12 = USD 30,000

From the forward points quoted, it is seen that the second figure is less than the first, this means that the currency is quoted at a discount.
(i) The value of the total commitment in Indian rupees is calculated as below:

Principal Amount of loan	USD 20,00,000
Add: Interest	USD 30,000
Amount due	USD 20,30,000
Spot rate	Rs. 48.5275
Forward Points (6 months)	(–) 0.0700
Forward Rate	Rs. 48.4575
Value of Commitment	Rs. 9,83,68,725

(ii) It is seen from the forward rates that the market expectation is that the dollar will depreciate. If the firm's own expectation is that the dollar will depreciate more than what the bank has quoted, it may be worthwhile not to cover forward and keep the exposure open. If the firm has no specific view regarding future dollar price movements, it would be better to cover the exposure. This would freeze the total commitment and insulate the firm from undue market fluctuations. In other words, it will be advisable to cut the losses at this point of time.
Given the interest rate differentials and inflation rates between India and USA, it would be unwise to expect continuous depreciation of the dollar. The US Dollar is a stronger currency than the Indian Rupee based on past trends and it would be advisable to cover the exposure.

19. Excel Exporters are holding an Export bill in United States Dollar (USD) 1,00,000 due 60 days hence. They are worried about the falling USD value which is currently at Rs. 45.60 per USD. The concerned Export Consignment has been priced on an Exchange rate of Rs. 45.50 per USD. The Firm's Bankers have quoted a 60-day forward rate of Rs. 45.20.
Calculate:
(i) Rate of discount quoted by the Bank
(ii) The probable loss of operating profit if the forward sale is agreed to. [ALSO IN RTP - NOV 2019]
Answer:

(i) Rate of discount quoted by the bank

$$= \frac{(45.20 - 45.60) \times 365 \times 100}{45.60 \times 60} = 5.33\%$$

(ii) Probable loss of operating profit:

(45.20 – 45.50) × 1,00,000 = ₹ 30,000

20. In International Monetary Market an international forward bid for December, 15 on pound sterling is $ 1.2816 at the same time that the price of IMM sterling future for delivery on December, 15 is $ 1.2806. The contract size of pound sterling is £ 62,500. How could the dealer use arbitrage in profit from this situation and how much profit is earned?

Answer:

Buy £ 62500 × 1.2806 = $ 80037.50
Sell £ 62500 × 1.2816 = $ 80100.00
Profit $ 62.50
Alternatively, if the market comes back together before December 15, the dealer could unwind his position (by simultaneously buying £ 62,500 forward and selling a futures contract. Both for delivery on December 15) and earn the same profit of $ 62.5.

21. An Indian importer has to settle an import bill for $ 1,30,000. The exporter has given the Indian exporter two options:
(i) Pay immediately without any interest charges.
(ii) Pay after three months with interest at 5 percent per annum.
The importer's bank charges 15 percent per annum on overdrafts. The exchange rates in the market are as follows:
Spot rate (Rs. /$) : 48.35 /48.36
3-Months forward rate (Rs./$) : 48.81 /48.83
The importer seeks your advice. Give your advice. [ALSO IN RTP - NOV 2019]

Answer:

If importer pays now, he will have to buy US$ in Spot Market by availing overdraft facility. Accordingly, the outflow under this option will be

	₹
Amount required to purchase $130000[$130000X₹48.36]	6286800
Add: Overdraft Interest for 3 months @15% p.a.	235755
	6522555

If importer makes payment after 3 months then, he will have to pay interest for 3 months @ 5% p.a. for 3 month along with the sum of import bill. Accordingly, he will have to buy $ in forward market. The outflow under this option will be as follows:

	$
Amount of Bill	130000
Add: Interest for 3 months @5% p.a.	1625
	131625

Amount to be paid in Indian Rupee after 3 month under the forward purchase contract

₹ 6427249 (US$ 131625 X ₹ 48.83)

Since outflow of cash is least in (ii) option, it should be opted for.

22. DEF Ltd. has imported goods to the extent of US$ 1 crore. The payment terms are 60 days interest-free credit. For additional credit of 30 days, interest at the rate of 7.75% p.a. will be charged.
The banker of DEF Ltd. has offered a 30 days loan at the rate of 9.5% p.a. Their quote for the foreign exchange is as follows:

Spot rate INR/US$	**62.50**
60 days forward rate INR/US$	**63.15**
90 days forward rate INR/US$	**63.45**

Which one of the following options would be better?
(i) Pay the supplier on 60th day and avail bank loan for 30 days.
(ii) Avail the supplier's offer of 90 days credit.
Answer:

(i) **Pay the supplier in 60 days**

If the payment is made to supplier in 60 days the applicable forward rate for 1 USD	₹ 63.15
Payment Due	USD 1 crore
Outflow in Rupees (USD 1 crore × ₹ 63.15)	₹ 63.15 crore
Add: Interest on loan for 30 days@9.5% p.a.	₹ 0.50 crore
Total Outflow in ₹	₹ 63.65 crore

(ii) **Availing supplier's offer of 90 days credit**

Amount Payable	USD 1.00000 crore
Add: Interest on credit period for 30 days@7.75% p.a.	USD 0.00646 crore
Total Outflow in USD	USD 1.00646 crore
Applicable forward rate for 1 USD	₹ 63.45
Total Outflow in ₹ (USD 1.00646 crore ×₹ 63.45)	₹ 63.86 crore

Alternative 1 is better as it entails lower cash outflow.

23. A company is considering hedging its foreign exchange risk. It has made a purchase on 1st July, 2016 for which it has to make a payment of US$ 60,000 on December 31, 2016. The present exchange rate is 1 US $ = Rs. 65. It can purchase forward 1 $ at Rs. 64. The company will have to make an upfront premium @ 2% of the forward amount purchased. The cost of funds to the company is 12% per annum.
In the following situations, compute the profit/loss the company will make if it hedges its foreign exchange risk with the exchange rate on 31st December, 2016 as:
(i) Rs. 68 per US $.
(ii) Rs. 62 per US $.
(iii) Rs. 70 per US $.
(iv) Rs. 65 per US $.
Answer:

	(₹)
Present Exchange Rate ₹65 = 1 US$	
If company purchases US$ 60,000 forward premium is	
60000 × 64 × 2%	76,800
Interest on ₹76,800 for 6 months at 12%	4,608
Total hedging cost	81,408
If exchange rate is ₹68	
Then gain (₹68 – ₹64) for US$ 60,000	2,40,000
Less: Hedging cost	81,408
Net gain	1,58,592
If US$ = ₹62	
Then loss (₹64 – ₹62) for US$ 60,000	1,20,000
Add: Hedging Cost	81,408
Total Loss	2,01,408
If US$ = ₹70	
Then Gain (₹70 – ₹64) for US$ 60,000	3,60,000
Less: Hedging Cost	81,408
Total Gain	2,78,592
If US$ = ₹65	
Then Gain (₹ 65 – ₹ 64) for US$ 60,000	60,000
Less: Hedging Cost	81,408
Net Loss	21,408

24. Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.
Cost and Sales information:

	Japan	USA	Europe
Variable cost per unit	₹225	₹395	₹510
Export sale price per unit	Yen 650	US$10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US$1,02,300	Euro 95,920

Foreign exchange rate information:

	Yen/₹	US$/₹	Euro/₹
Spot market	2.417-2.437	0.0214-0.0217	0.0177-0.0180
3 months forward	2.397-2.427	0.0213-0.0216	0.0176-0.0178
3 months spot	2.423-2.459	0.02144-0.02156	0.0177-0.0179

Advise AKC Ltd. by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not. [ALSO IN MTP - AUGUST 2018 - 8 MARKS]
Answer:

If foreign exchange risk is hedged

				Total (₹)
Sum due	Yen 78,00,000	US$1,02,300	Euro 95,920	
Unit input price	Yen 650	US$10.23	Euro 11.99	
Unit sold	12000	10000	8000	
Variable cost per unit	₹225/-	₹395/-	₹510/-	
Variable cost	₹27,00,000	₹ 39,50,000	₹ 40,80,000	₹ 1,07,30,000
Three months forward rate for selling	2.427	0.0216	0.0178	
Rupee value of receipts	₹32,13,844	₹ 47,36,111	₹ 53,88,764	₹ 1,33,38,719
Contribution	₹5,13,844	₹ 7,86,111	₹ 13,08,764	₹ 26,08,719
Average contribution to sale ratio				19.56%
If risk is not hedged				
Rupee value of receipt	₹31,72,021	₹ 47,44,898	₹ 53,58,659	₹ 1,32,75,578
Total contribution				₹ 25,45,578
Average contribution to sale ratio				19.17%

AKC Ltd. Is advised to hedge its foreign currency exchange risk.

25. EFD Ltd. is an export business house. The company prepares invoice in customers' currency. Its debtors of US$. 10,000,000 is due on April 1, 2015.
Market information as at January 1, 2015 is:

Exchange rates US$/INR		**Currency Futures US$/INR**	
Spot	0.016667	Contract size: ₹	24,816,975
1-month forward	0.016529	1-month	0.016519
3-months forward	0.016129	3-month	0.016118

	Initial Margin	**Interest rates in India**
1-Month	₹ 17,500	6.5%
3-Months	₹ 22,500	7%

On April 1, 2015 the spot rate US$/INR is 0.016136 and currency future rate is 0.016134.
Which of the following methods would be most advantageous to EFD Ltd?
(i) Using forward contract
(ii) Using currency futures
(iii) Not hedging the currency risk [ALSO IN MTP - MARCH 2019 - 7 MARKS]
Answer:

Receipts using a forward contract = $10,000,000/0.016129	= ₹	620,001,240

Receipts using currency futures

The number of contracts needed is ($10,000,000/0.016118)/24,816,975 = 25

Initial margin payable is 25 contracts x ₹ 22,500	= ₹	5,62,500
On April 1,2015Close at 0.016134		
Receipts = US$10,000,000/0.016136	= ₹	619,732,276
Variation Margin =		
[(0.016134 – 0.016118) x 25 x 24,816,975/-]/0.016136		
OR (0.000016x 25 x 24,816,975)/.016136 = 9926.79/0.016136	= ₹	615,195
Less: Interest Cost – ₹ 5,62,500x 0.07 x 3/12	= ₹	9,844
Net Receipts	₹	620,337,627

Receipts under different methods of hedging

Forward contract	Rs. 620,001,240
Futures	Rs. 620,337,627
No hedge (US$ 10,000,000/0.016136)	Rs. 619,732,276

The most advantageous option would have been to hedge with futures.

26. Spot rate 1 US $ = Rs. 48.0123
180 days Forward rate for 1 US $ = Rs. 48.8190
Annualised interest rate for 6 months – Rupee = 12%
Annualised interest rate for 6 months – US $ = 8%
Is there any arbitrage possibility? If yes how an arbitrageur can take advantage of the situation, if he is willing to borrow Rs. 40,00,000 or US $83,312.
Answer:

Spot Rate = ₹40,00,000 /US$83,312 = 48.0123

Forward Premium on US$ = [(48.8190 – 48.0123)/48.0123] x 12/6 x 100
= 3.36%

Interest rate differential = 12% - 8%
= 4%

Since the negative Interest rate differential is greater than forward premium there is a possibility of arbitrage inflow into India.

The advantage of this situation can be taken in the following manner:

1. Borrow US$ 83,312 for 6 months
   Amount to be repaid after 6 months
   = US $ 83,312 (1+0.08 x 6/12) = US$86,644.48
2. Convert US$ 83,312 into Rupee and get the principal i.e. ₹40,00,000
   Interest on Investments for 6 months – ₹40,00,000/- x 0.06 = ₹2,40,000/-
   Total amount at the end of 6 months = ₹(40,00,000 + 2,40,000) = ₹42,40,000/-
   Converting the same at the forward rate
   = ₹42,40,000/ ₹48.8190= US$ 86,851.43

Hence the gain is US $ (86,851.43 – 86,644.48) = US$ 206.95 OR
₹10,103 i.e., ($206.95 x ₹48.8190)

27. Given the following information:
Exchange rate – Canadian dollar 0.665 per DM (spot)
Canadian dollar 0.670 per DM (3 months)
Interest rates – DM 7% p.a.
Canadian Dollar – 9% p.a.
What operations would be carried out to take the possible arbitrage gains?
Answer:
In this case, DM is at a premium against the Can$.
Premium = [(0.67 – 0.665) /0.665] x (12/3) x 100 = 3.01 per cent
Interest rate differential = 9% - 7% = 2 per cent.
Since the interest rate differential is smaller than the premium, it will be profitable to place money in Deutschmarks the currency whose 3-months interest is lower.
The following operations are carried out:
(i) Borrow Can$ 1000 at 9 per cent for 3- months;
(ii) Change this sum into DM at the spot rate to obtain DM = (1000/0.665) = 1503.76
(iii) Place DM 1503.76 in the money market for 3 months to obtain a sum of DM

	Principal:	1503.76
Add:	Interest @ 7% for 3 months =	26.32
	Total	1530.08

(iv) Sell DM at 3-months forward to obtain Can$= (1530.08x0.67) = 1025.15

(v) Refund the debt taken in Can$ with the interest due on it, i.e.,

	Can$
Principal	1000.00
Add: Interest @9% for 3 months	22.50
Total	1022.50

Net arbitrage gain = 1025.15 – 1022.50 = Can$ 2.65

28. An Indian exporting firm, Rohit and Bros., would be covering itself against a likely depreciation of pound sterling. The following data is given:

Receivables of Rohit and Bros :	**£500,000**
Spot rate :	**Rs. 56.00/£**
Payment date :	**3-months**
3 months interest rate : India :	**12 per cent per annum**
: UK :	**5 per cent per annum**

What should the exporter do?
Answer:

The only thing lefts Rohit and Bros to cover the risk in the money market. The following steps are required to be taken:

(i) Borrow pound sterling for 3- months. The borrowing has to be such that at the end of three months, the amount becomes £ 500,000. Say, the amount borrowed is £ x. Therefore

$$x\left[1+0.05\times\frac{3}{12}\right]=500{,}000 \text{ or } x = £493{,}827$$

(ii) Convert the borrowed sum into rupees at the spot rate. This gives: £493,827 × ₹ 56 = ₹ 27,654,312

(iii) The sum thus obtained is placed in the money market at 12 per cent to obtain at the end of 3- months:

$$S = ₹\ 27{,}654{,}312 \times \left[1+0.12\times\frac{3}{12}\right] = ₹\ 28{,}483{,}941$$

(iv) The sum of £500,000 received from the client at the end of 3- months is used to refund the loan taken earlier.

From the calculations. It is clear that the money market operation has resulted into a net gain of ₹ 483,941 (₹ 28,483,941 – ₹ 500,000 × 56).

If pound sterling has depreciated in the meantime. The gain would be even bigger.

29. An exporter is a UK based company. Invoice amount is $3,50,000. Credit period is three months. Exchange rates in London are :

Spot Rate ($/£) 1.5865 – 1.5905

3-month Forward Rate ($/£) 1.6100 – 1.6140

Rates of interest in Money Market :

	Deposit	Loan
$	7%	9%
£	5%	8%

Compute and show how a money market hedge can be put in place. Compare and contrast the outcome with a forward contract. [ALSO IN RTP - MAY 2019]

Answer:

Identify: Foreign currency is an asset. Amount $ 3,50,000.

Create: $ Liability.

Borrow: In $. The borrowing rate is 9% per annum or 2.25% per quarter.

Amount to be borrowed: 3,50,000 / 1.0225 = $ 3,42,298.29

Convert: Sell $ and buy £. The relevant rate is the Ask rate, namely, 1.5905 per £,

(**Note:** This is an indirect quote). Amount of £s received on conversion is 2,15,214.27 (3,42,298.29/1.5905).

Invest: £ 2,15,214.27 will be invested at 5% for 3 months and get £ 2,17,904.45

Settle: The liability of $3,42,298.29 at interest of 2.25 per cent quarter matures to $3,50,000 receivable from customer.

Using forward rate, amount receivable is = 3,50,000 / 1.6140 = £2,16,852.54

Amount received through money market hedge = £2,17,904.45
Gain = 2,17,904.45 – 2,16,852.54 = £1,051.91
So, money market hedge is beneficial for the exporters

30. The rate of inflation in India is 8% per annum and in the U.S.A. it is 4%. The current spot rate for USD in India is Rs. 46. What will be the expected rate after 1 year and after 4 years applying the Purchasing Power Parity Theory.
Answer:

End of Year	₹	₹/USD
1	$₹46.00 \times \frac{(1+0.08)}{(1+0.04)}$	47.77
2	$₹47.77 \times \frac{(1+0.08)}{(1+0.04)}$	49.61
3	$₹49.61 \times \frac{(1+0.08)}{(1+0.04)}$	51.52
4	$₹51.52 \times \frac{(1+0.08)}{(1+0.04)}$	53.50

31. On April 1, 3 months interest rate in the UK £ and US $ are 7.5% and 3.5% per annum respectively. The UK £/US $ spot rate is 0.7570. What would be the forward rate for US $ for delivery on 30th June?
Answer:

As per interest rate parity

$$S_1 = S_0\left[\frac{1+\text{in A}}{1+\text{in B}}\right]$$

$$S_1 = £0.7570\left[\frac{1+(0.075)\times 3/12}{1+(0.035)\times 3/12}\right]$$

$$= £0.7570\left[\frac{1.01875}{1.00875}\right]$$

$$= £0.7570 \times 1.0099 = £0.7645$$

$$= \text{UK } £0.7645 / \text{US\$}$$

32. An importer requests his bank to extend the forward contract for US$ 20,000 which is due for maturity on 30th October, 2010, for a further period of 3 months. He agrees to pay the required margin money for such extension of the contract.
Contracted Rate – US$ 1= Rs. 42.32
The US Dollar quoted on 30-10-2010:-
Spot – 41.5000/41.5200
3 months' Premium -0.87% /0.93%
Margin money for buying and selling rate is 0.075% and 0.20% respectively.
Compute:
(i) The cost to the importer in respect of the extension of the forward contract, and
(ii) The rate of new forward contract.
Answer:

(i) The contract is to be cancelled on 30-10-2010 at the spot buying rate of US$ 1 = ₹ 41.5000

Less: Margin Money 0.075%	= ₹ 0.0311
	= ₹ 41.4689 or ₹ 41.47
US$ 20,000 @ ₹ 41.47	= ₹ 8,29,400
US$ 20,000 @ ₹ 42.32	= ₹ 8,46,400
The difference in favour of the Bank/Cost to the importer	₹ 17,000

(ii) The Rate of New Forward Contract

Spot Selling Rate US$ 1	= ₹ 41.5200
Add: Premium @ 0.93%	= ₹ 0.3861
	= ₹ 41.9061
Add: Margin Money 0.20%	= ₹ 0.0838
	= ₹ 41.9899 or ₹ 41.99

33. XYZ, an Indian firm, will need to pay JAPANESE YEN (JY) 5,00,000 on 30th June. In order to hedge the risk involved in foreign currency transaction, the firm is considering two alternative methods i.e. forward market cover and currency option contract.
On 1st April, following quotations (JY/INR) are made available:
Spot 3 months forward
1.9516/1.9711. 1.9726./1.9923
The prices for forex currency option on purchase are as follows:
Strike Price JY 2.125
Call option (June) JY 0.047
Put option (June) JY 0.098
For excess or balance of JY covered, the firm would use forward rate as future spot rate.
You are required to recommend cheaper hedging alternative for XYZ.
Answer:

(i) **Forward Cover**

$$\text{3-month Forward Rate} = \frac{1}{1.9726} = ₹\ 0.5070/JY$$

Accordingly, INR required for JY 5,00,000 (5,00,000 X ₹ 0.5070) ₹ 2,53,500

(ii) Option Cover

To purchase JY 5,00,000, XYZ shall enter into a Put Option @ JY 2.125/INR

Accordingly, outflow in INR $\left(\frac{JY\,5,00,000}{2.125}\right)$	₹ 2,35,294
Premium $\left(\frac{INR\,2,35,294 \times 0.098}{1.9516}\right)$	₹ 11,815
	₹ 2,47,109

Since outflow of cash is least in case of Option same should be opted for. Further if price of INR goes above JY 2.125/INR the outflow shall further be reduced.

34. ABC Technologic is expecting to receive a sum of US$ 4,00,000 after 3 months. The company decided to go for future contract to hedge against the risk. The standard size of future contract available in the market is $1000. As on date spot and futures $ contract are quoting at Rs. 44.00 &Rs. 45.00 respectively. Suppose after 3 months the company closes out its position futures are quoting at Rs. 44.50 and spot rate is also quoting at Rs. 44.50. You are required to calculate effective realization for the company while selling the receivable. Also calculate how company has been benefitted by using the future option.

Answer:

The company can hedge position by selling future contracts as it will receive amount from outside.

Number of Contracts = $\frac{\$4,00,000}{\$1,000}$ = 400 contracts

Gain by trading in futures = (₹ 45 – ₹ 44.50) 4,00,000= ₹ 2,00,000

Net Inflow after after 3 months = ₹ 44.50 x ₹ 4,00,000+ 2,00,000 = ₹ 1,80,00,000

Effective Price realization = $\frac{₹\,1,80,00,000}{\$4,00,000}$ = ₹ 45 Per US$

35. Gibralater Limited has imported 5000 bottles of shampoo at landed cost in Mumbai, of US $ 20 each. The company has the choice for paying for the goods immediately or in 3 months' time. It has a clean overdraft limited where 14% p.a. rate of interest is charged.

Calculate which of the following method would be cheaper to Gibralter Limited.

(i) Pay in 3 months' time with interest @ 10% p.a. and cover risk forward for 3 months.

(ii) Settle now at a current spot rate and pay interest of the over draft for 3 months.

The rates are as follows:

Mumbai Rs. /$ spot : 60.25-60.55

3 months swap points : 35/25

Answer:

Option - I

$20 x 5000 = $ 1,00,000

Repayment in 3 months time = $1,00,000 x (1 + 0.10/4) = $ 1,02,500

3-months outright forward rate = ₹ 59.90/ ₹ 60.30

Repayment obligation in ₹ ($1,02,500 X ₹ 60.30) = ₹ 61,80,750

Option -II

Overdraft ($1,00,000 x ₹ 60.55)	₹ 60,55,000
Interest on Overdraft (₹ 60,55,000 x 0.14/4)	₹ 2,11,925
	₹ 62,66,925

Option I should be preferred as it has lower outflow.

36. An American firm is under obligation to pay interests of Can$ 1010000 and Can$ 705000 on 31st July and 30th September respectively. The Firm is risk averse and its policy is to hedge the risks involved in all foreign currency transactions. The Finance Manager of the firm is thinking of hedging the risk considering two methods i.e. fixed forward or option contracts.

It is now June 30. Following quotations regarding rates of exchange, US$ per Can$, from the firm's bank were obtained:

Spot	1 Month Forward	3 Months Forward
0.9284-0.9288	0.9301	0.9356

Price for a Can$ /US$ option on a U.S. stock exchange (cents per Can$, payable on purchase of the option, contract size Can$ 50000) are as follows:

Strike Price	Calls		Puts	
(US$/Can$)	July	Sept.	July	Sept.
0.93	1.56	2.56	0.88	1.75
0.94	1.02	NA	NA	NA
0.95	0.65	1.64	1.92	2.34

According to the suggestion of finance manager if options are to be used, one month option should be bought at a strike price of 94 cents and three month option at a strike price of 95 cents and for the remainder uncovered by the options the firm would bear the risk itself. For this, it would use forward rate as the best estimate of spot. Transaction costs are ignored.

Recommend, which of the above two methods would be appropriate for the American firm to hedge its foreign exchange risk on the two interest payments.

Answer:

Forward Market Cover

Hedge the risk by buying Can$ in 1 and 3 months time will be:

July - 1010000 X 0.9301 = US $ 939401
Sept. - 705000 X 0.9356 = US $ 659598

Option Contracts

July Payment = 1010000/ 50,000 = 20.20

September Payment = 705000/ 50,000 = 14.10

Company would like to take out 20 contracts for July and 14 contracts for September respectively. Therefore costs, if the options were exercised, will be:

	July		Sept.	
	Can $	US $	Can $	US $
Covered by Contracts	1000000	940000	700000	665000
Balance bought at spot rate	10000	9301	5000	4678
Option Costs:				
Can $ 50000 x 20 x 0.0102		10200	---	
Can $ 50000 x 14 x 0.0164	---			11480
Total cost in US $ of using Option Contract		959501		681158

Decision: As the firm is stated as risk averse and the money due to be paid is certain, a fixed forward contract, being the cheapest alternative in the both the cases, would be recommended.

37. Zaz plc, a UK Company is in the process of negotiating an order amounting €2.8 million with a large German retailer on 6 month's credit. If successful, this will be first time for Zaz has exported goods into the highly competitive German Market. The Zaz is considering following 3 alternatives for managing the transaction risk before the order is finalized.

(a) Mr. Peter the Marketing head has suggested that in order to remove transaction risk completely Zaz should invoice the German firm in Sterling using the current €/£ average spot rate to calculate the invoice amount.

(b) Mr. Wilson, CE is doubtful about Mr. Peter's proposal and suggested an alternative of invoicing the German firm in € and using a forward exchange contract to hedge the transaction risk.

(c) Ms. Karen, CFO is agreed with the proposal of Mr. Wilson to invoice the German first in €, but she is of opinion that Zaz should use sufficient 6 month sterling further contracts (to the nearest whole number) to hedge the transaction risk.

Following data is available

Spot Rate	**€ 1.1960 - €1.1970/£**
6 months forward points	**0.60 – 0.55 Euro Cents.**
6 month further contract is currently trading at	**€ 1.1943/£**
6 month future contract size is	**£62,500**
After 6 month Spot rate and future rate	**€ 1.1873/£**

You are required to

(a) Calculate (to the nearest £) the £ receipt for Zaz plc, under each of 3 above proposals.

(b) In your opinion which alternative you consider to be most appropriate.

Answer:

(i) Receipt under three proposals

(a) Proposal of Mr. Peter

Invoicing in £ will produce = $\frac{€\,2.8\text{ million}}{1.1965}$ = £ 2.340 million

(b) Proposal of Mr. Wilson

Forward Rate = €1.1970-0.0055 = 1.1915

Using Forward Market hedge Sterling receipt would be $\frac{€\,2.8\text{million}}{1.1915}$ = £ 2.35 million

(c) Proposal of Ms. Karen

The equivalent sterling of the order placed based on future price (€1.1943)

= $\frac{€\,2.8\text{million}}{1.1943}$ = £ 2,344,470 (rounded off)

Number of Contracts = $\frac{£2,344,470}{62,500}$ = 37 Contracts (to the nearest whole number)

Thus, € amount hedged by future contract will be = 37 × £62,500 = £23,12,500

Buy Future at	€1.1943
Sell Future at	€1.1873
	€0.0070

Total loss on Future Contracts = 37 × £62,500 × €0.0070 =€16,188

After 6 months

Amount Received	€28,00,000
Less: Loss on Future Contracts	€ 16,188
	€ 27,83,812

Sterling Receipts

On sale of € at spot = $\frac{€\,27,83,812}{1.1873}$ = £ 2.3446 million

(ii) Proposal of option (b) is preferable because the option (a) & (c) produces least receipts. Further, in case of proposal (a) there must be a doubt as to whether this would be acceptable to German firm as it is described as a competitive market and Zaz is moving into it first time.

38. Columbus Surgicals Inc. is based in US, has recently imported surgical raw materials from the UK and has been invoiced for £ 480,000, payable in 3 months. It has also exported surgical goods to India and France. The Indian customer has been invoiced for £ 138,000, payable in 3 months, and the French customer has been invoiced for € 590,000, payable in 4 months.

Current spot and forward rates are as follows:

£ / US$

Spot : 0.9830 – 0.9850

Three months forward :0.9520 – 0.9545

US$ / €

Spot: 1.8890 – 1.8920

Four months forward: 1.9510 – 1.9540

Current money market rates are as follows:

UK: 10.0% – 12.0% p.a.

France: 14.0% – 16.0% p.a.

USA: 11.5% – 13.0% p.a.

You as Treasury Manager are required to show how the company can hedge its foreign exchange exposure using Forward markets and Money markets hedge and suggest which the best hedging technique is.

Answer:

£ Exposure

Since Columbus has a £ receipt (£ 138,000) and payment of (£ 480,000) maturing at the same time i.e. 3 months, it can match them against each other leaving a net liability of £ 342,000 to be hedged.

(i) Forward market hedge

Buy 3 months' forward contract accordingly, amount payable after 3 months will be

£ 342,000 / 0.9520 = US$ 359,244

(ii) Money market hedge

To pay £ after 3 months' Columbus shall requires to borrow in US$ and translate to £ and then deposit in £.

For payment of £ 342,000 in 3 months (@2.5% interest) amount required to be deposited now

(£ 342,000 ÷ 1.025) = £ 333,658

With spot rate of 0.9830 the US$ loan needed will be = US$ 339,429

Loan repayable after 3 months (@3.25% interest) will be = US$ 350,460

In this case the money market hedge is a cheaper option.

€ Receipt

Amount to be hedged = € 590,000

(i) Forward market hedge

Sell 4 months' forward contract accordingly, amount receivable after 4 months will be (€ 590,000 x1.9510) = US$ 1,151,090

(ii) Money market hedge

For money market hedge Columbus shall borrow in € and then translate to US$ and deposit in US$

For receipt of € 590,000 in 4 months (@ 5.33% interest) amount required to be borrowed now (€590,000 ÷ 1.0533) = € 560,144

With spot rate of 1.8890 the US$ deposit will be = US$ 1,058,113

Deposit amount will increase over 3 months (@3.83% interest) will be = US$ 1,098,639

In this case, more will be received in US$ under the forward hedge.

39. XYZ Ltd. a US firm will need £ 3,00,000 in 180 days. In this connection, the following information is available:
Spot rate 1 £ = $ 2.00
180 days forward rate of £ as of today = $1.96
Interest rates are as follows:

	U.K.	US
180 days deposit rate	4.5%	5%
180 days borrowing rate	5%	5.5%

A call option on £ that expires in 180 days has an exercise price of $ 1.97 and a premium of $ 0.04.
XYZ Ltd. has forecasted the spot rates 180 days hence as below:

Future rate	Probability
$ 1.91	25%
$ 1.95	60%
$ 2.05	15%

Which of the following strategies would be most preferable to XYZ Ltd.?
(a) A forward contract;
(b) A money market hedge;
(c) An option contract;
(d) No hedging.
Show calculations in each case [ALSO ASKED IN MTP - APRIL 2018 - 10 MARKS]

Answer:
(a) Forward contract: Dollar needed in 180 days = £3,00,000 x $ 1.96 = $5,88,000/-
(b) Money market hedge: Borrow $, convert to £, invest £, repay $ loan in 180 days
Amount in £ to be invested = 3,00,000/1.045 = £ 2,87,081
Amount of $ needed to convert into £ = 2,87,081 x 2 = $ 5,74,162
Interest and principal on $ loan after 180 days = $5,74,162 x 1.055 = $ 6,05,741
(c) Call option:

Expected Spot rate in 180 days	*Prem. /unit*	*Exercise Option*	*Total price per unit*	*Total price for £3,00,000xi*	*Prob. Pi*	*pixi*
1.91	0.04	No	1.95	5,85,000	0.25	1,46,250
1.95	0.04	No	1.99	5,97,000	0.60	3,58,200
2.05	0.04	Yes	2.01*	6,03,000	0.15	90,450
						5,94,900
Add: Interest on Premium @ 5.5% (12,000 x 5.5%)						660
						5,95,560

* ($1.97 + $0.04)

(d) No hedge option:

Expected Future spot rate	*Dollar needed Xi*	*Prob. Pi*	*Pi xi*
1.91	5,73,000	0.25	1,43,250
1.95	5,85,000	0.60	3,51,000
2.05	6,15,000	0.15	92,250
			5,86,500

The probability distribution of outcomes for no hedge strategy appears to be most preferable because least number of $ are needed under this option to arrange £3,00,000.

40. A Ltd. of U.K. has imported some chemical worth of USD 3,64,897 from one of the U.S. suppliers. The amount is payable in six months time. The relevant spot and forward rates are:

Spot rate USD 1.5617-1.5673

6 months' forward rate USD 1.5455 –1.5609

The borrowing rates in U.K. and U.S. are 7% and 6% respectively and the deposit rates are 5.5% and 4.5% respectively.

Currency options are available under which one option contract is for GBP 12,500. The option premium for GBP at a strike price of USD 1.70/GBP is USD 0.037 (call option) and USD 0.096 (put option) for 6 months period.

The company has 3 choices:

(i) Forward cover

(ii) Money market cover, and

(iii) Currency option

Which of the alternatives is preferable by the company? [ASKED IN MTP - MAR 2018 / APR 2019 - 10 MARKS / 8 MARKS]

Answer:

In the given case, the exchange rates are indirect. These can be converted into direct rates as follows:

Spot rate

GBP = $\frac{1}{\text{USD1.5617}}$ to $\frac{1}{\text{USD1.5673}}$

USD = GBP 0.64033 - GBP 0.63804

6 months' forward rate

GBP = $\frac{1}{\text{USD1.5455}}$ to $\frac{1}{\text{USD1.5609}}$

USD = GBP 0.64704 - GBP 0.64066

Payoff in 3 alternatives

i. Forward Cover

Amount payable	USD 3,64,897
Forward rate	GBP 0.64704
Payable in GBP	GBP 2,36,103

ii. Money market Cover

Amount payable	USD 3,64,897	
PV @ 4.5% for 6 months i.e. $\frac{1}{1.0225}$ = 0.9779951	USD 3,56,867	
Spot rate purchase	GBP 0.64033	
Borrow GBP 3,56,867 x 0.64033		GBP 2,28,512
Interest for 6 months @ 7 %		7,998
Payable after 6 months		GBP 2,36,510

iii. Currency options

Amount payable	USD 3,64,897
Unit in Options contract	GBP 12,500
Value in USD at strike rate of 1.70 (GBP 12,500 x 1.70)	USD 21,250
Number of contracts USD 3,64,897/ USD 21,250	17.17
Exposure covered USD 21,250 x 17	USD 3,61,250
Exposure to be covered by Forward (USD 3,64,897 – USD 3,61,250)	USD 3,647

Options premium 17 x GBP 12,500 x 0.096	USD 20,400
Premium in GBP (USD 20,400 x 0.64033)	GBP 13,063
Total payment in currency option	
Payment under option (17 x 12,500)	GBP 2,12,500
Premium payable	GBP 13,063
Payment for forward cover (USD 3,647 x 0.64704)	GBP 2,360
	GBP 2,27,923

Thus total payment in:

(i)	Forward Cover	2,36,103 GBP
(ii)	Money Market	2,36,510 GBP
(iii)	Currency Option	2,27,923 GBP

The company should take currency option for hedging the risk.

Note: Even interest on Option Premium can also be considered in the above solution.

41. Nitrogen Ltd, a UK company is in the process of negotiating an order amounting to €4 million with a large German retailer on 6 months credit. If successful, this will be the first time that Nitrogen Ltd has exported goods into the highly competitive German market. The following three alternatives are being considered for managing the transaction risk before the order is finalized.
(i) Invoice the German firm in Sterling using the current exchange rate to calculate the invoice amount.
(ii) Alternative of invoicing the German firm in € and using a forward foreign exchange contract to hedge the transaction risk.
(iii) Invoice the German first in € and use sufficient 6 months sterling future contracts (to the nearly whole number) to hedge the transaction risk.
Following data is available:

Spot Rate	**€ 1.1750 - €1.1770/£**
6 months forward premium	**0.55-0.60 Euro Cents**
6 months future contract is currently trading at	**€1.1760/£**
6 months future contract size is	**£62500**
Spot rate and 6 months future rate	**€1.1785/£**

Required:
(a) Calculate to the nearest £ the receipt for Nitrogen Ltd, under each of the three proposals.
(b) In your opinion, which alternative would you consider to be the most appropriate and the reason thereof.
[ALSO IN RTP - MAY 2020]
Answer:

(i) Receipt under three proposals

(a) Invoicing in Sterling

Invoicing in £ will produce $= \frac{€\,4\,\text{million}}{1.1770} = £3398471$

(b) Use of Forward Contract

Forward Rate = €1.1770+0.0055 = 1.1825

Using Forward Market hedge Sterling receipt would be $\frac{€\,4\,\text{million}}{1.1825}$

= £ 3382664

(c) Use of Future Contract

The equivalent sterling of the order placed based on future price (€1.1760)

$= \frac{€\,4.00\,\text{million}}{1.1760} = £\ 3401360$

Number of Contracts $= \frac{£3401360}{62,500} = 54$ Contracts (to the nearest whole number)

Thus, € amount hedged by future contract will be = 54 × £62,500 = £3375000

Buy Future at	€1.1760
Sell Future at	€1.1785
	€0.0025

Total profit on Future Contracts = 54 × £62,500 × €0.0025 = €8438

After 6 months

Amount Received	€ 4000000
Add: Profit on Future Contracts	€ 8438
	€ 4008438

Sterling Receipts

On sale of € at spot $= \frac{€\,4008438}{1.1785} = €3401305$

(ii) Proposal of option (c) is preferable because the option (a) & (b) produces least receipts.

42. Sun Ltd. is planning to import equipment from Japan at a cost of 3,400 lakh yen. The company may avail loans at 18 percent per annum with quarterly rests with which it can import the equipment. The company has also an offer from Osaka branch of an India based bank extending credit of 180 days at 2 percent per annum against opening of an irrecoverable letter of credit.

Additional information:

Present exchange rate **Rs. 100 = 340 yen**

180 day's forward rate **Rs. 100 = 345 yen**

Commission charges for letter of credit at 2 per cent per 12 months.

Advice the company whether the offer from the foreign branch should be accepted.

Answer:

Option I (To finance the purchases by availing loan at 18% per annum):

Cost of equipment	₹ *in lakhs*
3400 lakh yen at ₹100 = 340 yen	1,000.00
Add: Interest at 4.5% I Quarter	45.00
Add: Interest at 4.5% II Quarter (on ₹1045 lakhs)	47.03
Total outflow in Rupees	1,092.03
Alternatively, interest may also be calculated on compounded basis, i.e., ₹1000 × [1.045]²	₹1092.03

Option II (To accept the offer from foreign branch):

Cost of letter of credit	
At 1 % on 3400 lakhs yen at ₹100 = 340 yen	₹ 10.00 lakhs
Add: Interest for 2 Quarters	₹ 0.90 lakhs
(A)	₹ 10.90 lakhs
Payment at the end of 180 days:	
Cost	3400.00 lakhs yen
Interest at 2% p.a. [3400 × 2/100 × 180/365]	33.53 lakhs yen
	3433.53 lakhs yen
Conversion at ₹100 = 345 yen [3433.53 / 345 ×100] (B)	₹ 995.23 lakhs
Total Cost: (A) + (B)	₹ 1006.13 lakhs

Advise: Option 2 is cheaper by (1092.03 – 1006.13) lakh or ₹ 85.90 lakh. Hence, the offer may be accepted.

43. NP and Co. has imported goods for US $ 7,00,000. The amount is payable after three months. The company has also exported goods for US $ 4,50,000 and this amount is receivable in two months. For receivable amount a forward contract is already taken at Rs. 48.90.

The market rates for Rupee and Dollar are as under:

Spot **Rs. 48.50/70**

Two months **25/30 points**

Three months **40/45 points**

The company wants to cover the risk and it has two options as under :

(A) To cover payables in the forward market and

(B) To lag the receivables by one month and cover the risk only for the net amount. No interest for delaying the receivables is earned. Evaluate both the options if the cost of Rupee Funds is 12%. Which option is preferable? [ALSO IN MTP - OCTOBER 2019 - 8 MARKS]

Answer:

(A) To cover payable and receivable in forward Market

Amount payable after 3 months	$7,00,000
Forward Rate	Rs. 48.45
Thus Payable Amount (Rs.) (A)	Rs. 3,39,15,000
Amount receivable after 2 months	$ 4,50,000
Forward Rate	Rs. 48.90
Thus Receivable Amount (Rs.) (B)	Rs. 2,20,05,000
Interest @ 12% p.a. for 1 month (C)	Rs. 2,20,050
Net Amount Payable in (Rs.) (A) – (B) – (C)	Rs. 1,16,89,950

(B) Assuming that since the forward contract for receivable was already booked it shall be cancelled if we lag the receivables. Accordingly, any profit/ loss on cancellation of contract shall also be calculated and shall be adjusted as follows:

Amount Payable ($)	$7,00,000
Amount receivable after 3 months	$ 4,50,000
Net Amount payable	$2,50,000
Applicable Rate	Rs. 48.45
Amount payable in (Rs.) (A)	Rs. 1,21,12,500
Profit on cancellation of Forward cost (48.90 – 48.30) × 4,50,000 (B)	Rs. 2,70,000
Thus, net amount payable in (Rs.) (A) + (B)	Rs. 1,18,42,500

Since net payable amount is least in case of first option, hence the company should cover payable and receivables in forward market.

Note: In the question it has not been clearly mentioned that whether quotes given for 2 and 3 months (in points terms) are premium points or direct quotes. Although above solution is based on the assumption that these are direct quotes, but students can also consider them as premium points and solve the question accordingly.

44. A customer with whom the Bank had entered into 3 months' forward purchase contract for Swiss Francs 10,000 at the rate of Rs. 27.25 comes to the bank after 2 months and requests cancellation of the contract. On this date, the rates, prevailing, are:

Spot	**CHF 1 = Rs. 27.30**	**27.35**
One month forward	**Rs. 27.45**	**27.52**

What is the loss/gain to the customer on cancellation?

Answer:

The contract would be cancelled at the one-month forward sale rate of ₹ 27.52.

	₹
Francs bought from customer under original forward contract at:	27.25
It is sold to him on cancellation at:	27.52
Net amount payable by customer per Franc	0.27

At ₹ 0.27 per Franc, exchange difference for CHF 10,000 is ₹ 2,700.

Loss to the Customer:

Exchange difference (Loss) ₹ 2,700

Note: The exchange commission and other service charges are ignored.

45. A bank enters into a forward purchase TT covering an export bill for Swiss Francs 1,00,000 at Rs. 32.4000 due 25th April and covered itself for same delivery in the local inter bank market at Rs. 32.4200. However, on 25th March, exporter sought for cancellation of the contract as the tenor of the bill is changed.
In Singapore market, Swiss Francs were quoted against dollars as under:

Spot	**USD 1 = Sw. Fcs.**	**1.5076/1.5120**
One month forward		**1.5150/ 1.5160**
Two months forward		**1.5250 / 1.5270**
Three months forward		**1.5415/ 1.5445**

and in the interbank market US dollars were quoted as under:

Spot	**USD 1 = Rs. 49.4302/.4455**
Spot / April	**4100/.4200**
Spot/May	**.4300/.4400**
Spot/June	**.4500/.4600**

Calculate the cancellation charges, payable by the customer if exchange margin required by the bank is 0.10% on buying and selling.

Answer:

First the contract will be cancelled at TT Selling Rate

USD/ Rupee Spot Selling Rate	₹ 49.4455	
Add: Premium for April	₹ 0.4200	
	₹ 49.8655	
Add: Exchange Margin @ 0.10%	₹ 0.04987	
	₹ 49.91537	Or 49.9154
USD/ Sw. Fcs One Month Buying Rate	Sw. Fcs. 1.5150	
Sw. Fcs. Spot Selling Rate (₹49.91537/1.5150)	₹ 32.9474	
Rounded Off	₹ 32.9475	
Bank buys Sw. Fcs. Under original contract	₹ 32.4000	
Bank Sells under Cancellation	₹ 32.9475	
Difference payable by customer	₹ 00.5475	

Exchange difference of Sw. Fcs. 1,00,000 payable by customer ₹ 54,750

(Sw. Fcs. 1,00,000 x ₹ 0.5475)

46. Your forex dealer had entered into a cross currency deal and had sold US $ 10,00,000 against EURO at US $ 1 = EURO 1.4400 for spot delivery.
However, later during the day, the market became volatile and the dealer in compliance with his management's guidelines had to square – up the position when the quotations were:

Spot US $ 1	**INR 31.4300/4500**
1 month margin	**25/20**
2 months margin	**45/35**
Spot US $ 1	**EURO 1.4400/4450**
1 month forward	**1.4425/4490**
2 months forward	**1.4460/4530**

What will be the gain or loss in the transaction? [ALSO IN MTP - OCTOBER 2019 - 8 MARKS]

Answer:

The amount of EURO bought by selling US$

US$ 10,00,000 * EURO 1.4400 = EURO 14,40,000

The amount of EURO sold for buying USD 10,00,000 * 1.4450 = EURO 14,45,000

Net Loss in the Transaction = EURO 5,000

To acquire EURO 5,000 from the market @

(a) USD 1 = EURO 1.4400 &

(b) USD1 = INR 31.4500

Cross Currency buying rate of EUR/INR is ₹ 31.4500 / 1.440 i.e. ₹ 21.8403

Loss in the Transaction ₹ 21.8403 * 5000 = ₹ 1,09,201.50

Alternatively, if delivery to be affected then computation of loss shall be as follows:

EURO to be surrendered to acquire $ 10,00,000 = EURO 14,45,000

EURO to be received after selling $ 10,00,000 = EURO 14,40,000

Loss = EURO 5,000

To acquire EURO 5,000 from market @

US $ 1 = EURO 1.4400

US $ 1 = INR 31.45

$$\text{Cross Currency} = \frac{31.45}{1.440} = ₹\ 21.8403$$

Loss in Transaction (21.8403 x EURO 5,000) = ₹ 1,09,201.50

47. You have following quotes from Bank A and Bank B:

	Bank A	Bank B
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 months	5/10	
6 months	10/15	
SPOT	GBP/USD 1.7645/60	GBP/USD 1.7640/50
3 months	25/20	
6 months	35/25	

Calculate :

(i) How much minimum CHF amount you have to pay for 1 Million GBP spot?

(ii) Considering the quotes from Bank A only, for GBP/CHF what are the Implied Swap points for Spot over 3 months?

[MTP - MARCH 2019 - 8 MARKS]

Answer:

(i) To Buy 1 Million GBP Spot against CHF

1. First to Buy USD against CHF at the cheaper rate i.e. from Bank A. 1 USD = CHF 1.4655
2. Then to Buy GBP against USD at a cheaper rate i.e. from Bank B 1 GBP = USD 1.7650

By applying chain rule Buying rate would be

1 GBP = 1.7650 * 1.4655 CHF

1 GBP = CHF 2.5866

Amount payable CHF 2.5866 Million or CHF 25,86,600

(ii) Spot rate Bid rate GBP 1 = CHF 1.4650 * 1.7645 = CHF 2.5850

Offer rate GBP 1 = CHF 1.4655 * 1.7660 = CHF 2.5881

GBP / USD 3 months swap points are at discount

Outright 3 Months forward rate GBP 1 = USD 1.7620 / 1.7640

USD / CHF 3 months swap points are at premium

Outright 3 Months forward rate USD 1 = CHF 1.4655 / 1.4665

Hence

Outright 3 Months forward rate GBP 1 = CHF 2.5822 / 2.5869

Spot rate GBP 1 = CHF 2.5850 / 2.5881

Therefore 3-month swap points are at discount of 28/12.

48. M/s Omega Electronics Ltd. exports air conditioners to Germany by importing all the components from Singapore. The company is exporting 2,400 units at a price of Euro 500 per unit. The cost of imported components is S$ 800 per unit. The fixed cost and other variables cost per unit are Rs. 1,000 and Rs. 1,500 respectively. The cash flows in Foreign currencies are due in six months. The current exchange rates are as follows:

Rs./Euro	**51.50/55**
Rs./S$	**27.20/25**

After six months the exchange rates turn out as follows:

Rs./Euro	**52.00/05**
Rs./S$	**27.70/75**

(A) You are required to calculate loss/gain due to transaction exposure.

(B) Based on the following additional information calculate the loss/gain due to transaction and operating exposure if the contracted price of air conditioners is Rs. 25,000 :

(i) the current exchange rate changes to

Rs./Euro 51.75/80

Rs./S$ s27.10/15

(ii) Price elasticity of demand is estimated to be 1.5

(iii) Payments and receipts are to be settled at the end of six months.

Answer:

(i) Profit at current exchange rates

2400 [€ 500 × Rs. 51.50 – (S$ 800 × Rs. 27.25 + Rs. 1,000 + Rs. 1,500)]

2400 [Rs. 25,750 - Rs. 24,300] = Rs. 34,80,000

Profit after change in exchange rates

2400[€500× Rs. 52 – (S$ 800 × Rs. 27.75 + Rs. 1000 + Rs. 1500)]

2400[Rs. 26,000 - Rs. 24,700] = Rs. 31,20,000

LOSS DUE TO TRANSACTION EXPOSURE

Rs. 34,80,000 – Rs. 31,20,000 = Rs. 3,60,000

(ii) Profit based on new exchange rates

2400[Rs. 25,000 - (800 × Rs. 27.15 + Rs. 1,000 + Rs. 1,500)]

2400[Rs. 25,000 - Rs. 24,220] = Rs. 18,72,000

Profit after change in exchange rates at the end of six months

2400 [Rs. 25,000 - (800 × Rs. 27.75 + Rs. 1,000 + Rs. 1,500)]

2400 [Rs.. 25,000 - Rs. 24,700] = Rs. 7,20,000

Decline in profit due to transaction exposure

Rs. 18,72,000 - Rs. 7,20,000 = Rs. 11,52,000

Current price of each unit in € = 485.44 € 51.50 25,000 = Rs. Rs.

Price after change in Exch. Rate = = € 483.09 51.75 25,000 Rs. Rs.

Change in Price due to change in Exch. Rate

€ 485.44 - € 483.09 = € 2.35 or (-) 0.48%

Price elasticity of demand = 1.5

Increase in demand due to fall in price 0.48 × 1.5 = 0.72%

Size of increased order = 2400 ×1.0072 = 2417 units

Profit = 2417 [Rs. 25,000 – (800 × Rs. 27.75 + Rs. 1,000 + Rs. 1,500)]

= 2417 [Rs. 25,000 - Rs. 24,700] = Rs. 7,25,100

Therefore, decrease in profit due to operating exposure Rs. 18,72,000 – Rs. 7,25,100 = Rs. 11,46,900

Alternatively, if it is assumed that Fixed Cost shall not be changed with change in units then answer will be as follows:

Fixed Cost = 2400[Rs. 1,000] = Rs. 24,00,000

Profit = 2417 [Rs. 25,000 – (800 × Rs. 27.75 + Rs. 1,500)] – Rs. 24,00,000

= 2417 (Rs. 1,300) – Rs. 24,00,000 = Rs. 7,42,100

Therefore, decrease in profit due to operating exposure Rs. 18,72,000 – Rs. 7,42,100 = Rs. 11,29,900

49. Your bank's London office has surplus funds to the extent of USD 5,00,000/- for a period of 3 months. The cost of the funds to the bank is 4% p.a. It proposes to invest these funds in London, New York or Frankfurt and obtain the best yield, without any exchange risk to the bank. The following rates of interest are available at the three centres for investment of domestic funds there at for a period of 3 months.

London	5 % p.a.
New York	8% p.a.
Frankfurt	3% p.a.

The market rates in London for US dollars and Euro are as under:

London on New York	
Spot	1.5350/90
1 month	15/18
2 month	30/35
3 months	80/85
London on Frankfurt	
Spot	1.8260/90
1 month	60/55
2 month	95/90
3 month	145/140

At which centre, will be investment be made & what will be the net gain (to the nearest pound) to the bank on the invested funds? [ALSO IN RTP S- MAY 2018]

Answer:

(i) If investment is made at London

Convert US$ 5,00,000 at Spot Rate (5,00,000/1.5390)		= £ 3,24,886
Add: £ Interest for 3 months on £ 324,886 @ 5%		= £ 4,061
		= £ 3,28,947
Less: Amount Invested	$ 5,00,000	
Interest accrued thereon	$ 5,000	
	= $ 5,05,000	
Equivalent amount of £ required to pay the above sum ($ 5,05,000/1.5430*)		= £ 3,27,285
Arbitrage Profit		= £ 1,662

(ii) If investment is made at New York

Gain $ 5,00,000 (8% - 4%) x 3/12	= $ 5,000
Equivalent amount in £ 3 months ($ 5,000/ 1.5475)	£ 3,231

(iii) If investment is made at Frankfurt

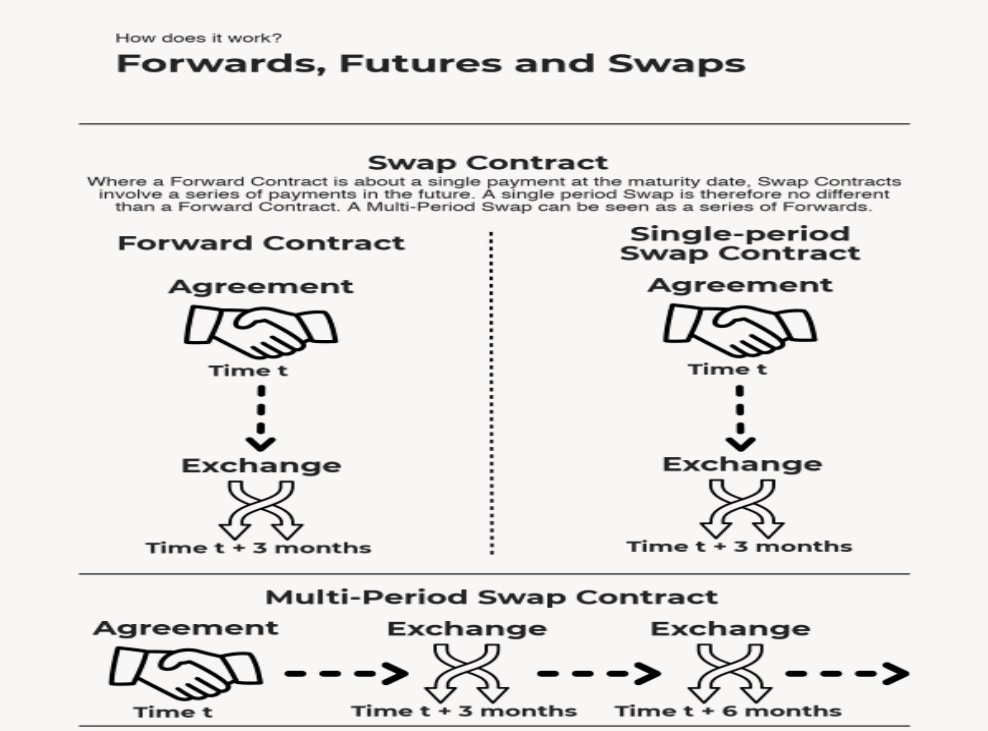
Convert US$ 500,000 at Spot Rate (Cross Rate) 1.8260/1.5390	= € 1.1865
Euro equivalent US$ 500,000	= € 5,93,250
Add: Interest for 3 months @ 3%	= € 4,449
	= € 5,97,699
3 month Forward Rate of selling € (1/1.8150)	= £ 0.5510
Sell € in Forward Market € 5,97,699 x £ 0.5510	= £ 3,29,332
Less: Amounted invested and interest thereon	= £ 3,27,285
Arbitrage Profit	= £ 2,047

Since out of three options the maximum profit is in case investment is made in New York. Hence it should be opted.

* Due to conservative outlook.

50. Drilldip Inc. a US based company has a won a contract in India for drilling oil field. The project will require an initial investment of Rs. 500 crore. The oil field along with equipments will be sold to Indian Government for Rs. 740 crore in one year time. Since the Indian Government will pay for the amount in Indian Rupee (Rs.) the company is worried about exposure due exchange rate volatility.
You are required to:
(a) Construct a swap that will help the Drilldip to reduce the exchange rate risk.
(b) Assuming that Indian Government offers a swap at spot rate which is 1US$ = Rs. 50 in one year, then should the company should opt for this option or should it just do nothing. The spot rate after one year is expected to be 1US$ = Rs. 54. Further you may also assume that the Drilldip can also take a US$ loan at 8% p.a.

Answer:



(a) The following swap arrangement can be entered by Drilldip.

(i) Swap a US$ loan today at an agreed rate with any party to obtain Indian Rupees (₹) to make initial investment.

(ii) After one year swap back the Indian Rupees with US$ at the agreed rate. In such case the company is exposed only on the profit earned from the project.

(b) **With the swap**

	Year 0 (Million US$)	Year 1 (Million US$)
Buy ₹ 500 crore at spot rate of 1US$ = ₹ 50	(100.00)	----
Swap ₹ 500 crore back at agreed rate of ₹ 50	----	100.00
Sell ₹ 240 crore at 1US$ = ₹ 54	----	44.44
Interest on US$ loan @8% for one year	----	(8.00)
	(100.00)	136.44

Net result is a net receipt of US$ 36.44 million.

Without the swap

	Year 0 (Million US$)	Year 1(Million US$)
Buy ₹ 500 crore at spot rate of 1US$ = ₹ 50	(100.00)	----
Sell ₹ 740 crore at 1US$ = ₹ 54	----	137.04
Interest on US$ loan @8% for one year	----	(8.00)
	(100.00)	129.04

Net result is a net receipt of US$ 29.04 million.

Decision: Since the net receipt is higher in swap option the company should opt for the same.

51. You as a dealer in foreign exchange have the following position in Swiss Francs on 31st October, 2009:

	Swiss Francs
Balance in the Nostro A/c Credit	1,00,000
Opening Position Overbought	50,000
Purchased a bill on Zurich	80,000
Sold forward TT	60,000
Forward purchase contract cancelled	30,000
Remitted by TT	75,000
Draft on Zurich cancelled	30,000

What steps would you take, if you are required to maintain a credit Balance of Swiss Francs 30,000 in the Nostro A/c and keep as overbought position on Swiss Francs 10,000? [NOV 2018 - 8 MARKS]

Answer:

Exchange Position:

Particulars	*Purchase Sw. Fcs.*	*Sale Sw. Fcs.*
Opening Balance Overbought	50,000	
Bill on Zurich	80,000	
Forward Sales – TT		60,000
Cancellation of Forward Contract		30,000
TT Sales		75,000
Draft on Zurich cancelled	30,000	—
	1,60,000	1,65,000
Closing Balance Oversold	5,000	—
	1,65,000	1,65,000

Cash Position (Nostro A/c)

	Credit	Debit
Opening balance credit	1,00,000	—
TT sales	—	75,000
	1,00,000	75,000
Closing balance (credit)	—	25,000
	1,00,000	1,00,000

The Bank has to buy spot TT Sw. Fcs. 5,000 to increase the balance in Nostro account to Sw. Fcs. 30,000.

This would bring down the oversold position on Sw. Fcs. as Nil.

Since the bank requires an overbought position of Sw. Fcs. 10,000, it has to buy forward Sw. Fcs. 10,000.

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Following information is given:
Exchange rates: Canadian dollar 0.666 per DM (spot)
Canadian dollar 0.671 per DM (3-months)
Interest rates: DM 7.5% p.a.
Canadian Dollar - 9.5% p.a.
To take the possible arbitrage gains, what operations would be carried out?
[MAY 2018 - 8 MARKS]
Answer:

In this case, DM is at a premium against the Can$.

Premium = [(0.671 – 0.666) /0.666] x (12/3) x 100 = 3.00 per cent
Interest rate differential = 9.5% - 7.5% = 2 per cent.
Since the interest rate differential is smaller than the premium, it will be profitable to place money in Deutschmarks the currency whose 3-months interest is lower.

The following operations are carried out:

(i) Borrow Can$ 1000 at 9.5 per cent for 3- months;

(ii) Change this sum into DM at the spot rate to obtain DM
= (1000/0.666) = 1501.50

(iii) Place DM 1501.50 in the money market for 3 months to obtain a sum of DM

Principal:	1501.50
Add: Interest @ 7.5% for 3 months =	28.15
Total	1529.65

(iv) Sell DM at 3-months forward to obtain Can$= (1529.65x0.671) = 1026.40

(v) Refund the debt taken in Can$ with the interest due on it, i.e.,

	Can$
Principal	1000.00
Add: Interest @ 9.5% for 3 months	23.75
Total	1023.75

Net arbitrage gain = 1026.40 – 1023.75 = Can$ 2.65

Note: The students may use any quantity of currency to arrive at the arbitrage gain since no specific amount is mentioned in the question.

2. Punjab Bank has entered into a plain vanilla swap through on Overnight Index Swap (OIS) on a principal of Rs. 2 crore and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 24th July, 2017 and was to commence on 25th July, 2017 and run for a period of 7 days.
Respective MIBOR rates for Tuesday to Monday were:

8.70%, 9.10%, 9.12%, 8.95%, 8.98% and 9.10%.

If Punjab Bank received Rs. 507 net on settlement, calculate Fixed rate and interest under both legs.
Notes:
(i) Sunday is a Holiday.
(ii) Workout in rounded rupees and avoid decimal working.
(iii) Consider a year consists of 365 days
[MAY 2018 - 8 MARKS]

Answer:

Day	Principal (₹)	MIBOR (%)	Interest (₹)
Tuesday	2,00,00,000	8.70	4,767
Wednesday	2,00,04,767	9.10	4,987
Thursday	2,00,09,754	9.12	5,000
Friday	2,00,14,754	8.95	4,908
Saturday & Sunday (*)	2,00,19,662	8.98	9,851
Monday	2,00,29,513	9.10	4,994
Total Interest @ Floating			34,507
Less: Net Received			507
Expected Interest @ fixed			34,000
Thus Fixed Rate of Interest			0.0886428
Approx.			8.86%

(*) i.e. interest for two days.

3. An Indian company obtains the following quotes (Rs./$)
Spot: 35.90/36.10
3 - Months forward rate: 36.00/36.25
6 - Months forward rate: 36.10/36.40
The company needs $ funds for six months. Determine whether the company should borrow in $ or Rs. Interest rates are :

3 - Months interest rate : Rs. : 12%, $: 6%

6 - Months interest rate : Rs. : 11.50%, $: 5.5%

Also determine what should be the rate of interest after 3-months to make the company indifferent between 3-months borrowing and 6-months borrowing in the case of:

(i) Rupee borrowing

(ii) Dollar borrowing

Note: For the purpose of calculation you can take the units of dollar and rupee as 100 each.

[NOV 2018 - 8 MARKS]

Answer:

(i) If company borrows in $ then outflow would be as follows:

Let company borrows $ 100	$ 100.00
Add: Interest for 6 months @ 5.5%	$ 2.75
Amount Repayable after 6 months	$ 102.75
Applicable 6 month forward rate	36.40
Amount of Cash outflow in Indian Rupees	Rs. 3,740.10

If company borrows equivalent amount in Indian Rupee, then outflow would be as follows:

Equivalent Rs. amount Rs. 36.10 x 100	Rs. 3,610.00
Add: Interest @11.50%	Rs. 207.58
	Rs. 3817.58

Since cash outflow is more in Rs. borrowing then borrowing should be made in $.

(ii)

(a) Let 'i_r' be the interest rate of Rs. borrowing make indifferent between 3 months borrowings and 6 months borrowing then

$(1 + 0.03)(1 + i_r) = (1 + 0.0575)$

i_r = 2.67% or 10.68% (on annualized basis)

(b) Let 'i_d' be the interest rate of $ borrowing after 3 months to make indifference between 3 months borrowings and 6 months borrowings. Then,

$(1 + 0.015)(1 + i_d) = (1 + 0.0275)$

i_d = 1.232% or 4.93% (on annualized basis)

4. A dealer quotes 'All-in-cost' for a generic swap at 6% against six month LIBOR flat. If the notional principal amount of swap is Rs. 8,00,000:

(i) Calculate semi-annual fixed payment.

(ii) Find the first floating rate payment for (i) above if the six month period from the effective date of swap to the settlement date comprises 181 days and that the corresponding LIBOR was 5% on the effective date of swap.

(iii) In (ii) above, if the settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer? Generic swap is based on 30/360 days basis.

[NOV 2018 - 4 MARKS]

Answer:

(i) Semi-annual fixed payment

= (N) (AIC) (Period)

Where N = Notional Principal amount = ₹8,00,000

AIC = All-in-cost = 6% = 0.06

$$= 8,00,000 \times 0.06 \left(\frac{180}{360}\right)$$

$$= 8,00,000 \times 0.06\ (0.5)$$

= ₹24,000

(ii) Floating Rate Payment

$$= N\ (LIBOR) \left(\frac{dt}{360}\right)$$

$$= 8,00,000 \times 0.05 \times \frac{181}{360}$$

= ₹20,111 or ₹ 20,120

(iii) Net Amount

= (i) – (ii)

= ₹24,000 – ₹20,111 = ₹3889

Or = ₹24,000 – ₹20,120 = ₹3880

5. On 19th January, Bank A entered into forward contract with a customer for a forward sale of US $ 7,000, delivery 20th March at Rs. 46.67. On the same day, it covered its position by buying forward from the market due 19th March, at the rate of Rs. 46.655. On 19th February, the customer approaches the bank and requests for early delivery of US $. Rates prevailing in the interbank markets on that date are as under:

Spot (Rs./$)	**46.5725/5800**
March	**46.3550/3650**

Interest on outflow of funds is 16% and on inflow of funds is 12%. Flat charges for early delivery are Rs. 100. What is the amount that would be recovered from the customer on the transaction?

Note: Calculation should be made on months basis than on days basis.

[NOV 2018 - 8 MARKS]

Answer:

The bank would sell US $ to its customer at the agreed rate under the contract. However, it would recover loss from the customer for early delivery. On 19th February bank would buy US$ 7000 from market and shall sell to customer. Further, Bank would enter into one month forward contract to sell the US $ acquired under the cover deal.

(i) Swap Difference

Bank sells at	Rs. 46.3550
Bank buys at	Rs. 46.5800
Swap loss per US	$ 0.225

Swap loss for US $ 7000 Rs. 1,575

(ii) Interest on Outlay of Funds

On 19th February, Bank sell to customer	Rs. 46.67
It buys from spot Market	Rs. 46.58
Inflow of funds per US $	Rs. 0.09

Inflow of funds for US $ 7000 is Rs. 630
Interest on Rs. 630 at 12% for one month Rs. 6.30

(iii) Charges for early delivery

Swap loss	Rs. 1,575.00
Flat charges	Rs. 100.00
Less: Interest on outflow of funds	Rs. 6.30
	Rs. 1,668.70

Total amount to be recovered from the customer

Amount as per Forward Contract Rs. 46.67 x 7000	Rs. 3,26,690.00
Add: Charges for early delivery	Rs. 1,668.70
	Rs. 3,28,358.70

6. Sun Limited, an Indian company will need $ 5,00,000 in 90 days. In this connection, ssfollowing information is given below:
Spot Rate - $1 = Rs. 71
90 days forward rate of $1 as of today = Rs. 73
Interest Rates are as follows:

Particulars	*US*	*India*
90 days Deposit Rate	*2.50%*	*4.00%*
90 days Borrowing Rate	*4.00%*	*6.00%*

A call option on $ that expires in 90 days has an exercise price of Rs. 74 and a premium of Re. 0.10. Sun Limited has forecasted the spot rates for 90 days as below

Future Rate	*Probability*
₹72.50	*25%*
₹73.00	*50%*
₹74.50	*25%*

Which of the following strategies would be the most preferable to Sun Limited:
(i) A Forward Contract;
(ii) A Money Market hedge;
(iii) An Option Contract;
(iv) No Hedging.
Show your calculations in each case
[MAY 2019 - 8 MARKS]
Answer:

(i) Forward contract:

Rupees needed in 90 days = $5,00,000 x ₹ 73 = ₹ 3,65,00,000

(ii) Money market hedge:

Amount in $ to be invested = 5,00,000/1.0250 = ₹ 4,87,805

Amount of ₹ needed to convert into $ = 4,87,805 x 71 = ₹ 3,46,34,155

Interest and principal on ₹ loan after 90 days

= ₹ 3,46,34,155 x 1.06 = ₹ 3,67,12,204

(iii) Call option:

Expected Spot rate (1)	Prem./unit (2)	Exercise Option (3)	Total price per unit (4)	Total price for $5,00,000 x (4) = (5)	Prob. Pi (6)	Pixi (5) x (6) (7)
72.50	0.10	No	72.60	3,63,00,000	0.25	90,75,000
73.00	0.10	No	73.10	3,65,50,000	0.50	1,82,75,000
74.50	0.10	Yes	74.10*	3,70,50,000	0.25	92,62,500
						3,66,12,500
Add: Interest on Premium @ 6% (50,000 x 6%)						3,000
						3,66,15,500

* (₹ 74 + ₹ 0.10)

(iv) No hedge option:

Expected Future spot rate	₹ needed Xi	Prob. Pi	Pi xi
72.50	3,62,50,000	0.25	90,62,500
73.00	3,65,00,000	0.50	1,82,50,000
74.50	3,72,50,000	0.25	93,12,500
			3,66,25,000

Decision: Forward Contract Strategy is most preferable strategy because it requires the least amount to arrange $5,00,000.

7. M/s. Parker & Co. is contemplating to borrow an amount of Rs. 60 crores for a Period of 3 months in the coming 6 month's time from now. The current rate of interest is 9% p.a., but it may go up in 6 month's time. The company wants to hedge itself against the likely increase in interest rate. The Company's Bankers quoted an FRA (Forward Rate Agreement) at 9.30%p.a. Analyze the effect of FRA and actual rate of interest cost to the company, if the actual rate of interest after 6 months happens to be (i) 9.60% p.a. and (ii) 8.80% p.a. [MTP - MARCH 2018 - 8 MARKS | RTP - NOV 2018]

Answer:

Final settlement amount shall be computed by using formula:

$$= \frac{(N)(RR-FR)(dtm/DY)}{[1+RR(dtm/DY)]}$$

Where,

N = the notional principal amount of the agreement;

RR = Reference Rate for the maturity specified by the contract prevailing on the contract settlement date;

FR = Agreed-upon Forward Rate; and

dtm = maturity of the forward rate, specified in days (FRA Days)

DY = Day count basis applicable to money market transactions which could be 360 or 365 days.

Accordingly,

If actual rate of interest after 6 months happens to be 9.60%

$$= \frac{(₹\,60\,crore)(0.096-0.093)(3/12)}{[1+0.096(3/12)]}$$

$$= \frac{(₹\,60\,crore)(0.00075)}{1.024} = ₹\ 4,39,453$$

Thus banker will pay Parker & Co. a sum of ₹ 4,39,453

If actual rate of interest after 6 months happens to be 8.80%

$$= \frac{(₹\,60\,crore)(0.088-0.093)(3/12)}{[1+0.088(3/12)]}$$

$$= \frac{(₹\,60\,crore)(-0.00125)}{1.022} = -₹\ 7,33,855$$

Thus Parker & Co. will pay banker a sum of ₹ 7,33,855

Note: It might be possible that students may solve the question on basis of days instead of months (as considered in above calculations). Further there may be also possibility that the FRA days and Day Count convention may be taken in various plausible combinations such as 90 days/360 days, 90 days/ 365 days, 91 days/360 days or 91 days/365days.

8. Odessa Limited has proposed to expand its operations for which it requires funds of $ 15 million, net of issue expenses which amount to 2% of the issue size. It proposed to raise the funds through a GDR issue. It considers the following factors in pricing the issue:
(i) The expected domestic market price of the share is Rs. 300
(ii) 3 shares underly each GDR
(iii) Underlying shares are priced at 10% discount to the market price
(iv) Expected exchange rate is Rs. 60/$
Calculate the number of GDR's to be issued and cost of GDR to Odessa Limited, if 20% dividend is expected to be paid with a growth rate of 20%.
[MTP - MARCH 2018 & APRIL 2018 - 8 MARKS]
Answer:

Net Issue Size = $15 million

Gross Issue = $\frac{\$15\,\text{million}}{0.98}$ = $15.306 million

Issue Price per GDR in ₹ (300 x 3 x 90%)	₹ 810
Issue Price per GDR in $ (₹ 810/ ₹ 60)	$13.50
Dividend Per GDR (D_1) = ₹ 2* x 3 =	₹ 6

* Assumed to be based on Face Value of ₹ 10 each share.

Net Proceeds Per GDR = ₹ 810 x 0.98 = ₹ 793.80

(a) Number of GDR to be issued

$$\frac{\$15.306\ \text{million}}{\$13.50} = 1.1338\ \text{million}$$

(b) Cost of GDR to Odessa Ltd.

$$k_e = \frac{6.00}{793.80} + 0.20 = \mathbf{20.76\%}$$

9. XYZ Limited borrows £ 15 Million of six months LIBOR + 10.00% for a period of 24 months. The company anticipates a rise in LIBOR, hence it proposes to buy a Cap Option from its Bankers at the strike rate of 8.00%. The lump sum premium is 1.00% for the entire reset periods and the fixed rate of interest is 7.00% per annum. The actual position of LIBOR during the forthcoming reset period is as under:

Reset Period	LIBOR
1	9.00%
2	9.50%
3	10.00%

Analyze how far interest rate risk is hedged through Cap Option.
(For calculation, work out figures at each stage up to four decimal points and amount nearest to £.)
[MTP - APRIL 2018, AUGUST 2018 & OCTOBER 2019 - 8 MARKS]
Answer:

Analysis of hedging of interest rate risk thorough Cap Option

First of all we shall calculate premium payable to bank as follows:

$$P = \frac{rp}{\left[(1\div i) - \frac{1}{i\times(1+i)^t}\right]} \text{ X A or } \frac{rp}{PVAF(3.5\%,4)} \times A$$

Where

P = Premium

A = Principal Amount

rp = Rate of Premium

i = Fixed Rate of Interest

t = Time

$$= \frac{0.01}{\left[(1/0.035) - \frac{1}{0.035\times1.035^4}\right]} \times £15,000,000 \text{ or } \frac{0.01}{(0.966+0.933+0.901+0.871)} \times £15,000,000$$

$$= \frac{0.01}{\left[(28.5714) - \frac{1}{0.04016}\right]} \times £15,000,000 \text{ or } \frac{£150,000}{3.671} = £\ 40,861$$

Please note above solution has been worked out on the basis of four decimal points at each stage.

Now we see the net payment received from bank

Reset Period	Additional interest due to rise in interest rate	Amount received from bank	Premium paid to bank	Net Amt. received from bank
1	£ 75,000	£ 75,000	£ 40,861	£34,139
2	£ 112,500	£ 112,500	£ 40,861	£71,639
3	£ 150,000	£ 150,000	£ 40,861	£109,139
TOTAL	£ 337,500	£ 337,500	£122,583	£ 214,917

Analysis: Thus, from above it can be seen that interest rate risk amount of £ 337,500 reduced by £ 214,917 by using of Cap option.

Note: It may be possible that student may compute upto three decimal points or may use different basis. In such case their answer is likely to be different.

10. Discuss the types of Commodity Swaps [MTP - AUGUST 2018 - 5 MARKS]

Answer:

There are two types of commodity swaps: fixed-floating or commodity-for-interest.

(a) Fixed-Floating Swaps: They are just like the fixed-floating swaps in the interest rate swap market with the exception that both indices are commodity based indices. General market indices in the international commodities market with which many people would be familiar include the S&P Goldman Sachs Commodities Index (S&PGSCI) and the Commodities Research Board Index (CRB). These two indices place different weights on the various Scommodities so they will be used according to the swap agent's requirements.

(b) Commodity-for-Interest Swaps: They are similar to the equity swap in which a total return on the commodity in question is exchanged for some money market rate (plus or minus a spread).

11. XY Limited is engaged in large retail business in India. It is contemplating for expansion into a country of Africa by acquiring a group of stores having the same line of operation as that of India.
The exchange rate for the currency of the proposed African country is extremely volatile.
Rate of inflation is presently 40% a year. Inflation in India is currently 10% a year.
Management of XY Limited expects these rates likely to continue for the foreseeable future.
Estimated projected cash flows, in real terms, in India as well as African country for the first three years of the project are as follows:

	Year – 0	Year – 1	Year – 2	Year - 3
Cashflowsin Indian Rs. (000)	-50,000	-1,500	-2,000	-2,500
Cash flows in African Rands (000)	-2,00,000	+50,000	+70,000	+90,000

XY Ltd. assumes the year 3 nominal cash flows will continue to be earned each year indefinitely. It evaluates all investments using nominal cash flows and a nominal discounting rate. The present exchange rate is African Rand 6 to Rs. 1.
You are required to calculate the net present value of the proposed investment considering the following:
(i) African Rand cash flows are converted into rupees and discounted at a risk adjusted rate.
(ii) All cash flows for these projects will be discounted at a rate of 20% to reflect it's high risk.
(iii) Ignore taxation.

	Year - 1	Year – 2	Year - 3
PVIF @ 20%	.833	.694	.579

[MTP - AUGUST 2018 - 8 MARKS]
Answer:
Calculation of NPV

Year	0	1	2	3
Inflation factor in India	1.00	1.10	1.21	1.331
Inflation factor in Africa	1.00	1.40	1.96	2.744
Exchange Rate (as per IRP)	6.00	7.6364	9.7190	12.3696
Cash Flows in Rs.'000				
Real	-50000	-1500	-2000	-2500
Nominal (1)	-50000	-1650	-2420	-3327.50
Cash Flows in African Rand '000				
Real	-200000	50000	70000	90000
Nominal	-200000	70000	137200	246960
In Indian ₹ '000 (2)	-33333	9167	14117	19965
Net Cash Flow in Rs. '000 (1)+(2)	-83333	7517	11697	16637
PVF@20%	1	0.833	0.694	0.579
PV	-83333	6262	8118	9633

NPV of 3 years = -59320 (Rs. '000)

$$\text{NPV of Terminal Value} = \frac{16637}{0.20} \times 0.579 = 48164 \text{ (Rs.'000)}$$

Total NPV of the Project = -59320 (Rs. '000) + 48164 (Rs.'000) = -11156 (Rs.'000)

12. A multinational company is planning to set up a subsidiary company in India (where hitherto it was exporting) in view of growing demand for its product and competition from other MNCs. The initial project cost (consisting of Plant and Machinery including installation) is estimated to be US$ 500 million. The net working capital requirements are estimated at US$ 50 million. The company follows straight line method of depreciation. Presently, the company is exporting two million units every year at a unit price of US$ 80, its variable cost per unit being US$ 40.

The Chief Financial Officer has estimated the following operating cost and other data in respect of proposed project:

(i) Variable operating cost will be US $ 20 per unit of production;

(ii) Additional cash fixed cost will be US $ 30 million p.a. and project's share of allocated fixed cost will be US $ 3 million p.a. based on principle of ability to share;

(iii) Production capacity of the proposed project in India will be 5 million units;

(iv) Expected useful life of the proposed plant is five years with no salvage value;

(v) Existing working capital investment for production & sale of two million units through exports was US $ 15 million;

(vi) Export of the product in the coming year will decrease to 1.5 million units in case the company does not open subsidiary company in India, in view of the presence of competing MNCs that are in the process of setting up their subsidiaries in India;

(vii) Applicable Corporate Income Tax rate is 35%, and

(viii) Required rate of return for such project is 12%.

ADVICE X Inc. to establish the proposed project in India.

Note:

1. There will be no variation in the exchange rate of two currencies and all profits will be repatriated, as there will be no withholding tax.

2. Present Value Interest Factors (PVIF) @ 12% for five years are as below:

Year	1	2	3	4	5
PVIF	0.8929	0.7972	0.7118	0.6355	0.5674

[MTP - OCTOBER 2018 - 8 MARKS | RTP - NOV 2018]

Answer:

Financial Analysis whether to set up the manufacturing units in India or not may be carried using NPV technique as follows:

I. Incremental Cash Outflows

	$ Million
Cost of Plant and Machinery	500.00
Working Capital	50.00
Release of existing Working Capital	(15.00)
	535.00

II. Incremental Cash Inflow after Tax (CFAT)

(a) Generated by investment in India for 5 years

	$ Million
Sales Revenue (5 Million x $80)	400.00
Less: Costs	
Variable Cost (5 Million x $20)	100.00
Fixed Cost	30.00
Depreciation ($500Million/5)	100.00
EBIT	170.00
Taxes@35%	59.50
EAT	110.50
Add: Depreciation	100.00
CFAT (1-5 years)	210.50
Cash flow at the end of the 5 years (Release of Working Capital)	35.00

(b) Cash generation by exports

	$ Million
Sales Revenue (1.5 Million x $80)	120.00
Less: Variable Cost (1.5 Million x $40)	60.00
Contribution before tax	60.00
Tax@35%	21.00
CFAT (1-5 years)	39.00

(c) Additional CFAT attributable to Foreign Investment

	$ Million
Through setting up subsidiary in India	210.50
Through Exports in India	39.00
CFAT (1-5 years)	171.50

III. Determination of NPV

Year	CFAT ($ Million)	PVF@12%	PV($ Million)
1-5	171.50	3.6048	618.2232
5	35	0.5674	19.8590
			638.0822
Less: Initial Outflow			535.0000
			103.0822

Since NPV is positive the proposal should be accepted.

13. XYZ Inc. issues a £ 10 million floating rate loan on July 1, 2013 with resetting of coupon rate every 6 months equal to LIBOR + 50 bp. XYZ is interested in a collar strategy by selling a Floor and buying a Cap. XYZ buys the 3 years Cap and sell 3 years Floor as per the following details on July 1, 2013:

Notional Principal Amount $ 10 million
Reference Rate 6 months LIBOR
Strike Rate 4% for Floor and 7% for Cap
Premium 0*
The actual LIBOR happened to at each reset date was as follows:

Reset Date	LIBOR (%)
31-12-2013	6.00
30-06-2014	7.50
31-12-2014	5.00
30-06-2015	4.00
31-12-2015	3.75
30-06-2016	4.25

Determine:

(i) Effective interest paid out at each of above reset date,

(ii) The average overall effective rate of interest p.a.

***Since Premium paid for Cap = Premium received for Floor**

[MTP - OCTOBER 2018 - 8 MARKS | RTP - MAY 2019]

Answer:

(i) The pay-off of each leg shall be computed as follows:

Cap Receipt

Max {0, [Notional principal x (LIBOR on Reset date – Cap Strike Rate) x $\frac{\text{Number of days in the settlement period}}{365}$}

Floor Pay-off

Max {0, [Notional principal x (Floor Strike Rate – LIBOR on Reset date) x $\frac{\text{Number of days in the settlement period}}{365}$}

Statement showing effective interest on each re-set date

Reset Date	LIBOR (%)	Days	Interest Payment ($) LIBOR+0.50%	Cap Receipts ($)	Floor Pay-off ($)	Effective Interest
31-12-2013	6.00	184	3,27,671	0	0	3,27,671
30-06-2014	7.50	181	3,96,712	24,795	0	3,71,917
31-12-2014	5.00	184	2,77,260	0	0	2,77,260
30-06-2015	4.00	181	2,23,151	0	0	2,23,151
31-12-2015	3.75	184	2,14,247	0	12,603	2,26,850
30-06-2016	4.25	182	2,36,849	0	0	2,36,849
Total		1096				16,63,698

(ii) Average Annual Effective Interest Rate shall be computed as follows:

$$\frac{16,63,698}{1,00,00,000} \times \frac{365}{1096} \times 100 = 5.54\%$$

14. TM Fincorp has bought a 6 x 9 Rs. 100 crore Forward Rate Agreement (FRA) at 5.25%. On fixing date reference rate i.e. MIBOR turns out be as follows:

Period	Rate (%)
3 months	5.50
6 months	5.70
9 months	5.85

You are required to calculate:

(i) Profit/Loss to TM Fincorp. in terms of basis points.
(ii) The settlement amount.
(Assume 360 days in a year)
[MTP - MARCH 2019 - 8 MARKS]
Answer:

(i) TM will make a profit of 25 basis points since a 6X9 FRA is a contract on 3-month interest rate in 6 months, which turns out to be 5.50% (higher than FRA price).

(ii) The settlement amount shall be calculated by using the following formula:

$$\frac{N(RR-FR)(dtm/360)}{1+RR(dtm/360)}$$

Where

N = Notional Principal Amount
RR = Reference Rate
FR = Agreed upon Forward Rate
Dtm = FRA period specified in days.

Accordingly:

$$\frac{100\text{ crore}\,(5.50\%-5.25\%)(92^*/360)}{1+0.055(92^*/360)} = \text{Rs. } 6,30,032$$

Hence there is profit of Rs. 6,30,032 to TM Fincorp.

* Alternatively, it can also be taken as 90 days.

15. If the present interest rate for 6 months borrowings in India is 9% per annum and the corresponding rate in USA is 2% per annum, and the US$ is selling in India at Rs. 64.50/$.
Then Recommend:
(i) Will US $ be at a premium or at a discount in the Indian forward market?
(ii) The expected 6 month forward rate for US$ in India.
(iii) The rate of forward premium/discount.
[MTP - APRIL 2019 -S 6 MARKS]
Answer:

(i) Under the given circumstances, the USD is expected to quote at a premium in India as the interest rate is higher in India.

(ii) Calculation of the forward rate:

$$\frac{1+R_h}{1+R_f}=\frac{F_1}{E_o}$$

Where: R_h is home currency interest rate, R_f is foreign currency interest rate, F_1 is end of the period forward rate, and E_o is the spot rate.

$$\text{Therefore } \frac{1+(0.09/2)}{1+(0.02/2)} = \frac{1+(0.09/2)}{1+(0.02/2)} = \frac{F_1}{64.50}$$

$$\frac{1 + 0.045}{1 + 0.01} = \frac{F_1}{64.50}$$

or $\frac{1.045}{1.01} \times 64.50 = F_1$

or $\frac{67.4025}{1.01} = F_1$

or F_1 = Rs.66.74

(iii) Rate of premium:

$$\frac{66.74 - 64.50}{64.50} \times \frac{12}{6} \times 100 = 6.94\%$$

16. With relaxation of norms in India for investment in international market upto $ 2,50,000, Mr. X to hedge himself against the risk of declining Indian economy and weakening of Indian Rupee during last few years, decided to diversify in the International Market. Accordingly, Mr. X invested a sum of Rs. 1.58 crore on 1.1.20x1 in Standard & Poor Index. On 1.1.20x2 Mr. X sold his investment. The other relevant data is given below:

	1.1.20x1	1.1.20x2
Index of Stock Market in India	7395	?
Standard & Poor Index	2028	1919
Exchange Rate (Rs./$)	62.00/62.25	67.25/67.50

You are required to Calculate:
(i) The return for a US investor.
(ii) Holding Period Return to Mr. X.
(iii) The value of Index of Stock Market in India as on 1.1.20x2 at which Mr. X would be indifferent between investment in Standard & Poor Index and India Stock Market
[MTP - APRIL 2019 - 7 MARKS]
Answer:

(i) Return of a US Investor

$$= \frac{\text{Ending Price - Initial Price}}{\text{Initial Price}} \times 100$$

$$= \frac{1919 - 2028}{2028} \times 100 = -5.37\%$$

(ii) Return of Mr. X

Initial Investment (Rs.)	1.58 Crore
Applicable Exchange Rate on 1.1.20x1	Rs. 62.25
Equivalent US$	US$ 2,53,815.26
Purchase Price of Standard & Poor Index	2028
No. of Standard & Poor Indices Purchased	125.16
Ending Price of Standard & Poor Index	1919
Proceeds realised in US$ on sale of Standard & Poor Index	US$ 2,40,182.04
Applicable Exchange Rate on 1.1.20x2	Rs. 67.25
Proceeds realised in INR on sale of Standard & Poor Index	Rs. 1,61,52,242
Rate of Return $\left(\frac{16152242 - 15800000}{15800000} \times 100\right)$	2.23%

(iii) Rate of Return had the amount been invested in India

Initial Investment (Rs.)	1.58 Crore
Purchase Price of Indian Index	7395
No. of Indian Indices Purchased	2136.58
Let Ending Price of Indian Index	X
Then to be indifferent with return in International Market	$\frac{2136.58 \times X - 1.58}{1.58} \times 100 = 2.23$
Price of Indian Index to be indifferent	7559.90 say 7560

17. Mercy is a Forex Dealer with XYZ Bank. She notices following information relating to Canadian Dollar (CAD) and German Deutschmark (DEM):
Exchange rate – CAD 0.775 per DEM (Spot)
CAD 0.780 per DEM (3 months)
Interest rates – DEM 7% p.a.
CAD 9% p.a.
(i) Assuming that there is no transaction cost determine does the Interest Rate Parity holds in above quotations.
(ii) If yes, then explain the steps that would be required to make an arbitrage profit if Mercy is authorized to work with CAD 1 Million for the same purpose. Also determine the profit that would be made in CAD.
Note: Ignore the decimal points in the amounts.
[MTP - OCTOBER 2019 - 8 MARKS]
Answer:

(i) For 3 months, r_{CAD} = 2.25% and r_{DEM} = 1.75%. Since the exchange rate is in CAD/ DEM term the appropriate equation for Interest Rate Parity is as follows:

$$\frac{F}{S} = \frac{(1 + r_{CAD})}{(1 + r_{DEM})}$$

$$\frac{0.780}{0.775} = \frac{(1 + 0.0225)}{(1 + 0.0175)}$$

$1.00645 \neq 1.00491$

Since both sides are not equal, Interest Rate Parity does not hold.

(ii) Since IRP does not hold there is an arbitrage opportunity.

Interest Differential = 2.25% - 1.75% = 0.50%

$$\text{Premium} = \frac{0.780 - 0.775}{0.775} \times 100 = 0.645\%$$

Since the interest rate differential is smaller than the premium, it will be profitable to place money in Deutschmarks the currency whose 3-months interest is lower.

The following operations are carried out:

(i) Borrow CAD 1 Million at 9 per cent for 3- months;

(ii) Change this sum into DEM at the spot rate

= (1,000,000/0.775) = 1,290,323

(iii) Place DM 1,290,323 in the money market for 3 months to obtain a sum of DM

Principal:	1,290,323
Add: Interest @ 7% for 3 months =	22,581
Total	1,312,904

(iv) Sell DEM at 3-months forward to obtain CAD = (1,312,904 x 0.780) = CAD 1,024,065

(v) Refund the debt taken in CAD with the interest due on it, i.e.,

	CAD
Principal	1,000,000
Add: Interest @9% for 3 months	22,500
Total	1,022,500

Net arbitrage gain = CAD 1,024,065 – CAD 1,022,500 = CAD 1,565

18. Place the following strategies by different persons in the Exposure Management Strategies Matrix.

Strategy 1: Kuljeet a wholesaler of imported items imports toys from China to sell them in the domestic market to retailers. Being a sole trader, he is always so much involved in the promotion of his trade in domestic market and negotiation with foreign supplier that he never pays attention to hedge his payable in foreign currency and leaves his position unhedged.

Strategy 2: Moni, is in the business of exporting and importing brassware to USA and European countries. In order to capture the market he invoices the customers in their home currency. Lavi enters into forward contracts to sell the foreign exchange only if he expects some profit out of it other-wise he leaves his position open.

Strategy 3: TSC Ltd. is in the business of software development. The company has both receivables and payables in foreign currency. The Treasury Manager of TSC Ltd. not only enters into forward contracts to hedge the exposure but carries out cancellation and extension of forward contracts on regular basis to earn profit out of the same. As a result management has started looking Treasury Department as Profit Centre.

Strategy 4: DNB Publishers Ltd. in addition to publishing books are also in the business of importing and exporting of books. As a matter of policy the movement company invoices the customer or receives invoice from the supplier immediately covers its position in the Forward or Future markets and hence never leave the exposure open even for a single day.

[RTP - NOV 2018]

Answer:

Strategy 1: This strategy is covered by High Risk: Low Reward category and worst as it leaves all exposures unhedged. Although this strategy does not involve any time and effort, it carries high risk.

Strategy 2: This strategy covers Low Risk: Reasonable reward category as the exposure is covered wherever there is anticipated profit otherwise it is left.

Strategy 3: This strategy is covered by High Risk: High Reward category as to earn profit, cancellations and extensions are carried out. Although this strategy leads to high gains but it is also accompanied by high risk.

Strategy 4: This strategy is covered by Low Risk : Low Reward category as company plays a very safe game.
Diagrammatically all these strategies can be depicted as follows

	High Risk		
Low Reward	Strategy 1	Strategy 3	High Reward
	Strategy 4	Strategy 2	
	Low Risk		

19. XYZ Ltd. is an export oriented business house based in Mumbai. The Company invoices in customers' currency. Its receipt of US $ 1,00,000 is due on September 1, 2009.
Market information as at June 1, 2009 is:

Exchange Rates		Currency Futures		
US $/₹		US $/₹	Contract size	₹ 4,72,000
Spot	0.02140	June	0.02126	
1 Month Forward	0.02136	September	0.02118	
3 Months Forward	0.02127			
		Initial Margin		Interest Rates in India
June		₹ 10,000		7.50%
September		₹ 15,000		8.00%

On September 1, 2009 the spot rate US $Re. is 0.02133 and currency future rate is 0.02134.
Comment which of the following methods would be most advantageous for XYZ Ltd.
(a) Using forward contract
(b) Using currency futures
(c) Not hedging currency risks.

It may be assumed that variation in margin would be settled on the maturity of the futures contract. [RTP - MAY 2019]

Answer:

Receipts using a forward contract (1,00,000/0.02127)	= ₹47,01,457
Receipts using currency futures	
The number of contracts needed is (1,00,000/0.02118)/4,72,000 = 10	
Initial margin payable is 10 x ₹15,000 = ₹1,50,000	
On September 1 Close at 0.02134	
Receipts = US$1,00,000/0.02133	= 46,88,233
Variation Margin = [(0.02134 – 0.02118) x 10 x 472000/-]/0.02133	
OR (0.00016x10x472000)/.02133 = 755.2/0.02133	35,406
	47,23,639
Less: Interest Cost – 1,50,000 x 0.08 x 3/12	₹3,000
Net Receipts	₹47,20,639
Receipts under different methods of hedging	
Forward contract	₹47,01,457
Futures	₹47,20,639
No hedge	
US$ 1,00,000/0.02133	₹46,88,233
The most advantageous option would have been to hedge with futures.	

20. Derivative Bank entered into a swap arrangement on a principal of Rs. 10 crores and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 19th August, 2019 and was to commence on 20th August, 2019 and run for a period of 7 days.
Respective MIBOR rates for Tuesday to Monday were:
8.15%, 7.98%, 7.95%, 8.12%, 8.15%, 7.75%.
If Fixed Rate of Interest is 8%, then evaluate
(i) the nature of this Swap arrangement.
(ii) the Net Settlement amount.
Notes:
(1) Sunday is Holiday.
(2) Work in rounded rupees and avoid decimal working.
(3) Consider 365 days in a year. (MTP-OCT 2020-8 Marks)

Answer:

(i) The given swap arrangement is Plain Vanilla Overnight Index Swap (OIS).

(ii) To compute the Net Settlement amount we shall compute Interest as per floating rate as follows:

Day	Principal (₹)	MIBOR (%)	Interest (₹)
Tuesday	10,00,00,000	8.15	22,329
Wednesday	10,00,22,329	7.98	21,868
Thursday	10,00,44,197	7.95	21,790
Friday	10,00,65,987	8.12	22,261
Saturday & Sunday (*)	10,00,88,248	8.15	44,697
Monday	10,01,32,945	7.75	21,261
Total Interest @ Floating Rate (A)			1,54,206
Total Interest @ Fixed Rate (B)			1,53,425
$10,00,00,000 \times 8.00\% \times \frac{7}{365}$			
Net Settlement Amount Paid			781

21.

You as a dealer in foreign exchange have the following position in GBP on 31st October, 2019: GBP

Balance in the Nostro A/c Credit	**2,00,000**
Opening Position Overbought	**1,00,000**
Purchased a bill on London	**1,60,000**
Sold forward TT	**1,20,000**
Forward purchase contract cancelled	**60,000**
Remitted by TT	**1,50,000**
Draft on London cancelled	**60,000**

Decide the steps would you take, if you are required to maintain a credit Balance of GBP 65,000 in the Nostro A/c and keep as oversold position on GBP 20,000? (MTP OCT 2020-8 Marks)

Answer:

(a) **Exchange Position:**

Particulars	*Purchases (GBP)*	*Sales (GBP)*
Opening Balance Overbought	1,00,000	
Bill on London	1,60,000	
Forward Sales – TT		1,20,000
Cancellation of Forward Contract		60,000
TT Sales		1,50,000
Draft on London cancelled	60,000	—
	3,20,000	3,30,000
Closing Balance Oversold	10,000	—
	3,30,000	3,30,000

Cash Position (Nostro A/c)

	Credit	Debit
Opening balance credit	2,00,000	—
TT sales	—	1,50,000
	2,00,000	1,50,000
Closing balance (credit)	—	50,000
	2,00,000	2,00,000

The Bank has to buy spot TT GBP 15,000 to increase the balance in Nostro account to GBP 65,000.

This would bring the overbought position on GBP to 5,000.

Since the bank requires an oversold position of GBP 20,000, it has to sell forward GBP 25,000.

22. XYZ Ltd. has imported goods to the extent of US$ 8 Million. The payment terms are as under:
(1) 1% discount if full amount is paid immediately or
(2) 60 days interest free credit. However, in case of a further delay up to 30 days, interest at the rate of 8% p.a. will be charged for additional days after 60 days. M/s XYZ Ltd. has Rs. 25 Lakh available and for remaining it has an offer from bank for a loan up to 90 days @ 9.0% p.a.
The quotes for foreign exchange are as follows:

Spot Rate INR/ US$ (buying)	**Rs. 66.98**
60 days Forward Rate INR/ US$ (buying)	**Rs. 67.16**
90 days Forward Rate INR/ US$ (buying)	**Rs. 68.03**

Advise which one of the following options would be better for XYZ Ltd.
(i) Pay immediately after utilizing cash available and for balance amount take 90 days loan from bank.
(ii) Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.
(iii) Avail supplier offer of 90 days credit and utilize cash available.
Further presume that the cash available with XYZ Ltd. will fetch a return of 4% p.a. in India till it is utilized. Assume year has 360 days. Ignore Taxation.
Compute your working upto four decimals and cash flows in Rs. in Crore. (MTP-OCT 2020-10 Marks)
Answer:

To evaluate which option would be better we shall compute the outflow under each option as follows:

(i) Pay Immediately availing discount

Particulars		
Spot Rate		₹ 66.98
Amount required in US$	[US$ 8 Million (1 – 0.01)]	US$ 7.92 Million
Amount required in ₹	[₹ 66.98 x US$ 7.92 Million]	₹ 53.0482 Crore
Cash Available		₹ 0.2500 Crore

Loan required	₹ 52.7982 Crore
Interest for 90 days @ 9%	₹ 1.1880 Crore
Total Outflow	₹ 53.9862 Crore

(ii) Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.

Particulars		
Applicable Forward Rate		₹ 67.16
Amount required in ₹	[₹ 67.16 x US$ 8 Million]	₹ 53.7280 Crore
Loan required	[₹ 53.7280 Crore – ₹ 0.25 Crore]	₹ 53.4780 Crore
Interest for 30 days @ 9%		₹ 0.4011 Crore
		₹ 53.8791 Crore
Interest earned on Cash for 60 days @ 4%		₹ 0.0017 Crore
Total Outflow		₹ 53.8774 Crore

(iii) Avail supplier offer of 90 days credit and utilize cash available

Particulars		
Amount Payable		US$ 8 Million
Interest for 30 days @ 8%		US$ 0.0533 Million
Amount required in ₹		US$ 8.0533 Million
Applicable Forward Rate		₹ 68.03
Amount required in ₹	[₹ 68.03 x US$ 8.0533 Million]	₹ 54.7866 Crore
Cash Available		₹ 0.2500 Crore
Interest earned on Cash for 90 days @ 4%		₹ 0.0025 Crore
Total Outflow		₹ 54.5341 Crore

Decision: Cash outflow is least in case of Option (ii) same should be opted for.

23.

Citi Bank quotes JPY/ USD 105.00 -106.50 and Honk Kong Bank quotes USD/JPY 0.0090- 0.0093.

(a) Are these quotes identical if not then how they are different?

(b) Is there a possibility of arbitrage?

(c) If there is an arbitrage opportunity, then show how would you make profit from the given quotation in both cases if you are having JPY 1,00,000 or US$ 1,000.

(RTP-NOV 2020)

Answer:

(a) No, while Citi Bank's quote is a Direct Quote for JPY (i.e. for Japan) the Hong Kong Bank quote is a Direct Quote for USD (i.e. for USA).

(b) Since Citi Bank quote imply USD/ JPY 0.0094 - 0.0095 and both rates exceed those offered by Hong Kong Bank, there is an arbitrage opportunity.

Alternatively, it can also be said that Hong Kong Bank quote imply JPY/ USD 107.53 – 111.11 and both rates exceed quote by Citi Bank, there is an arbitrage opportunity.

(c) Let us how arbitrage profit can be made.

(i)	Covert US$ 1,000 into JPY by buying from Hong Kong Bank	JPY 1,07,530
	Sell these JPY to Citi Bank at JPY/ USD 106.50	
	and convert in US$	US$ 1009.67
	Thus, arbitrage gain (US$ 1009.67 - US$ 1000.00)	US$ 9.67
(ii)	Covert JPY 1,00,000 into USD by buying from	
	Citi Bank at JPY/ USD 106.50	US$ 938.97
	Sell these US$ to Hong Kong Bank at	
	JPY/ USD 107.53 and convert in US$	JPY 100967.44
	Thus, arbitrage gain (JPY 1,00,967.44 - JPY 1,00,000)	JPY 967.44

24.

(a) Given:

US$ 1 = ¥ 107.31

£ 1 = US$ 1.26

A$ 1 = US$ 0.70

(i) Calculate the cross rate for Pound in Yen terms

(ii) Calculate the cross rate for Australian Dollar in Yen terms

(iii) Calculate the cross rate for Pounds in Australian Dollar terms

(b) The current spot exchange rate is $1.35/£ and the three-month forward rate is $1.30/£. According to your analysis of the exchange rate, you are quite confident that the spot exchange rate will be $1.32/£ after 3 months.

(i) Suppose you want to speculate in the forward market then what course of action would be required and what is the expected dollar Profit (Loss) from this speculation?

(ii) What would be your Profit (Loss) in Dollar terms on the position taken as per your speculation if the spot exchange rate turns out to be $1.26/£.

Assume that you would like to buy or sell £1,000,000.

(RTP-NOV 2020)

Answer:

(a) (i) Calculate the cross rate for Pounds in Yen terms

1£ = ? ¥

US$1 = ¥ 107.31

£ 1 = US$ 1.26

$$\frac{¥}{\$} \times \frac{\$}{£} = \frac{¥}{£}$$

$$\frac{¥}{£} = 107.31 \times 1.26$$

£1 = ¥ 135.21

(ii) Calculate the cross rate for Australian Dollar in Yen terms

A$1 = ¥ ?

US$1 = ¥ 107.31

A$ 1 = US$ 0.70

$$\frac{¥}{\$} \times \frac{\$}{A\$} = \frac{¥}{A\$}$$

$$\frac{¥}{A\$} = 107.31 \times 0.70$$

A$ 1 = ¥ 75.12

(iii) Calculate the cross rate for Pounds in Australian Dollar terms

£ 1 = A$?

A$1 = US$ 0.70

US $ 1 = A$ 1.4286

£1 = US$1.26

$$\frac{A\$}{\$} \times \frac{\$}{£} = \frac{A\$}{£}$$

$$\frac{A\$}{£} = 1.4286 \times 1.26 = 1.80$$

£ 1 = A$ 1.80

(b) (i) If you believe the spot exchange rate will be $ 1.32/£ in three months, you should buy £ 1,000,000 forward for $1.30/£ and sell at $ 1.32/£ 3 months hence.

Your expected profit will be: £1,000,000 x ($1.32 - $1.30) = $20,000

(ii) If the spot exchange rate turns out to be $1.26/£ in three months, your loss from the long position in Forward Market will be: -

£ 1,000,000 x ($ 1.26 - $1.30) = $ 40,000

25. Explain the difference between Forward and Future Contract. (RTP- NOV 2020)

Answer:

Difference between forward and future contract is as follows:

S. No.	Features	Forward	Futures
1.	Trading	Forward contracts are traded on personal basis or on telephone or otherwise.	Futures Contracts are traded in a competitive arena.

2.	Size of Contract	Forward contracts are individually tailored and have no standardized size	Futures contracts are standardized in terms of quantity or amount as the case may be
3.	Organized exchanges	Forward contracts are traded in an over the counter market.	Futures contracts are traded on organized exchanges with a designated physical location.
4.	Settlement	Forward contracts settlement takes place on the date agreed upon between the parties.	Futures contracts settlements are made daily via. Exchange's clearing house.
5.	Delivery date	Forward contracts may be delivered on the dates agreed upon and in terms of actual delivery.	Futures contracts delivery dates are fixed on cyclical basis and hardly takes place. However, it does not mean that there is no actual delivery.
6.	Transaction costs	Cost of forward contracts is based on bid – ask spread.	Futures contracts entail brokerage fees for buy and sell orders.
7.	Marking to market	Forward contracts are not subject to marking to market	Futures contracts are subject to marking to market in which the loss on profit is debited or credited in the margin account on daily basis due to change in price.
8.	Margins	Margins are not required in forward contract.	In futures contracts every participants is subject to maintain margin as decided by the exchange authorities
9.	Credit risk	In forward contract, credit risk is born by each party and, therefore, every party has to bother for the creditworthiness.	In futures contracts the transaction is a two way transaction, hence the parties need not to bother for the risk.

CHAPTER-10 INTERNATIONAL FINANCIAL MANAGEMENT

Practical Illustrations

1. Perfect Inc., a U.S. based Pharmaceutical Company has received an offer from Aidscure Ltd., a company engaged in manufacturing of drugs to cure Dengue, to set up a manufacturing unit in Baddi (H.P.), India in a joint venture. As per the Joint Venture agreement, Perfect Inc. will receive 55% share of revenues plus a royalty @ US $0.01 per bottle. The initial investment will be Rs. 200 crores for machinery and factory. The scrap value of machinery and factory is estimated at the end of five (5) year to be Rs. 5 crores. The machinery is depreciable @ 20% on the value net of salvage value using Straight Line Method. An initial working capital to the tune of Rs. 50 crores shall be required and thereafter Rs. 5 crores each year. As per GOI directions, it is estimated that the price per bottle will be Rs. 7.50 and production will be 24 crores bottles per year. The price in addition to inflation of respective years shall be increased by Rs. 1 each year. The production cost shall be 40% of the revenues.

The applicable tax rate in India is 30% and 35% in US and there is Double Taxation Avoidance Agreement between India and US. According to the agreement tax credit shall be given in US for the tax paid in India. In both the countries, taxes shall be paid in the following year in which profit have arisen.

The Spot rate of $ is Rs. 57. The inflation in India is 6% (expected to decrease by 0.50% every year) and 5% in US. As per the policy of GOI, only 50% of the share can be remitted in the year in which they are earned and remaining in the following year. Though WACC of Perfect Inc. is 13% but due to risky nature of the project it expects a return of 15%.

Determine whether Perfect Inc. should invest in the project or not (from subsidiary point of view)

Answer:

Working Notes:

1. Estimated Exchange Rates (Using PPP Theory)

Year	0	1	2	3	4	5	6
Exchange rate *	57	57.54	57.82	57.82	57.54	56.99	56.18

2. Share in sales

Year	1	2	3	4	5
Annual Units in crores	24	24	24	24	24
Price per bottle (₹)	7.50	8.50	9.50	10.50	11.50
Price fluctuating Inflation Rate	6.00%	5.50%	5.00%	4.50%	4.00%
Inflated Price (₹)	7.95	8.97	9.98	10.97	11.96
Inflated Sales Revenue (₹ Crore)	190.80	215.28	239.52	263.28	287.04
Sales share @55%	104.94	118.40	131.74	144.80	157.87

3. Royalty Payment

Year	1	2	3	4	5
Annual Units in crores	24	24	24	24	24
Royalty in $	0.01	0.01	0.01	0.01	0.01
Total Royalty ($ Crore)	0.24	0.24	0.24	0.24	0.24
Exchange Rate	57.54	57.82	57.82	57.54	56.99
Total Royalty (₹ Crore)	13.81	13.88	13.88	13.81	13.68

4. Tax Liability

(₹ Crore)

Year	1	2	3	4	5
Sales Share	104.94	118.40	131.74	144.80	157.87
Total Royalty	13.81	13.88	13.88	13.81	13.68
Total Income	118.75	132.28	145.61	158.61	171.55
Less: Expenses					
Production Cost (Sales share x 40%)	41.98	47.36	52.69	57.92	63.15
Depreciation (195 x 20%)	39.00	39.00	39.00	39.00	39.00
PBT	37.77	45.92	53.92	61.69	69.40
Tax on Profit @30%	11.33	13.78	16.18	18.51	20.82
Net Profit	26.44	32.14	37.74	43.18	48.58

5. Free Cash Flow

(₹ Crore)

Year	0	1	2	3	4	5	6
Sales Share	0.00	104.94	118.40	131.74	144.80	157.87	0.00
Total Royalty	0.00	13.81	13.88	13.88	13.81	13.68	0.00
Production Cost	0.00	-41.98	-47.36	-52.69	-57.92	-63.15	0.00
Initial Outlay	-200.00	0.00	0.00	0.00	0.00	0.00	0.00
Working Capital	-50.00	-5.00	-5.00	-5.00	-5.00	70.00	0.00
Scrap Value	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Tax on Profit	0.00	0.00	-11.33	-13.78	-16.18	-18.51	-20.82
Free Cash Flow	**-250.00**	**71.77**	**68.59**	**74.15**	**79.51**	**164.89**	**-20.82**

6. Remittance of Cash Flows

(₹ Crore)

Year	0	1	2	3	4	5	6
Free Cash Flow	-250.00	71.77	68.59	74.15	79.51	164.89	-20.82
50% of Current Year Cash Flow	0.00	35.89	34.29	37.07	39.76	82.45	0.00
Previous year remaining cash flow	0.00	0.00	35.88	34.30	37.08	39.75	82.44
Total Remittance	**-250.00**	**35.88**	**70.17**	**71.37**	**76.84**	**122.20**	**61.62**

NPV of Project under Appraisal

Year	0	1	2	3	4	5	6
Total Remittance (₹ Crore)	-250.00	35.88	70.17	71.37	76.84	122.20	61.62
Exchange Rate	57.00	57.54	57.82	57.82	57.54	56.99	56.18
Remittance ($ mn)	-43.86	6.24	12.14	12.34	13.35	21.44	10.97
US Tax @35% ($ mn)	0.00	0.00	2.18	4.25	4.32	4.67	7.50
Indian Tax ($ mn)	0.00	0.00	1.96	2.38	2.82	3.25	3.71
Net Tax ($ mn)	0.00	0.00	0.22	1.87	1.51	1.42	3.79
Net Cash Flow ($ mn)	-43.86	6.24	11.92	10.47	11.84	20.02	7.18
PVF @ 15%	1.000	0.870	0.756	0.658	0.572	0.497	0.432
Present Value ($ mn)	-43.86	5.43	9.01	6.89	6.77	9.95	3.10
Net Present Value ($ mn)							= -2.71

Decision: Since NPV of the project is negative, Perfect inc. should not invest in the project.

* Estimated exchange rates have been calculated by using the following formula:

Expected spot rate = Current Spot Rate x expected difference in inflation rates

$$E(S_1) = S_0 \times \frac{(1 + I_d)}{(1 + I_f)}$$

Where

$E(S_1)$ is the expected Spot rate in time period 1

S_0 is the current spot rate (Direct Quote)

I_d is the inflation in the domestic country (home country)

I_f is the inflation in the foreign country

2. Its Entertainment Ltd., an Indian Amusement Company is happy with the success of its Water Park in India. The company wants to repeat its success in Nepal also where it is planning to establish a Grand Water Park with world class amenities. The company is also encouraged by a marketing research report on which it

has just spent Rs. 20,00,000 lacs. The estimated cost of construction would be Nepali Rupee (NPR) 450 crores and it would be completed in one years time. Half of the construction cost will be paid in the beginning and rest at the end of year. In addition, working capital requirement would be NPR 65 crores from the year end one. The after tax realizable value of fixed assets after four years of operation is expected to be NPR 250 crores. Under the Foreign Capital Encouragement Policy of Nepal, company is allowed to claim 20% depreciation allowance per year on reducing balance basis subject to maximum capital limit of NPR 200 crore. The company can raise loan for theme park in Nepal @ 9%.

The water park will have a maximum capacity of 20,000 visitors per day. On an average, it is expected to achieve 70% capacity for first operational four years. The entry ticket is expected to be NPR 220 per person. In addition to entry tickets revenue, the company could earn revenue from sale of food and beverages and fancy gift items. The average sales expected to be NPR 150 per visitor for food and beverages and NPR 50 per visitor for fancy gift items. The sales margin on food and beverages and fancy gift items is 20% and 50% respectively. The park would open for 360 days a year.

The annual staffing cost would be NPR 65 crores per annum. The annual insurance cost would be NPR 5 crores. The other running and maintenance costs are expected to be NPR 25 crores in the first year of operation which is expected to increase NPR 4 crores every year. The company would apportion existing overheads to the tune of NPR 5 crores to the park.

All costs and receipts (excluding construction costs, assets realizable value and other running and maintenance costs) mentioned above are at current prices (i.e. 0 point of time) which are expected to increase by 5% per year.

The current spot rate is NPR 1.60 per Rs.. The tax rate in India is 30% and in Nepal it is 20%.

The current WACC of the company is 12%. The average market return is 11% and interest rate on treasury bond is 8%. The company's current equity beta is 0.45. The company's funding ratio for the Water Park would be 55% equity and 45% debt.

Being a tourist Place, the amusement industry in Nepal is competitive and very different from its Indian counterpart. The company has gathered the relevant information about its nearest competitor in Nepal. The competitor's market value of the equity is NPR 1850 crores and the debt is NPR 510 crores and the equity beta is 1.35.

State whether Its Entertainment Ltd. should undertake Water Park project in Nepal or not.

Answer:

Working Notes:

1. Calculation of Cost of Funds/ Discount Rate

Competing Company's Information	
Equity Market Value	1850.00
Debt Market Value	510.00
Equity Beta	1.35

Assuming debt to be risk free i.e. beta is zero, the beta of competitor is un-geared as follows:

$$\text{Asset Beta} = \text{Equity Beta} \times \frac{E}{E + D(1-t)} = 1.35 \times \frac{1850}{1850 + 510(1-0.20)} = 1.106$$

Equity beta for Its Entertainment Ltd. in Nepal

Assets beta in Nepal	1.106
Ratio of funding in Nepal	
Equity	55.00%
Debt	45.00%

1. $1.106 = \text{Equity Beta} \times \frac{55}{55 + 45(1-0.30)}$

Equity Beta = 1.74

Cost of Equity as per CAPM

Market Return 11.00%

Risk free return 8.00%

Cost of Equity = Risk free return + β (Market Return - Risk free return)

= 8.00% + 1.74(11.00% - 8.00%) = 13.22%

WACC = 13.22% x 0.55 + 9%(1- 0.20) x 0.45 = 10.51%

2. Present Value Factors at the discount rate of 10.51%

Year	0	1	2	3	4	5
PVAF	1.000	0.905	0.819	0.741	0.670	0.607

3. Calculation of Capital Allowances

Year	1	2	3	4
Opening Balance (NPR Crore)	200.00	160.00	128.00	102.40
Less: Depreciation (NPR Crore)	40.00	32.00	25.60	20.48
Closing Balance (NPR Crore)	160.00	128.00	102.40	81.92

Calculation of Present of Free Cash Flow

Year	0	1	2	3	4	5
Expected Annual visitors			5040000	5040000	5040000	5040000
Entry ticket price per visitor (NPR)			242.55	254.68	267.41	280.78
Profit from sale of Food and Beverages per visitor (NPR)			33.08	34.73	36.47	38.29
Profit from sale of Fancy Gift Items per visitor (NPR)			27.56	28.94	30.39	31.91
Revenue per visitor (NPR)			303.19	318.35	334.27	350.98
Total Revenue (NPR crores)			152.81	160.45	168.47	176.89
Less:						
Annual Staffing Cost (NPR crores)			71.66	75.25	79.01	82.96
Annual Insurance Costs (NPR crores)			5.51	5.79	6.08	6.38

Other running and maintenance costs (NPR crores)			25.00	29.00	33.00	37.00
Depreciation Allowances (NPR crores)			40.00	32.00	25.60	20.48
Total Expenses (NPR crores)			142.17	142.04	143.69	146.82
PBT (NPR crores)			10.64	18.41	24.78	30.07
Tax on Profit (NPR crores)			2.13	3.68	4.96	6.01
Net Profit (NPR crores)			8.51	14.73	19.82	24.06
Add: Depreciation Allowances (NPR crores)			40	32	25.6	20.48
Park Construction Cost (NPR crores)	-225	-225				
After tax assets realisation value (NPR crores)						250
Working capital (NPR crores)		-65.00	-3.25	-3.41	-3.58	75.25
Net cash Flow (NPR crores)	-225.00	-290.00	45.26	43.32	41.84	369.79
PVF at discount rate	1.00	0.905	0.819	0.741	0.670	0.607
Present Values (NPR crores)	-225.00	-262.45	37.07	32.10	28.03	224.46
Net Present Value (NPR crores)						-165.79

3. Opus Technologies Ltd., an Indian IT company is planning to make an investment through a wholly owned subsidiary in a software project in China with a shelf life of two years. The inflation in China is estimated as 8 percent. Operating cash flows are received at the year end.

For the project an initial investment of Chinese Yuan (CN¥) 30,00,000 will be in land. The land will be sold after the completion of project at estimated value of CN¥ 35,00,000. The project also requires an office complex at cost of CN¥ 15,00,000 payable at the beginning of project. The complex will be depreciated on straight-line basis over two years to a zero salvage value. This complex is expected to fetch CN¥ 5,00,000 at the end of project. The company is planning to raise the required funds through GDR issue in Mauritius. Each GDR will have 5 common equity shares of the company as underlying security which are currently trading at Rs. 200 per share (Face Value = Rs. 10) in the domestic market. The company has currently paid the dividend of 25% which is expected to grow at 10% p.a. The total issue cost is estimated to be 1 percent of issue size. The annual sales is expected to be 10,000 units at the rate of CN¥ 500 per unit. The price of unit is expected to rise at the rate of inflation. Variable operating costs are 40 percent of sales. Fixed operating costs will be CN¥ 22,00,000 per year and expected to rise at the rate of inflation.

The tax rate applicable in China for income and capital gain is 25 percent and as per GOI Policy no further tax shall be payable in India. The current spot rate of CN¥ 1 is Rs. 9.50. The nominal interest rate in India and China is 12% and 10% respectively and the international parity conditions hold

You are required to
(a) Identify expected future cash flows in China and determine NPV of the project in CN¥.
(b) Determine whether Opus Technologies should go for the project or not assuming that there neither there is restriction on the transfer of funds from China to India nor any charges/taxes payable on the transfer of funds.

Answer:

Working Notes:

1. Calculation of Cost of Capital (GDR)

Current Dividend (D_0)	2.50
Expected Divedend (D_1)	2.75
Net Proceeds (Rs. 200 per share – 1%)	198.00
Growth Rate	10.00%

$$k_e = \frac{2.75}{198} + 0.10 = 0.1139 \text{ i.e. } 11.39\%$$

2. Calculation of Expected Exchange Rate as per Interest Rate Parity

YEAR	EXPECTED RATE
1	$= 9.50 \times \frac{(1+0.12)}{(1+0.10)} = 9.67$
2	$= 9.50 \times \frac{(1+0.12)^2}{(1+0.10)^2} = 9.85$

3. Realization on the disposal of Land net of Tax

	CN¥
Sale value at the end of project	3500000.00
Cost of Land	3000000.00
Capital Gain	500000.00
Tax paid	125000.00
Amount realized net of tax	3375000.00

4. Realization on the disposal of Office Complex

	(CN¥)
Sale value at the end of project	500000.00
WDV	0.00
Capital Gain	500000.00
Tax paid	125000.00
Amount realized net of tax (A)	375000.00

5. Computation of Annual Cash Inflows

Year	1	2
Annual Units	10000	10000
Price per bottle (CN¥)	540.00	583.20
Annual Revenue (CN¥)	5400000.00	5832000.00
Less: Expenses		
Variable operating cost (CN¥)	2160000.00	2332800.00
Depreciation (CN¥)	750000.00	750000.00
Fixed Cost per annum (CN¥)	2376000.00	2566080.00
PBT (CN¥)	114000.00	183120.00
Tax on Profit (CN¥)	28500.00	45780.00
Net Profit (CN¥)	85500.00	137340.00
Add: Depreciation (CN¥)	750000.00	750000.00
Cash Flow	835500.00	887340.00

(a) Computation of NPV of the project in CN¥

(CN¥)

Year	0	1	2
Initial Investment	-4500000.00		
Annual Cash Inflows		835500.00	887340.00
Realization on the disposal of Land net of Tax			3375000.00
Realization on the disposal of Office Complex			375000.00
Total	-4500000.00	835500.00	4637340.00
PVF @11.39%	1.000	0.898	0.806
PV of Cash Flows	-4500000.00	750279.00	3737696.00
NPV			-12,025

(a) Computation of NPV of the project in CN¥

(CN¥)

Year	0	1	2
Initial Investment	-4500000.00		
Annual Cash Inflows		835500.00	887340.00
Realization on the disposal of Land net of Tax			3375000.00
Realization on the disposal of Office Complex			375000.00
Total	-4500000.00	835500.00	4637340.00
PVF @11.39%	1.000	0.898	0.806
PV of Cash Flows	-4500000.00	750279.00	3737696.00
NPV			-12,025

(b) Evaluation of Project from Opus Point of View

(i) Assuming that inflow funds are transferred in the year in which same are generated i.e. first year and second year.

Year	0	1	2
Cash Flows (CN¥)	-4500000.00	835500.00	4637340.00
Exchange Rate (₹/ CN¥)	9.50	9.67	9.85
Cash Flows (₹)	-42750000.00	8079285.00	45677799.00
PVF @ 12%	1.00	0.893	0.797
	-42750000.00	7214802.00	36405206.00
NPV			870008.00

(ii) Assuming that inflow funds are transferred at the end of the project i.e. second year.

Year	0	2
Cash Flows (CN¥)	-4500000.00	5472840.00
Exchange Rate (₹./ CN¥)	9.50	9.85
Cash Flows (₹)	-42750000.00	53907474.00
PVF	1.00	0.797
	-42750000.00	42964257.00
NPV		214257.00

Though in terms of CN¥ the NPV of the project is negative but in Rs. it has positive NPV due to weakening of Rs. in comparison of CN¥. Thus, Opus can accept the project.

4. X Ltd. is interested in expanding its operation and planning to install manufacturing plant at US. For the proposed project it requires a fund of $ 10 million (net of issue expenses/ floatation cost). The estimated floatation cost is 2%. To finance this project it proposes to issue GDRs.
You as financial consultant is required to compute the number of GDRs to be issued and cost of the GD R with the help of following additional information.
1. Expected market price of share at the time of issue of GDR is Rs. 250 (Face Value Rs. 100)
2. Shares shall underly each GDR and shall be priced at 10% discount to market price.s
3. Expected exchange rate Rs. 60/$.
4. Dividend expected to be paid is 20% with growth rate 12%.
[ALSO ASKED IN MAY 2018 EXAMS - 8 MARKS]
Answer:

Net Issue Size = $10 million

$$\text{Gross Issue} = \frac{\$10\,\text{million}}{0.98} = \$\ 10.204\ \text{million}$$

Issue Price per GDR in ₹ (200 x 2 x 90%)	₹ 450
Issue Price per GDR in $ (₹ 450/ ₹ 60)	$ 7.50
Dividend Per GDR (D_1) (₹ 20 x 2)	₹ 40
Net Proceeds Per GDR (₹ 450 x 0.98)	₹ 441.00

(a) Number of GDR to be issued

$$\frac{\$10.204\ \text{million}}{\$7.50} = 1.3605\ \text{million}$$

(b) Cost of GDR to Odessa Ltd.

$$k_e = \frac{60.00}{441.00} + 0.12 = 21.07\%$$

Theoretical Questions

1. Write a short note on Instruments of International Finance.
Answer:

Indian companies have been able to tap global markets to raise foreign currency funds by issuing various types of financial instruments which are discussed as follows:

1. Foreign Currency Convertible Bonds (FCCBs)
A type of convertible bond issued in a currency different than the issuer's domestic currency. In other words, the money being raised by the issuing company is in the form of a foreign currency. A convertible bond is a mix between a debt and equity instrument. It acts like a bond by making regular coupon and principal

2. American Depository Receipts (ADRs)
Depository receipts issued by a company in the United States of America (USA) is known as American Depository Receipts (ADRs). Such receipts must be issued in accordance with the provisions stipulated by the Securities and Exchange Commission of USA (SEC) which are very stringent.

An ADR is generally created by the deposit of the securities of a non-United States company with a custodian bank in the country of incorporation of the issuing company. The custodian bank informs the depository in the United States that the ADRs can be issued. ADRs are United States dollar denominated and are traded in the same way as are the securities of United States companies. The ADR holder is entitled to the same rights and advantages as owners of the underlying securities in the home country. Several variations on ADRs have developed over time to meet more specialized demands in different markets. One such variation is the GDR which are identical in structure to an ADR, the only difference being that they can be traded in more than one currency and within as well as outside the United States.

3. Global Depository Receipts (GDRs)

A depository receipt is basically a negotiable certificate, denominated in a currency not native to the issuer, that represents the company's publicly - traded local currency equity shares. Most GDRs are denominated in USD, while a few are denominated in Euro and Pound Sterling. The Depository Receipts issued in the US are called American Depository Receipts (ADRs), which anyway are denominated in USD and outside of USA, these are called GDRs. In theory, though a depository receipt can also represent a debt instrument, in practice it rarely does. DRs (depository receipts) are created when the local currency shares of an Indian company are delivered to the depository's local custodian bank, against which the Depository bank (such as the Bank of New York) issues depository receipts in US dollar. These depository receipts may trade freely in the overseas markets like any other dollar-denominated security, either on a foreign stock exchange, or in the over-the-counter market, or among a restricted group such as Qualified Institutional Buyers (QIBs). Indian issues have taken the form of GDRs to reflect the fact that they are marketed globally, rather than in a specific country or market.

4. Euro-Convertible Bonds (ECBs)

A convertible bond is a debt instrument which gives the holders of the bond an option to convert the bond into a predetermined number of equity shares of the company. Usually, the price of the equity shares at the time of conversion will have a premium element. The bonds carry a fixed rate of interest

5. Other Sources

• **Euro Bonds:** Plain Euro-bonds are nothing but debt instruments. These are not very attractive for an investor who desires to have valuable additions to his investments.

• **Euro-Convertible Zero Bonds:** These bonds are structured as a convertible bond. No interest is payable on the bonds. But conversion of bonds takes place on maturity at a predetermined price. Usually there is a 5 years maturity period and they are treated as a deferred equity issue.

• **Euro-bonds with Equity Warrants:** These bonds carry a coupon rate determined by the market rates. The warrants are detachable. Pure bonds are traded at a discount. Fixed income funds' managements may like to invest for the purposes of regular income.

• **Syndicated bank loans:** One of the earlier ways of raising funds in the form of large loans from banks with good credit rating, can be arranged in reasonably short time and with few formalities. The maturity of the loan can be for a duration of 5 to 10 years. The interest rate is generally set with reference to an index, say, LIBOR plus a spread which depends upon the credit rating of the borrower. Some covenants are laid down by the lending institution like maintenance of key financial ratios.

• **Euro-bonds:** These are basically debt instruments denominated in a currency issued outside the country of that currency for examples Yen bond floated in France. Primary attraction of these bonds is the refuge from tax and regulations and provide scope for arbitraging yields. These are usually bearer bonds and can take the form of

(i) Traditional fixed rate bonds.

(ii) Floating rate Notes.(FRNs)

(iii) Convertible Bonds.

• **Foreign Bonds:** Foreign bonds are denominated in a currency which is foreign to the borrower and sold at the country of that currency. Such bonds are always subject to the restrictions and are placed by that country on the foreigners funds.
• **Euro Commercial Papers:** These are short term money market securities usually issued at a discount, for maturities less than one year.
• **Credit Instruments:** The foregoing discussion relating to foreign exchange risk management and international capital market shows that foreign exchange operations of banks consist primarily of purchase and sale of credit instruments. There are many types of credit instruments used in effecting foreign remittances. They differ in the speed, with which money can be received by the creditor at the other end after it has been paid in by the debtor at his end. The price or the rate of each instrument, therefore, varies with extent of the loss of interest and risk of loss involved. There are, therefore, different rates of exchange applicable to different types of credit instruments.

2. What is the impact of GDRs on Indian Capital Market?
Answer:
Impact of GDRs on Indian Capital Market
Since the inception of GDRs a remarkable change in Indian capital market has been observed as follows:
(i) Indian stock market to some extent is shifting from Bombay to Luxemburg.
(ii) There is arbitrage possibility in GDR issues.
(iii) Indian stock market is no longer independent from the rest of the world. This puts additional strain on the investors as they now need to keep updated with world wide economic events.
(iv) Indian retail investors are completely sidelined. GDRs/Foreign Institutional Investors' placements + free pricing implies that retail investors can no longer expect to make easy money on heavily discounted rights/public issues. As a result of introduction of GDRs a considerable foreign investment has flown into India.

Practical Questions

1. ABC Ltd. is considering a project in US, which will involve an initial investment of US $ 1,10,00,000. The project will have 5 years of life. Current spot exchange rate is Rs. 48 per US $. The risk free rate in US is 8% and the same in India is 12%. Cash inflow from the project is as follows

Year	Cash inflow
1	US $ 20,00,000
2	US $ 25,00,000
3	US $ 30,00,000
4	US $ 40,00,000
5	US $ 50,00,000

Calculate the NPV of the project using foreign currency approach. Required rate of return on this project is 14%. [ALSO IN RTP - NOV 2019]
Answer:

(1 + 0.12) (1 + Risk Premium) = (1 + 0.14)

Or, 1 + Risk Premium = 1.14/1.12 = 1.0179

Therefore, Risk adjusted dollar rate is = 1.0179 x 1.08 = 1.099 – 1 = 0.099

Calculation of NPV

Year	Cash flow (Million) US$	PV Factor at 9.9%	P.V.
1	2.00	0.910	1.820
2	2.50	0.828	2.070
3	3.00	0.753	2.259
4	4.00	0.686	2.744
5	5.00	0.624	3.120
			12.013
		Less: Investment	11.000
		NPV	1.013

Therefore, Rupee NPV of the project is = ₹ (48 x 1.013) Million= ₹48.624 Million

2. A USA based company is planning to set up a software development unit in India. Software developed at the Indian unit will be bought back by the US parent at a transfer price of US $10 millions. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame. The US based company will be subject to corporate tax of 30 per cent and a withholding tax of 10 per cent in India and will not be eligible for tax credit in the US. The software developed will be sold in the US market for US $ 12.0 millions. Other estimates are as follows:
Rent for fully furnished unit with necessary hardware in India Rs. 15,00,000
Man power cost (80 software professional will be working for 10 hours each day) Rs. 400 per man hour
Administrative and other costs Rs. 12,00,000
Advise the US Company on the financial viability of the project. The rupee-dollar rate is Rs.48/$.
Note: Assume 365 days a year.
Answer;

Proforma profit and loss account of the Indian software development unit

	₹	₹
Revenue		48,00,00,000
Less: Costs:		
Rent	15,00,000	
Manpower (₹400 x 80 x 10 x 365)	11,68,00,000	
Administrative and other costs	12,00,000	11,95,00,000
Earnings before tax		36,05,00,000
Less: Tax		10,81,50,000
Earnings after tax		25,23,50,000
Less: Withholding tax(TDS)		2,52,35,000
Repatriation amount (in rupees)		22,71,15,000
Repatriation amount (in dollars)		$4.7 million

Advise: The cost of development software in India for the US based company is $5.268 million. As the USA based Company is expected to sell the software in the US at $12.0 million, it is advised to develop the software in India.

Alternatively, if is assumed that since foreign subsidiary has paid taxes it will not pay withholding taxes then solution will be as under:

	₹	₹
Revenue		48,00,00,000
Less: Costs:		
Rent	15,00,000	
Manpower (₹400 x 80 x 10 x 365)	11,68,00,000	
Administrative and other costs	12,00,000	11,95,00,000
Earnings before tax		36,05,00,000
Less: Tax		10,81,50,000
Earnings after tax		25,23,50,000
Repatriation amount (in rupees)		25,23,50,000
Repatriation amount (in dollars)		$ 5,257,292

Advise: The cost of development software in India for the US based company is $4.743 million. As the USA based Company is expected to sell the software in the US at $12.0 million, it is advised to develop the software in India.

Alternatively, if it assumed that first the withholding tax @ 10% is being paid and then its credit is taken in the payment of corporate tax then solution will be as follows:

	₹	₹
Revenue		48,00,00,000
Less: Costs:		
Rent	15,00,000	
Manpower (₹400 x 80 x 10 x 365)	11,68,00,000	
Administrative and other costs	12,00,000	11,95,00,000
Earnings before tax		36,05,00,000
Less: Withholding Tax		3,60,50,000
Earnings after Withholding tax @ 10%		32,44,50,000
Less: Corporation Tax net of Withholding Tax		7,21,00,000
Repatriation amount (in rupees)		25,23,50,000
Repatriation amount (in dollars)		$ 5,257,292

Advise: The cost of development software in India for the US based company is $4.743 million. As the USA based Company is expected to sell the software in the US at $12.0 million, it is advised to develop the software in India.

3. XY Limited is engaged in large retail business in India. It is contemplating for expansion into a country of Africa by acquiring a group of stores having the same line of operation as that of India.
The exchange rate for the currency of the proposed African country is extremely volatile. Rate of inflation is presently 40% a year. Inflation in India is currently 10% a year. Management of XY Limited expects these rates likely to continue for the foreseeable future.
Estimated projected cash flows, in real terms, in India as well as African country for the first three years of the project are as follows:

	Year – 0	Year – 1	Year – 2	Year - 3
Cashflowsin Indian ₹ (000)	-50,000	-1,500	-2,000	-2,500
Cash flows in African Rands (000)	-2,00,000	+50,000	+70,000	+90,000

XY Ltd. assumes the year 3 nominal cash flows will continue to be earned each year indefinitely. It evaluates all investments using nominal cash flows and a nominal discounting rate. The present exchange rate is African Rand 6 to Rs. 1.
You are required to calculate the net present value of the proposed investment considering the following:

(i) African Rand cash flows are converted into rupees and discounted at a risk adjusted rate.

(ii) All cash flows for these projects will be discounted at a rate of 20% to reflect it's high risk.

(iii) Ignore taxation.

	Year - 1	Year - 2	Year - 3
PVIF @ 20%	.833	.694	.579

Answer:

Calculation of NPV

Year	0	1	2	3
Inflation factor in India	1.00	1.10	1.21	1.331
Inflation factor in Africa	1.00	1.40	1.96	2.744
Exchange Rate (as per IRP)	6.00	7.6364	9.7190	12.3696
Cash Flows in ₹ '000				
Real	-50000	-1500	-2000	-2500
Nominal (1)	-50000	-1650	-2420	-3327.50
Cash Flows in African Rand '000				
Real	-200000	50000	70000	90000
Nominal	-200000	70000	137200	246960
In Indian ₹ '000 (2)	-33333	9167	14117	19965
Net Cash Flow in ₹ '000 (1)+(2)	-83333	7517	11697	16637
PVF@20%	1	0.833	0.694	0.579
PV	-83333	6262	8118	9633

NPV of 3 years = -59320 (₹ '000)

NPV of Terminal Value = $\frac{16637}{0.20} \times 0.579 = 48164$ (₹ '000)

Total NPV of the Project = -59320 (₹ '000) + 48164 (₹ '000) = -11156 (₹ '000)

4. A multinational company is planning to set up a subsidiary company in India (where hitherto it was exporting) in view of growing demand for its product and competition from other MNCs. The initial project cost (consisting of Plant and Machinery including installation) is estimated to be US$ 500 million. The net working capital requirements are estimated at US$ 50 million. The company follows straight line method of depreciation. Presently, the company is exporting two million units every year at a unit price of US$ 80, its variable cost per unit being US$ 40.

The Chief Financial Officer has estimated the following operating cost and other data in respect of proposed project:

(i) Variable operating cost will be US $ 20 per unit of production;

(ii) Additional cash fixed cost will be US $ 30 million p.a. and project's share of allocated fixed cost will be US $ 3 million p.a. based on principle of ability to share;

(iii) Production capacity of the proposed project in India will be 5 million units;
(iv) Expected useful life of the proposed plant is five years with no salvage value;
(v) Existing working capital investment for production & sale of two million units through exports was US $ 15 million;
(vi) Export of the product in the coming year will decrease to 1.5 million units in case the company does not open subsidiary company in India, in view of the presence of competing MNCs that are in the process of setting up their subsidiaries in India;
(vii) Applicable Corporate Income Tax rate is 35%, and
(viii) Required rate of return for such project is 12%.
Assuming that there will be no variation in the exchange rate of two currencies and all profits will be repatriated, as there will be no withholding tax, estimate Net Present Value (NPV) of the proposed project in India.

Present Value Interest Factors (PVIF) @ 12% for five years are as below:

Year	1	2	3	4	5
PVIF	0.8929	0.7972	0.7118	0.6355	0.5674

Answer:

Financial Analysis whether to set up the manufacturing units in India or not may be carried using NPV technique as follows:

I. Incremental Cash Outflows

	$ Million
Cost of Plant and Machinery	500.00
Working Capital	50.00
Release of existing Working Capital	(15.00)
	535.00

II. Incremental Cash Inflow after Tax (CFAT)

(a) Generated by investment in India for 5 years

	$ Million
Sales Revenue (5 Million x $80)	400.00
Less: Costs	
Variable Cost (5 Million x $20)	100.00
Fixed Cost	30.00
Depreciation ($500Million/5)	100.00
EBIT	170.00
Taxes@35%	59.50
EAT	110.50
Add: Depreciation	100.00
CFAT (1-5 years)	210.50

(b) Cash flow at the end of the 5 years (Release of Working Capital) 35.00

(c) Cash generation by exports (Opportunity Cost)

	$ Million
Sales Revenue (1.5 Million x $80)	120.00
Less: Variable Cost (1.5 Million x $40)	60.00
Contribution before tax	60.00
Tax@35%	21.00
CFAT (1-5 years)	39.00

(d) Additional CFAT attributable to Foreign Investment

	$ Million
Through setting up subsidiary in India	210.50
Through Exports in India	39.00
CFAT (1-5 years)	171.50

III. Determination of NPV

Year	CFAT ($ Million)	PVF@12%	PV ($ Million)
1-5	171.50	3.6048	618.2232
5	35	0.5674	19.8590
			638.0822
Less: Initial Outflow			535.0000
			103.0822

Since NPV is positive the proposal should be accepted.

5. XYZ Ltd., a company based in India, manufactures very high quality modem furniture and sells to a small number of retail outlets in India and Nepal. It is facing tough competition. Recent studies on marketability of products have clearly indicated that the customer is now more interested in variety and choice rather than exclusivity and exceptional quality. Since the cost of quality wood in India is very high, the company is reviewing the proposal for import of woods in bulk from Nepalese supplier.

The estimate of net Indian (`) and Nepalese Currency (NC) cash flows in Nominal terms for this proposal is shown below:

	Net Cash Flow (in millions)			
Year	0	1	2	3
NC	-25.000	2.600	3.800	4.100
Indian (₹)	0	2.869	4.200	4.600

The following information is relevant:

(i) XYZ Ltd. evaluates all investments by using a discount rate of 9% p.a. All Nepalese customers are invoiced in NC. NC cash flows are converted to Indian (`) at the forward rate and discounted at the Indian rate.

(ii) Inflation rates in Nepal and India are expected to be 9% and 8% p.a. respectively. The current exchange rate isRs.1= NC 1.6

Assuming that you are the finance manager of XYZ Ltd., calculate the net present value (NPV) and modified internal rate of return (MIRR) of the proposal.

You may use following values with respect to discount factor forRs.1 @9%.

	Present Value	Future Value
Year 1	0.917	1.188
Year 2	0.842	1.090
Year 3	0.772	1

[ALSO IN RTP - MAY 2020]

Answer:

Working Notes:

(i) Computation of Forward Rates

End of Year	*NC*	*NC/₹*
1	$NC1.60 \times \left(\frac{(1+0.09)}{(1+0.08)}\right)$	1.615
2	$NC1.615 \times \left(\frac{(1+0.09)}{(1+0.08)}\right)$	1.630
3	$NC1.630 \times \left(\frac{(1+0.09)}{(1+0.08)}\right)$	1.645

(ii) NC Cash Flows converted in Indian Rupees

Year	*NC (Million)*	*Conversion Rate*	*₹ (Million)*
0	-25.00	1.600	-15.625
1	2.60	1.615	1.61
2	3.80	1.630	2.33
3	4.10	1.645	2.49

Net Present Value

(₹ Million)

Year	Cash Flow in India	Cash Flow in Nepal	Total	PVF @ 9%	PV
0	---	-15.625	-15.625	1.000	-15.625
1	2.869	1.61	4.479	0.917	4.107
2	4.200	2.33	6.53	0.842	5.498
3	4.600	2.49	7.09	0.772	5.473
					-0.547

Modified Internal Rate of Return

	Year			
	0	1	2	3
Cash Flow (₹ Million)	-15.625	4.479	6.53	7.09
Year 1 Cash Inflow reinvested for 2 years (1.188 x 4.479)				5.32
Year 2 Cash Inflow reinvested for 1 years (1.090 x 6.53)				7.12
				19.53

$$MIRR = \sqrt[n]{\frac{\text{Terminal Cash Flow}}{\text{Initial Outlay}}} - 1 = \sqrt[3]{\frac{19.53}{15.625}} - 1 = 0.0772 \text{ say } 7.72\%$$

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Explain different constituents of International Financial Centre (IFC)
[MTP - AUGUST 2018 - 4 MARKS]
Answer:

Although there are many constituents for IFC but some of the important constituent are as follows:
(i) Highly developed Infrastructure: - A leading edge infrastructure is prerequisite for creating a platform to offer internationally completive financial services.
(ii) Stable Political Environment: - Destabilized political environment brings country risk investment by foreign nationals. Hence, to accelerate foreign participation in growth of financial center, stable political environment is prerequisite.
(iii) Strategic Location: - The geographical location of the finance center should be strategic such as near to airport, seaport and should have friendly weather.
(iv) Quality Life: - The quality of life at the center showed be good as center retains highly paid professional from own country as well from outside.
(v) Rationale Regulatory Framework: - Rationale legal regulatory framework is another prerequisite of international finance center as it should be fair and transparent.
(vi) Sustainable Economy: - The economy should be sustainable and should possess capacity to absorb all the shocks as it will boost investors' confidence.

2. A foreign based company is planning to set up a software development unit in India. Software developed at the Indian unit will be bought back by the foreign parent company at a transfer price of US $10 millions. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame. The foreign based company will be subject to corporate tax of 30 per cent and a withholding tax of 10 per cent in India and will not be eligible for tax credit. The software developed will be sold in the international market for US $ 12.0 millions. Other estimates are as follows:

Rent for fully furnished unit with necessary hardware in India Rs. 20,00,000
Man power cost (80 software professional will be working for 10 hours each day) Rs. 540 per man hour
Administrative and other costs Rs. 16,20,000
The rupee-dollar rate is Rs.65/$.
ADVISE the foreign company on the financial viability of the project.
Assumption: 365 days in a year.
[RTP - MAY 2018]

Answer:

Proforma profit and loss account of the Indian software development unit

	₹	₹
Revenue		65,00,00,000
Less: Costs:		
Rent	20,00,000	
Manpower (₹540 x 80 x 10 x 365)	15,76,80,000	
Administrative and other costs	16,20,000	16,13,00,000
Earnings before tax		48,87,00,000
Less: Tax		14,66,10,000
Earnings after tax		34,20,90,000
Less: Withholding tax		3,42,09,000
Repatriation amount (in rupees)		30,78,81,000
Repatriation amount (in dollars)		$4.7366 million

Advise: The cost of development software in India for the foreign based company is $5.3 million. As the USA based Company is expected to sell the software in the international market at $12.0 million, it is advised to develop the software in India.

3. The directors of Implant Inc. wishes to make an equity issue to finance a $10 (million) expansion scheme which has an excepted Net Present Value of $2.2m and to re-finance an existing $6 m 15% Bonds due for maturity in 5 years time. For early redemption of these bonds there is a $3,50,000 penalty charges. The Co. has also obtained approval to suspend these pre-emptive rights and make a $15 m placement of shares which will be at a price of $0.5 per share. The floatation cost of issue will be 4% of Gross proceeds. Any surplus funds from issue will be invested in IDRs which is currently yielding 10% per year.
The Present capital structure of Co. is as under:

	'000
Ordinary Share ($1 per share)	7,000
Share Premium	10,500
Free Reserves	25,500
	43,000
15% Term Bonds	6,000
11% Debenture (2012-2020)	8,000
	57,000

Current share price is $2 per share and debenture price is $ 103 per debenture. Cost of capital of Co. is 10%. It may be further presumed that stock market is semi-strong form efficient and no information about the proposed use of funds from the issue has been made available to the public. You are required to calculate expected share price of company once full details of the placement and to which the finance is to be put, are announced.
[RTP - MAY 2019]

Answer:

In semi-strong form of stock market, the share price should accurately reflect new relevant information when it is made publicly available including Implant Inc. expansion scheme and redemption of the term loan

The existing Market Value $ 2 x 7,000,000		$ 14,000,000
The new investment has an expected NPV		$ 2,200,000
Proceeds of New Issue		$ 15,000,000
Issue Cost of		($ 600,000)
PV of Benefit of early redemption		
Interest of $ 900,000 ($,6,000,000 x 15 %)x 3.791	3,411,900	
PV of Repayment in 5 years $ 6,000,000 x 0.621	3,726,000	
	7,137,900	
Redemption Cost Now	(6,000,000)	
Penalty charges	(350,000)	787,900
Expected Total Market value		31,387,900
New No. of shares (30 Million + 7 Million)		37,00,000
Expected Share Price of Company		$ 0.848

4.

Suppose you are a treasurer of XYZ plc in the UK. XYZ have two overseas subsidiaries, one is based in Amsterdam and another in Switzerland. The surplus position of funds in hand is as follows which it does not need for the next three months but will be needed at the end of that period (91 days).

Holding Company	£ 150,000
Swiss Subsidiary	CHF 1,996,154
Dutch Subsidiary	€ 1,450,000

Exchange Rate as on date are as follows:

Spot Rate (€)	£0.6858 - 0.6869
91 day Pts	0.0037 0.0040
Spot Rate (£)	CHF 2.3295 - 2.3326
91 day Pts	0.0242 0.0228

91-Day Interest rates on p.a. basis on the Deposits in Money Market are as follows:

Amount of Currency	£	€	CHF
0 – 200,000	1.00	0.25	Nil
200,001 – 1,000,000	2.00	1.50	0.25
1,000,001 – 2,000,000	4.00	2.00	0.50
Over 2,000,000	5.38	3.00	1.00

You have been approached by your banker wherein the above-mentioned surplus was lying, requesting you to swap the surplus lying with other two subsidiaries and place them in deposit with them.

Determine the minimum interest rate per annuam (upto 3 decimal points) that should be offered by the bank to your organization so that your organization is ready to undertake such swap arrangement.

Note: Consider 360 days a year.

(RTP- NOV 2020)

Answer;

XYZ plc shall be ready to undertake this swap arrangement only if it receives the interest on the surplus funds if invested on individual basis as follows:

	Interest	Amt. after 91 days	Conversion in £
Holland € 1,450,000 x 0.02 x 91/360 =	€ 7,330.56	€ 1,457,330.56	£1,004,829.42 (1,457,330.56 x 0.6895)
Switzerland CHF 1,996,154 x 0.005 x 91/360 =	CHF 2,522.92	CHF 1,998,676.92	£865,303.02 (1,998,676.92÷2.3098)

UK £ 150,000 x 0.01 x 91/360 = Total GBP at 91 days	£ 379.17	£ 150,379.17	£ 150,379.17 £ 2,020,511.61

Swap to Sterling

Sell € 1,450,000 (Spot at 0.6858) buy £	£ 994,410.00
Sell CHF 1,996,154 (Spot at 2.3326) buy £	£ 855,763.53
Independent GBP amount	£ 150,000.00
	£ 2,000,173.53
Amount accrued on Individual Basis (Principal + Interest)	£ 2,020,511.61
Interest Required	£ 20,338.08
Required Interest Rate on Per Annuam Basis $\frac{20,338.08}{2,000,173.53} \times \frac{360}{91} \times 100$	4.023%

Thus, the minimum rate that should be offered is 4.023%.

5.

ABC Ltd. is considering a project in US, which will involve an initial investment of US $ 1,10,00,000. The project will have 5 years of life. Current spot exchange rate is ₹ 48 per US $. The risk free rate in US is 8% and the same in India is 12%. Cash inflow from the project is as follows:

Year	Cash inflow
1	US $ 20,00,000
2	US $ 25,00,000
3	US $ 30,00,000
4	US $ 40,00,000
5	US $ 50,00,000

Calculate the NPV of the project using foreign currency approach. Required rate of return on this project is 14%.

(RTP- NOV 2019)

Answer:

(1 + 0.12) (1 + Risk Premium) = (1 + 0.14)

Or, 1 + Risk Premium = 1.14/1.12 = 1.0179

Therefore, Risk adjusted dollar rate is = 1.0179 x 1.08 = 1.099 – 1 = 0.099

Calculation of NPV

Year	Cash flow (Million) US$	PV Factor at 9.9%	P.V.
1	2.00	0.910	1.820
2	2.50	0.828	2.070
3	3.00	0.753	2.259
4	4.00	0.686	2.744
5	5.00	0.624	3.120
			12.013
		Less: Investment	11.000
		NPV	1.013

Therefore, Rupee NPV of the project is = ₹ (48 x 1.013) Million

= ₹48.624 Million

CHAPTER-11 INTEREST RATE RISK MANAGEMENT

QUESTIONS FROM STUDY MATERIAL

Theoretical Questions

1. Write a short note on Forward Rate Agreements

Answer:

A Forward Rate Agreement (FRA) is an agreement between two parties through which a borrower/ lender protects itself from the unfavourable changes to the interest rate. Unlike futures FRAs are not traded on an exchange thus are called OTC product. Following are main features of FRA.

- Normally it is used by banks to fix interest costs on anticipated future deposits or interest revenues on variable-rate loans indexed to LIBOR.
- It is an off Balance Sheet instrument.
- It does not involve any transfer of principal. The principal amount of the agreement is termed "notional" because, while it determines the amount of the payment, actual exchange of the principal never takes place.
- It is settled at maturity in cash representing the profit or loss. A bank that sells an FRA agrees to pay the buyer the increased interest cost on some "notional" principal amount if some specified maturity of LIBOR is above a stipulated "forward rate" on the contract maturity or settlement date. Conversely, the buyer agrees to pay the seller any decrease in interest cost if market interest rates fall below the forward rate.
- Final settlement of the amounts owed by the parties to an FRA is determined by the formula

$$Payment = \frac{(N)(RR - FR)(dtm/DY)}{[1 + RR(dtm/DY)]} \times 100$$

Where,

N = the notional principal amount of the agreement;
RR = Reference Rate for the maturity specified by the contract prevailing on the contract settlement date; typically LIBOR or MIBOR
FR = Agreed-upon Forward Rate; and
dtm = maturity of the forward rate, specified in days (FRA Days)
DY = Day count basis applicable to money market transactions which could be 360 or 365 days.

If LIBOR > FR the seller owes the payment to the buyer, and if LIBOR < FR the buyer owes the seller the absolute value of the payment amount determined by the above formula.

- The differential amount is discounted at post change (actual) interest rate as it is settled in the beginning of the period not at the end.

2. What do you know about swaptions and their uses?

Answer:

An interest rate swaption is simply an option on an interest rate swap. It gives the holder the right but not the obligation to enter into an interest rate swap at a specific date in the future, at a particular fixed rate and for a specified term.

There are two types of swaption contracts: -

• A fixed rate payer swaption gives the owner of the swaption the right but not the obligation to enter into a swap where they pay the fixed leg and receive the floating leg.

• A fixed rate receiver swaption gives the owner of the swaption the right but not the obligation to enter into a swap in which they will receive the fixed leg, and pay the floating leg.

Uses of Swaptions

: Swaptions can be applied in a variety of ways for both active traders as well as for corporate treasurers.

: Swap traders can use them for speculation purposes or to hedge a portion of their swap books.

: Swaptions have become useful tools for hedging embedded optionality which is common to the natural course of many businesses.

: Swaptions are useful to borrowers targeting an acceptable borrowing rate.

: Swaptions are also useful to those businesses tendering for contracts.

: Swaptions also provide protection on callable/puttable bond issues.

Practical Questions

1. M/s. Parker & Co. is contemplating to borrow an amount ofRs.60 crores for a Period of 3 months in the coming 6 month's time from now. The current rate of interest is 9% p.a., but it may go up in 6 month's time. The company wants to hedge itself against the likely increase in interest rate.

The Company's Bankers quoted an FRA (Forward Rate Agreement) at 9.30%p.a.

What will be the Final settlement amount, if the actual rate of interest after 6 months happens to be (i) 9.60% p.a. and (ii) 8.80% p.a.?

Answer:

Final settlement amount shall be computed by using formula:

$$= \frac{(N)(RR - FR)(dtm/DY)}{[1 + RR(dtm/DY)]}$$

Where,

N = the notional principal amount of the agreement;

RR = Reference Rate for the maturity specified by the contract prevailing on the contract settlement date;

FR = Agreed-upon Forward Rate; and

dtm = maturity of the forward rate, specified in days (FRA Days)

DY = Day count basis applicable to money market transactions which could be 360 or 365 days.

Accordingly,

If actual rate of interest after 6 months happens to be 9.60%

$$= \frac{(₹\,60\,crore)(0.096 - 0.093)(3/12)}{[1 + 0.096(3/12)]}$$

$$= \frac{(₹\,60\,crore)(0.00075)}{1.024} = ₹\ 4,39,453$$

Thus banker will pay Parker & Co. a sum of ₹ 4,39,453

If actual rate of interest after 6 months happens to be 8.80%

$$= \frac{(₹\,60\,crore)(0.088 - 0.093)(3/12)}{[1 + 0.088(3/12)]}$$

$$= \frac{(₹\,60\,crore)(-0.00125)}{1.022} = -₹\ 7,33,855$$

Thus Parker & Co. will pay banker a sum ofRs.7,33,855

Note: It might be possible that students may solve the question on basis of days ins tead of months (as considered in above calculations). Further there may be also possibility that the FRA days and Day Count convention may be taken in various plausible combinations such as 90 days/360 days, 90 days/ 365 days, 91 days/360 days or 91 days/365day

2. TM Fincorp has bought a 6 x 9Rs.100 crore Forward Rate Agreement (FRA) at 5.25%. On fixing date reference rate i.e. MIBOR turns out be as follows:

Period	Rate (%)
3 months	5.50
6 months	5.70
9 months	5.85

You are required to determine:

(a) Profit/Loss to TM Fincorp. in terms of basis points.

(b) The settlement amount.

(Assume 360 days in a year)

Answer:

(a) TM will make a profit of 25 basis points since a 6X9 FRA is a contract on 3-month interest rate in 6 months, which turns out to be 5.50% (higher than FRA price).

(b) The settlement amount shall be calculated by using the following formula:

$$\frac{N(RR-FR)(dtm/360)}{1+RR(dtm/360)}$$

Where

N = Notional Principal Amount

RR = Reference Rate

FR = Agreed upon Forward Rate

Dtm = FRA period specified in days.

Accordingly:

$$\frac{100\,\text{crore}\,(5.50\%-5.25\%)(92^{*}/360)}{1+0.055(92^{*}/360)} = ₹\ 6,30,032$$

Hence there is profit of ₹ 6,30,032 to TM Fincorp.

* Alternatively, it can also be taken as 90 days.

3. XYZ Limited borrows £ 15 Million of six months LIBOR + 10.00% for a period of 24 months. The company anticipates a rise in LIBOR, hence it proposes to buy a Cap Option from its Bankers at the strike rate of 8.00%. The lump sum premium is 1.00% for the entire reset periods and the fixed rate of interest is 7.00% per annum. The actual position of LIBOR during the forthcoming reset period is as under:

Reset Period	LIBOR
1	9.00%
2	9.50%
3	10.00%

You are required to show how far interest rate risk is hedged through Cap Option.

For calculation, work out figures at each stage up to four decimal points and amount nearest to £. It should be part of working notes.

Answer:

First of all we shall calculate premium payable to bank as follows:

$$P = \frac{rp}{\left[(1 \div i) - \frac{1}{i \times (1+i)^t}\right]} \text{ X A or } \frac{rp}{PVAF(3.5\%,4)} \times A$$

Where

P = Premium
A = Principal Amount
rp = Rate of Premium
i = Fixed Rate of Interest
t = Time

$$= \frac{0.01}{\left[(1/0.035) - \frac{1}{0.035 \times 1.035^4}\right]} \times £15,000,000 \text{ or } \frac{0.01}{(0.966 + 0.933 + 0.901 + 0.871)}$$

$$\times £15,000,000$$

$$= \frac{0.01}{\left[(28.5714) - \frac{1}{0.04016}\right]} \times £15,000,000 \text{ or } \frac{£150,000}{3.671} = £\ 40,861$$

Please note above solution has been worked out on the basis of four decimal points at each stage.

Now we see the net payment received from bank

Reset Period	Additional interest due to rise in interest rate	Amount received from bank	Premium paid to bank	Net Amt. received from bank
1	£ 75,000	£ 75,000	£ 40,861	£34,139
2	£ 112,500	£ 112,500	£ 40,861	£71,639
3	£ 150,000	£ 150,000	£ 40,861	£109,139
TOTAL	£ 337,500	£ 337,500	£122,583	£ 214,917

Thus, from above it can be seen that interest rate risk amount of £ 337,500 reduced by £ 214,917 by using of Cap option.

Note: It may be possible that student may compute upto three decimal points or may use different basis. In such case their answer is likely to be different.

4. Suppose a dealer quotes 'All-in-cost' for a generic swap at 8% against six month LIBOR flat. If the notional principal amount of swap isRs.5,00,000.
(i) Calculate semi-annual fixed payment.
(ii) Find the first floating rate payment for (i) above if the six month period from the effective date of swap to the settlement date comprises 181 days and that the corresponding LIBOR was 6% on the effective date of swap.
In (ii) above, if the settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?
Generic swap is based on 30/360 days basis.
Answer:

(i) Semi-annual fixed payment

= (N) (AIC) (Period)

Where N = Notional Principal amount = ₹5,00,000

AIC = All-in-cost = 8% = 0.08

$$= 5,00,000 \times 0.08 \left(\frac{180}{360}\right)$$

$$= 5,00,000 \times 0.08\ (0.5)$$

$$= 5,00,000 \times 0.04 = ₹20,000/-$$

(ii) Floating Rate Payment

$$= N\ (LIBOR) \left(\frac{dt}{360}\right)$$

$$= 5,00,000 \times 0.06 \times \frac{181}{360}$$

= 5,00,000 × 0.06 (0.503) or 5,00,000 × 0.06 (0.502777)

= 5,00,000 × 0.03018 or 0.30166 = ₹15,090 or 15,083

Both are correct

(iii) Net Amount

= (i) – (ii)

= ₹20,000 – ₹15,090 = ₹4,910

or = ₹20,000 – ₹15,083 = ₹4,917

5. Derivative Bank entered into a plain vanilla swap through on OIS (Overnight Index Swap) on a principal ofRs.10 crores and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 2nd August, 2010 and was to commence on 3rd August, 2010 and run for a period of 7 days.

Respective MIBOR rates for Tuesday to Monday were:

7.75%, 8.15%, 8.12%, 7.95%, 7.98%, 8.15%.

If Derivative Bank receivedRs.317 net on settlement, calculate Fixed rate and interest under both legs.

Notes:

(i) Sunday is Holiday.

(ii) Work in rounded rupees and avoid decimal working.

Answer:

Day	Principal (₹)	MIBOR (%)	Interest (₹)
Tuesday	10,00,00,000	7.75	21,233
Wednesday	10,00,21,233	8.15	22,334
Thursday	10,00,43,567	8.12	22,256
Friday	10,00,65,823	7.95	21,795
Saturday & Sunday (*)	10,00,87,618	7.98	43,764
Monday	10,01,31,382	8.15	22,358
Total Interest @ Floating			1,53,740
Less: Net Received			317
Expected Interest @ fixed			1,53,423
Thus Fixed Rate of Interest			0.07999914
Approx.			8%

(*) i.e. interest for two days.

Note: Alternatively, answer can also be calculated on the basis of 360 days in a year.

6. A Inc. and B Inc. intend to borrow $200,000 and $200,000 in ¥ respectively for a time horizon of one year. The prevalent interest rates are as follows:

Company	¥ Loan	$ Loan
A Inc	5%	9%
B Inc	8%	10%

The prevalent exchange rate is $1 = ¥120.

They entered in a currency swap under which it is agreed that B Inc will pay A Inc @ 1% over the ¥ Loan interest rate which the later will have to pay as a result of the agreed currency swap whereas A Inc will reimburse interest to B Inc only to the extent of 9%. Keeping the exchange rate invariant, quantify the opportunity gain or loss component of the ultimate outcome, resulting from the designed currency swap. [ALSO IN RTP - MAY 2020]

Answer:

Opportunity gain of A Inc under currency swap	Receipt	Payment	Net
Interest to be remitted to B. Inc in $ 2,00,000x9%=$18,000 Converted into ($18,000x¥120)		¥21,60,000	
Interest to be received from B. Inc in $ converted into ¥ (6%x$2,00,000 x ¥120)	¥14,40,000	-	
Interest payable on ¥ loan	-	¥12,00,000	
	¥14,40,000	¥33,60,000	
Net Payment	¥19,20,000	-	
	¥33,60,000	¥33,60,000	
$ equivalent paid ¥19,20,000 x(1/¥120)			$16,000
Interest payable without swap in $			$18,000
Opportunity gain in $			$ 2,000

Opportunity gain of B inc under currency swap	Receipt	Payment	Net
Interest to be remitted to A. Inc in ($ 2,00,000 x 6%)		$12,000	
Interest to be received from A. Inc in ¥ converted into $ =¥21,60,000/¥120	$18,000		
Interest payable on $ loan@10%	-	$20,000	
	$18,000	$32,000	
Net Payment	$14,000 $32,000	- $32,000	
¥ equivalent paid $14,000 X ¥120			¥16,80,000
Interest payable without swap in ¥ ($2,00,000X¥120X8%)			¥19,20,000
Opportunity gain in ¥			¥ 2,40,000

Alternative Solution

Cash Flows of A Inc

(i) At the time of exchange of principal amount

Transactions		Cash Flows
Borrowings	$2,00,000 x ¥120	+ ¥240,00,000
Swap		- ¥240,00,000
Swap		+$2,00,000
Net Amount		+$2,00,000

(ii) At the time of exchange of interest amount

Transactions		Cash Flows
Interest to the lender	¥240,00,000X5%	¥12,00,000
Interest Receipt from B Inc.	¥2,00,000X120X6%	¥14,40,000
Net Saving (in $)	¥2,40,000/¥120	$2,000
Interest to B Inc.	$2,00,000X9%	-$18,000
Net Interest Cost		-$16,000

A Inc. used $2,00,000 at the net cost of borrowing of $16,000 i.e. 8%. If it had not opted for swap agreement the borrowing cost would have been 9%. Thus there is saving of 1%.

Cash Flows of B Inc

(i) At the time of exchange of principal amount

Transactions		Cash Flows
Borrowings		+ $2,00,000
Swap		- $2,00,000
Swap	$2,00,000X¥120	+¥240,00,000
Net Amount		+¥240,00,000

(ii) At the time of exchange of interest amount

Transactions		Cash Flows
Interest to the lender	$2,00,000X10%	- $20,000
Interest Receipt from A Inc.		+$18,000
Net Saving (in ¥)	-$2,000X¥120	- ¥2,40,000
Interest to A Inc.	$2,00,000X6%X¥120	- ¥14,40,000
Net Interest Cost		- ¥16,80,000

B Inc. used ¥240,00,000 at the net cost of borrowing of ¥16,80,000 i.e. 7%. If it had not opted for swap agreement the borrowing cost would have been 8%. Thus there is saving of 1%.

7. A textile manufacturer has taken floating interest rate loan ofRs.40,00,000 on 1st April, 2012. The rate of interest at the inception of loan is 8.5% p.a. interest is to be paid every year on 31st March, and the duration of loan is four years. In the month of October 2012, the Central bank of the country releases following projections about the interest rates likely to prevail in future.
(i) On 31st March, 2013, at 8.75%; on 31st March, 2014 at 10% on 31st March, 2015 at 10.5% and on 31st March, 2016 at 7.75%. Show how this borrowing can hedge the risk arising out of expected rise in the rate of interest when he wants to peg his interest cost at 8.50% p.a. (ii) Assume that the premium negotiated by both the parties is 0.75% to be paid on 1st October, 2012 and the actual rate of interest on the respective due dates happens to be as: on 31st March, 2013 at 10.2%; on 31st March, 2014 at 11.5%; on 31st March, 2015 at 9.25%; on 31st March, 2016 at 9.0% and 8.25%. Show how the settlement will be executed on the perspective interest due dates.

Answer:

As borrower does not want to pay more than 8.5% p.a., on this loan where the rate of interest is likely to rise beyond this, hence, he has hedge the risk by entering into an agreement to buy interest rate caps with the following parameters:

- • National Principal:Rs.40,00,000/-
- • Strike rate: 8.5% p.a.
- • Reference rate: the rate of interest applicable to this loan
- • Calculation and settlement date: 31st March every year
- • Duration of the caps: till 31st March 2016
- • Premium for caps: negotiable between both the parties

To purchase the caps this borrower is required to pay the premium upfront at the time of buying caps. The payment of such premium will entitle him with right to receive the compensation from the seller of the caps as soon as the rate of interest on this loan rises above 8.5%. The compensation will be at the rate of the difference between the rate of none of the cases the cost of this loan will rise above 8.5% calculated onRs.40,00,000/-. This implies that in none of the cases the cost of this loan will rise above 8.5%. This hedging benefit is received at the respective interest due dates at the cost of premium to be paid only once**.**
The premium to be paid on 1st October 2012 is **30,000/-** (` 40,00,000 x 0.75/100). The payment of this premium will entitle the buyer of the caps to receive the compensation from the seller of the caps whereas the buyer will not have obligation. The compensation received by the buyer of caps will be as follows:

On 31st March 2013

The buyer of the caps will receive the compensation at the rate of 1.70% (10.20 - 8.50) to be calculated onRs.40,00,000, the amount of compensation will beRs.68000/- (40,00,000 x 1.70/100).

On 31st March 2014

The buyer of the caps will receive the compensation at the rate of 3.00% (11.50 – 8.50) to be calculated onRs.40,00,000/-, the amount of compensation will beRs.120000/- (40,00,000 x 3.00/100).

On 31st March 2015

The buyer of the caps will receive the compensation at the rate of 0.75% (9.25 – 8.50) to be calculated onRs.40,00,000/-, the amount of compensation will beRs.30,000 (40,00,000 x 0.75/100).

On 31st March 2016

The buyer of the caps will not receive the compensation as the actual rate of interest is 8.25% whereas strike rate of caps is 8.5%. Hence, his interest liability shall not exceed 8.50%.
Thus, by paying the premium upfront buyer of the caps gets the compensation on the respective interest due dates without any obligations.

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Electraspace is consumer electronics wholesaler. The business of the firm is highly seasonal in nature. In 6 months of a year, firm has a huge cash deposits and especially near Christmas time and other 6 months firm cash crunch, leading to borrowing of money to cover up its exposures for running the business.
It is expected that firm shall borrow a sum of €50 million for the entire period of slack season in about 3 months.
A Bank has given the following quotations:

Spot	**5.50% - 5.75%**
3 × 6	**FRA 5.59% - 5.82%**
3 × 9	**FRA 5.64% - 5.94%**

3 month €50,000 future contract maturing in a period of 3 months is quoted at 94.15 (5.85%).
ADVISE:
(i) How a FRA, shall be useful if the actual interest rate after 3 months turnout to be:
(a) 4.5% (b) 6.5%
(ii) How 3 months Future contract shall be useful for company if interest rate turns out as mentioned in part (a) above.
[RTP - MAY 2018]
Answer:

(i) By entering into an FRA, firm shall effectively lock in interest rate for a specified future in the given it is 6 months. Since, the period of 6 months is starting in 3 months, the firm shall opt for 3 × 9 FRA locking borrowing rate at 5.94%.

In the given scenarios, the net outcome shall be as follows:

	If the rate turns out to be 4.50%	If the rate turns out to be 6.50%
FRA Rate	5.94%	5.94%
Actual Interest Rate	4.50%	6.50%
Loss/ (Gain)	1.44%	(0.56%)
FRA Payment / (Receipts)	€50 m × 1.44% × ½ = €360,000	€50m × 0.56% × ½ = (€140,000)
Interest after 6 months on €50 Million at actual rates	= €50m × 4.5% × ½ = €1,125,000	= € 50m × 6.5% × ½ = €1,625,000
Net Out Flow	€ 1,485,000	€1,485,000

Thus, by entering into FRA, the firm has committed itself to a rate of 5.94% shown as follows:

$$\frac{€\ 1,485,000}{€\ 50,000,000} \times 100 \times \frac{12}{6} = 5.94\%$$

(ii) Since firm is a borrower it will like to off-set interest cost by profit on Future Contract. Accordingly, if interest rate rises it will gain hence it should sell interest rate futures.

$$\text{No. of Contracts} = \frac{\text{Amount of Borrowing}}{\text{Contract Size}} \times \frac{\text{Duration of Loan}}{\text{3 months}}$$

$$= \frac{€\ 50,000,000}{€\ 50,000} \times \frac{6}{3} = 2000 \text{ Contracts}$$

The final outcome in the given two scenarios shall be as follows:

	If the interest rate turns out to be 4.5%	If the interest rate turns out to be 6.5%
Future Course Action:		
Sell to open	94.15	94.15
Buy to close	95.50 (100 - 4.5)	93.50 (100 - 6.5)
Loss/ (Gain)	1.35%	(0.65%)
Cash Payment (Receipt) for Future Settlement	€50,000×2000×1.35%×3/12 = €337,500	€50,000×2000×0.65% × 3/12 = (€162,500)
Interest for 6 months on €50 million at actual rates	€50 million × 4.5% × ½ = €11,25,000	€50 million × 6.5% × ½ = €16,25,000
	€1,462,500	€1,462,500

Thus, the firm locked itself in interest rate of 5.85% shown as follows:

$$\frac{€\ 1,462,500}{€\ 50,000,000} \times 100 \times \frac{12}{6} = 5.85\%$$

2. Two companies ABC Ltd. and XYZ Ltd. approach the DEF Bank for FRA (Forward Rate Agreement). They want to borrow a sum of Rs. 100crores after 2 years for a period of 1 year. Bank has calculated Yield Curve of both companies as follows:

Year	XYZ Ltd.	ABC Ltd.*
1	3.86	4.12
2	4.20	5.48
3	4.48	5.78

***The difference in yield curve is due to the lower credit rating of ABC Ltd. compared to XYZ Ltd.**

(i) You are required to calculate the rate of interest DEF Bank would quote under 2V3 FRA, using the company's yield information as quoted above.

(ii) Suppose bank offers Interest Rate Guarantee for a premium of 0.1% of the amount of loan, you are required to calculate the interest payable by XYZ Ltd. if interest rate in 2 years turns out to be

(a) 4.50%

(b) 5.50%

[RTP - NOV 2019]

Answer:

(i) DEF Bank will fix interest rate for 2V3 FRA after 2 years as follows:

XYZ Ltd.

$(1+r)\ (1+0.0420)^2 = (1+0.0448)^3$

$(1+r)\ (1.0420)^2 = (1.0448)^3$

$r = 5.04\%$

Bank will quote 5.04% for a 2V3 FRA

ABC Ltd.

$(1+r)\ (1+0.0548)^2 = (1+0.0578)^3$

$(1+r)\ (1.0548)^2 = (1.0578)^3$

$r = 6.38\%$

Bank will quote 6.38% for a 2V3 FRA

(ii)

		4.50% - Allow to Lapse	5.50%-Exercise
Interest	₹ 100 crores X 4.50%	₹ 4.50 crores	-
	₹ 100 crores X 5.04%	-	₹ 5.04 crores
Premium (Cost of Option)	₹ 100 crores X 0.1%	₹ 0.10 crores	₹ 0.10 crores
		4.60 crores	5.14 crores

3.

Two companies ABC Ltd. and XYZ Ltd. approach the DEF Bank for FRA (Forward Rate Agreement). They want to borrow a sum of ₹ 100 crores after 2 years for a period of 1 year. Bank has calculated Yield Curve of both companies as follows:

Year	XYZ Ltd.	ABC Ltd.*
1	3.86	4.12
2	4.20	5.48
3	4.48	5.78

*The difference in yield curve is due to the lower credit rating of ABC Ltd. compared to XYZ Ltd.

(i) You are required to calculate the rate of interest DEF Bank would quote under 2V3 FRA, using the company's yield information as quoted above.

(ii) Suppose bank offers Interest Rate Guarantee for a premium of 0.1% of the amount of loan, you are required to calculate the interest payable by XYZ Ltd. if interest rate in 2 years turns out to be

(a) 4.50%

(b) 5.50%

(RTP-NOV 2019/ RTP-NOV 2020)

Answer:

(i) DEF Bank will fix interest rate for 2V3 FRA after 2 years as follows:

XYZ Ltd.

$(1+r)\ (1+0.0420)^2 = (1+0.0448)^3$

$(1+r)\ (1.0420)^2 = (1.0448)^3$

$r = 5.04\%$

Bank will quote 5.04% for a 2V3 FRA.

ABC Ltd.

$(1+r)\ (1+0.0548)^2 = (1+0.0578)^3$

$(1+r)\ (1.0548)^2 = (1.0578)^3$

$r = 6.38\%$

Bank will quote 6.38% for a 2V3 FRA.

(ii)

		4.50% Allow to Lapse	5.50% Exercise
Interest	₹ 100 crores X 4.50% ₹ 100 crores X 5.04%	₹ 4.50 crores -	- ₹ 5.04 crores
Premium (Cost of Option)	₹ 100 crores X 0.1%	₹ 0.10 crores 4.60 crores	₹ 0.10 crores 5.14 crores

CHAPTER-12 CORPORATE VALUATION

QUESTIONS FROM STUDY MATERIAL

Practical Illustrations

1. There is a privately held company X Pvt. Ltd that is operating into the retail space, and is now scouting for angel investors. The details pertinent to valuing X Pvt. Ltd are as follows –

The company has achieved break even this year and has an EBITDA of 90. The unleveraged beta based on the industry in which it operates is 1.8, and the average debt to equity ratio is hovering at 40:60. The rate of return provided by risk free liquid bonds is 5%. The EV is to be taken at a multiple of 5 on EBITDA. The accountant has informed that the EBITDA of 90 includes an extraordinary gain of 10 for the year, and a potential write off of preliminary sales promotion costs of 20 are still pending. The internal assessment of rate of market return for the industry is 11%.

The FCFs for the next 3 years are as follows:

	Y1	Y2	Y3
Future Cash flows	100	120	150

The pre-tax cost of debt is 12%. Assume a tax regime of 30%.

What is the potential value to be placed on X Pvt. Ltd?

Answer:

The levered beta of the company will be 1.8[1+(1-0.3)*40/60)] = 2.64

The adjusted EBITDA would be 90 –10 – 20 = 60

The EV will be multiple of 5 on the 60 obtained above = 300

The Cost of equity in accordance with CAPM = r (f) + β (Rm – Rf)

= 5% + 2.64 (11% - 5%) = 20.84%

The WACC = Cost of Equity + Cost of Debt

= 20.84 (60/100) + 12.0 (1-0.3) (40/100) = 15.864

Finally, the future cash flows can be discounted at the WACC obtained above as under –

	Y1	Y2	Y3
Future Cash flows	100	120	150
Discount factor	0.863	0.745	0.643
PVs of cash flows	86.30	89.40	96.45
VALUE OF THE FIRM			272.15

2. A Ltd. made a Gross Profit ofRs.10,00,000 and incurred Indirect Expenses ofRs.4,00,000. The number of issued Equity Shares is 1,00,000. The company has a Debt ofRs.3,00,000 and Reserves & Surplus to the tune ofRs.5,00,000. The market related details are as follows:

Risk Free Rate of Return	**4.5%**
Market Rate of Return	**12%**
β of the Company	**0.9**

Determine:

(a) Per Share Earning Value of the Company.

(b) Equity Value of the company if applicable EBITDA multiple is 5.

Answer:

(a) Capitalization Rate using CAPM

4.5% + 0.9(12% - 4.5%) = 11.25%

Calculation of Earning Value Per Share

	(₹ 000)
Gross Profit	1000
Less: Indirect Expenses	(400)
EBITDA	600
Earning Value of Company (600/ 0.1125)	5333.33
Number of Shares	1,00,000
Earning Value Per Share	₹ 53.33

(b) Equity Value of Company

	(₹ 000)
EBITDA	600
EBITDA Multiple	5
Capitalized Value	3000
Less: Debt	(300)
Add: Surplus Funds	500
Equity Value (Enterprise Value)	3200

Now let us see how EV can be arrived at using Balance Sheet approach in the following illustration.

3. The balance sheet of H K Ltd. is as follows:

	₹ 000
Non-Current Assets	1000
Current Assets	
Trade Receivables	500
Cash and cash equivalents	500
	2000
Shareholders' funds	800
Long Term Debt	200
Current Liabilities and Provisions	1000
	2000

The shares are actively traded and the Current Market Price (CMP) isRs.12 per share. Shareholder funds represent 70,000 shares ofRs.10 each and rest is retained earnings. Calculate the Enterprise Value of HK Ltd.

Answer:

Shares outstanding	70,000
CMP	₹ 12
Market Capitalization	₹ 8,40,000
Add: Debt	₹ 2,00,000
Less: Cash & Cash equivalents	(₹ 5,00,000)
Enterprise Value (EV)	**₹ 5 40 000**

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

Business segment	Segment sales	Segment assets	Segment income
Consumer wholesaling	€1,500,000	€ 750,000	€100,000
Specialty services	€800,000	€700,000	€150,000
Assorted centers	€2,000,000	€3,000,000	€600,000

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

Business segment	Capitalization/ sales	Capitalization/ assets	Capitalization/ operating income
Consumer wholesaling	0.75	0.60	10.00
Specialty services	1.10	0.90	7.00
Assorted centers	1.00	0.60	6.00

[MTP - AUGUST 2018 - 5 MARKS]

Answer:

Cornett, GMBH. – Break-up valuation

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

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

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

$$\text{Average theoretical value} = \frac{4,005,000 + 2,880,000 + 5,650,000}{3} = 4,178,333.33 \text{ say } 4,178,000$$

Average theoretical value of Cornett GMBH. = €4,178,000

5. Compute EVA of A Ltd. with the following information:

All Figure are in ₹ Lac			
Profit and Loss Statement		**Balance Sheet**	
Revenue	1000	PPE	1000
Direct Costs	-390	Current Assets	300
Selling, General & Admin. Exp. (SGA)	-200		**1300**

EBIT	**410**	Equity	700
Interest	-10	Reserves	100
EBT	**400**	Non-Current Borrowings	100
Tax Expense	-120	Current Liabilities & Provisions	400
EAT	**280**		**1300**

Assume Bad Debts provision ofRs.20 Lac is included in the SGA, and same amount is reduced from the trade receivables in current assets. Also assume that the pre-tax Cost of Debt is 12%, Tax Rate is 30% and Cost of Equity (i.e. shareholder's expected return) is 8.45%.

Answer:

Step I: Computation of NOPAT

NOPAT	
EBIT	410
Less: Taxes	-123
Add: Non-Cash Expenses	20
NOPAT	**307**

Step II: Finding out the Invested Capital:

Invested Capital	
Total Assets	1300
Less: Non Interest bearing liabilities	-400
	900
Add: Non Cash adjustment	20
	920

Note: It is assumed that the current liabilities also include the 100 of tax liability.

Step III: Compute the WACC

WACC = Cost of equity + Cost of debt

In this case, WACC = (800/900*8.45%) + [100/900*12% (1 - 0.30)] = 8.44%

Step IV: Find out the Capital Charge

Capital Charge = Invested Capital * WACC = 920 * 8.44% = 77.65

Step V: EVA = Adjusted NOPAT – Capital Charge = 307 – 77.65 = 229.35

Theoretical Questions

1. Differentiate between EVA and MVA.

Answer:

Economic Value Added (EVA) is a holistic method of evaluating a company's financial performance, which means that EVA is used not only as a mere valuation technique, but also to find the economic contribution of a company to the society at large. The core concept behind EVA is that a company generates 'value' only if there is a creation of wealth in terms of returns in excess of its cost of capital invested. EVA insists on separation of firm's operation from its financing. So if a company's EVA is negative, it means the company is not generating value from the funds invested into the business. Conversely, a positive EVA shows a company is producing value from the funds invested in it. EVA is a performance measure for management of the company, and this is as evident in its calculation formula as 'the excess of returns over the weighted average cost of invested capital '. The formula is as below –

EVA = NOPAT – (Invested Capital * WACC)

OR

NOPAT – Capital Charge

MVA is an attempt to resolve some of the issues involved in EVA e.g. ignoring Value Drivers, Book Value etc. Though MVA itself does not give any basis of share valuation but an alternative way to gauge performance efficiencies of an enterprise, albeit from a market capitalization point of view, the logic being that the market will discount the efforts taken by the management fairly. Hence, the MVA of 80 arrived in example above is the true value added that is perceived by the market. In contrast, EVA is a derived value added that is for the more discerning investor.

Since MVA represents market views regarding company's future value generation companies with a higher MVA will naturally become the darlings of the share market, and would eventually become 'pricey' from a pure pricing perspective. In such cases, the EVA may also sometimes have a slightly negative correlation as compared to MVA. But this will be a short term phenomenon as eventually the gap will get closed by investors themselves. A stock going ex-dividend will exhibit such propensities.

We can conclude that the main objective of EVA is thus to show management efficiency in generating returns over and above the hurdle rate of invested capital

2. Relative Valuation is the method to arrive at a 'relative' value using a 'comparative' analysis to its peers or similar enterprises. Elaborate this statement.

Answer:

The Concept of 'Relative Valuation': One way to look at the practical implementation of fair value within the valuation context would be to identify assets that are similar to the ones held by the acquiree company so that the values can be compared. This would be a significant departure from the 'intrinsic value' approach that we have seen until now. Trying to get a value that would be the nearest to the market price would mean that the valuation of a particular portfolio, or a divestiture in an entity, would happen at an agreeable price that fits into the normal distribution.

In one sense, we are indeed using the relative valuation in a limited approach when we speak about expected market returns, or when we are adopting an index based comparative. The more the asset pricing gets correlated to the similar assets in the market, the more inclusive it gets. Thus, when we are comparing bonds, the closer the YTM of the bond to the government index of return, the more credible it gets when it comes to pricing.

The Relative valuation, also referred to as 'Valuation by multiples,' uses financial ratios to derive at the desired metric (referred to as the 'multiple') and then compares the same to that of comparable firms. Comparable firms would mean the ones having similar asset and risk dispositions and assumed to continue to do so over the comparison period. In the process, there may be extrapolations set to the desired range to achieve the target set. To elaborate –

1. Find out the 'drivers' that will be the best representative for deriving at the multiple
2. Determine the results based on the chosen driver(s) through financial ratios
3. Find out the comparable firms, and perform the comparative analysis, and,
4. Iterate the value of the firm obtained to smoothen out the deviations

Step 1: Finding the correct driver that goes to determine the multiple is significant for relative valuation as it sets the direction to the valuation approach. Thereby, one can have two sets of multiple based approaches depending on the types of the drivers –

(a) Enterprise value based multiples, which would consist primarily of EV/EBITDA, EV/Invested Capital and EV/Sales.

(b) Equity value based multiples, which would comprise of P/E ratio and Price Earning Growth (PEG) Ratio.

We have already seen the concept and application of Enterprise Value in previous section. However, in light of relative valuation, we can definitely add that whereas EV/EBITDA is a popular ratio and does provide critical inputs, the EV/Invested Capital will be more appropriate to capital intensive enterprises, and EV/Sales will be used by companies who are cash rich, have a huge order book, and forecast organic growth through own capital.

The P/E has a celebrated status amongst Equity based multiples, and the PEG (PE Ratio/ Growth Rate i.e. the ratio of the PE to the expected growth rate of the firm) is more suitable where we are doing relative valuation of either high growth or sunrise industries.

Step 2: Choosing the right financial ratio is a vital part of success of this model. A factor based approach may help in getting this correct – for example – a firm that generates revenue mostly by exports will be highly influenced by future foreign exchange fluctuations. A pure P/E based ratio may not be reflective of this reality, which couldn't pre-empt the impacts that Brexit triggered on currency values. Likewise, an EV/Invested Capital would be a misfit for a company which may be light on core assets, or if has significant investment properties.

Step 3: Arriving at the right mix of comparable firms. This is perhaps the most challenging of all the steps – No two entities can be same – even if they may seem to be operating within the same risk and opportunity perimeter. So, a software company 'X' that we are now comparing to a similar sized company 'Y' may have a similar capital structure, a similar operative environment, and head count size – so far the two firms are on even platform for returns forecast and beta values. On careful scrutiny, it may be realized that the revenue generators are different – X may be deriving its revenues from dedicated service contracts having Full Time Equivalent (FTE) pricing, whereas Y earns through Unit Transfer Pricing (UTP) model. This additional set of information dramatically changes the risk structure – and this is precisely what the discerning investor has to watch for. In other words, take benchmarks with a pinch of salt.

Step 4: Iterate / extrapolate the results obtained to arrive at the correct estimate of the value of the firm.

Thus, we can conclude that 'Relative Valuation' is a comparative driven approach that assumes that the value of similar firms can form a good indicator for the value of the tested firm. There are some assumptions that are inherent to this model –

i. The market is efficient
ii. The function between the fundamentals and the multiples are linear
iii. The firms that are comparable are similar to structure, risk and growth pattern

Further, we can approach Enterprise Value (EV) in two ways –
(a) Take Entity Value as the base, and then adjust for debt values for arriving the 'EV';
or
(b) Take a balance sheet based approach and arrive at EV.

Practical Questions

1. ABC Company is considering acquisition of XYZ Ltd. which has 1.5 crores shares outstanding and issued. The market price per share isRs.400 at present. ABC's average cost of capital is 12%. Available information from XYZ indicates its expected cash accruals for the next 3 years as follows:

Year	Rs.Cr.
1	250
2	300
3	400

Calculate the range of valuation that ABC has to consider. (PV factors at 12% for years 1 to 3 respectively: 0.893, 0.797 and 0.712).

Answer:

VALUATION BASED ON MARKET PRICE

Market Price per share ₹ 400

Thus value of total business is (₹ 400 x 1.5 Cr.) ₹ 600 Cr.

VALUATION BASED ON DISCOUNTED CASH FLOW

Present Value of cash flows

(₹ 250 cr x 0.893) + (₹ 300 cr. X 0.797) + (₹ 400 cr. X 0.712) = ₹ 747.15 Cr.

Value of per share (₹ 747.15 Cr. / 1.5 Cr) ₹ 498.10 per share

RANGE OF VALUATION

	Per Share ₹	Total ₹ Cr.
Minimum	400.00	600.00
Maximum	498.10	747.15

2. Eagle Ltd. reported a profit ofRs.77 lakhs after 30% tax for the financial year 2011-12. An analysis of the accounts revealed that the income included extraordinary items ofRs.8 lakhs and an extraordinary loss ofRs.10 lakhs. The existing operations, except for the extraordinary items, are expected to continue in the future. In addition, the results of the launch of a new product are expected to be as follows:

	₹ In lakhs
Sales	70
Material costs	20
Labour costs	12
Fixed costs	10

You are required to:

(i) Calculate the value of the business, given that the capitalization rate is 14%.

(ii) Determine the market price per equity share, with Eagle Ltd.'s share capital being comprised of 1,00,000 13% preference shares ofRs.100 each and 50,00,000 equity shares ofRs.10 each and the P/E ratio being 10 times. [ALSO ASKED IN RTP - NOV 2018]

Answer:

(i) Computation of Business Value

			(₹ Lakhs)
Profit before tax $\frac{77}{1-0.30}$			110
Less: Extraordinary income			(8)
Add: Extraordinary losses			10
			112
Profit from new product		(₹ Lakhs)	
Sales		70	
Less: Material costs	20		
Labour costs	12		
Fixed costs	10	(42)	28
			140.00
Less: Taxes @30%			42.00
Future Maintainable Profit after taxes			98.00
Relevant Capitalisation Factor			0.14
Value of Business (₹98/0.14)			700

(ii) **Determination of Market Price of Equity Share**

Future maintainable profits (After Tax)	₹ 98,00,000
Less: Preference share dividends 1,00,000 shares of ₹ 100 @ 13%	₹ 13,00,000
Earnings available for Equity Shareholders	₹ 85,00,000
No. of Equity Shares	50,00,000
Earning per share = $\frac{₹\ 85,00,000}{50,00,000}$ =	₹ 1.70
PE ratio	10
Market price per share	₹ 17

3. ABC Co. is considering a new sales strategy that will be valid for the next 4 years. They want to know the value of the new strategy. Following information relating to the year which has just ended, is available:

Income Statement	₹
Sales	20,000
Gross margin (20%)	4,000
Administration, Selling & distribution expense (10%)	2,000
PBT	2,000
Tax (30%)	600
PAT	1,400
Balance Sheet Information	
Fixed Assets	8,000
Current Assets	4,000
Equity	12,000

If it adopts the new strategy, sales will grow at the rate of 20% per year for three years. From 4th year onward it will stabilize. The gross margin ratio, Assets turnover ratio, the Capital structure and the income tax rate will remain unchanged. Depreciation would be at 10% of net fixed assets at the beginning of the year. The Company's target rate of return is 15%.

Determine the incremental value due to adoption of the strategy.

Answer:

Projected Balance Sheet

	Year 1	Year 2	Year 3	Year 4
Fixed Assets (40% of Sales)	9,600	11,520	13,824	13,824
Current Assets (20% of Sales)	4,800	5,760	6,912	6,912
Total Assets	14,400	17,280	20,736	20,736
Equity	14,400	17,280	20,736	20,736

Projected Cash Flows:-

	Year 1	Year 2	Year 3	Year 4
Sales	24,000	28,800	34,560	34,560
PBT (10% of sale)	2,400	2,880	3,456	3,456
PAT (70%)	1,680	2,016	2,419.20	2,419.20
Depreciation	800	960	1,152	1,382
Addition to Fixed Assets	2,400	2,880	3,456	1,382
Increase in Current Assets	800	960	1,152	-
Operating cash flow (FCFF)	(720)	(864)	(1,036.80)	2,419.20

Projected Cash Flows:-

Present value of Projected Cash Flows:-

Cash Flows	*PVF at 15%*	*PV*
-720	0.870	-626.40
-864	0.756	-653.18
-1,036.80	0.658	-682.21
		-1,961.79

Residual Value - 2419.20/0.15 = 16,128

Present value of Residual value = $16128/(1.15)^3$

= 16128/1.521 = 10603.55

Total shareholders' value = 10,603.55 – 1,961.79 = 8,641.76

Pre strategy value = 1,400 / 0.15 = 9,333.33

∴ Value of strategy = 8,641.76 – 9,333.33 = – 691.57

Conclusion: The strategy is not financially viable

4. H Ltd. agrees to buy over the business of B Ltd. effective 1st April, 2012.The summarized Balance Sheets of H Ltd. and B Ltd. as on 31st March 2012 are as follows:

Balance sheet as at 31st March, 2012 (In Crores of Rupees)

Liabilities:	H. Ltd	B. Ltd.
Paid up Share Capital		
-Equity Shares of ₹100 each	350.00	
-Equity Shares of ₹10 each		6.50
Reserve & Surplus	950.00	25.00
Total	**1,300.00**	**31.50**
Assets:		
Net Fixed Assets	220.00	0.50
Net Current Assets	1,020.00	29.00
Deferred Tax Assets	60.00	2.00
Total	**1,300.00**	**31.50**

H Ltd. proposes to buy out B Ltd. and the following information is provided to you as part of the scheme of buying:

(1) The weighted average post tax maintainable profits of H Ltd. and B Ltd. for the last 4 years are Rs.300 crores and Rs.10 crores respectively.
(2) Both the companies envisage a capitalization rate of 8%.
(3) H Ltd. has a contingent liability of Rs.300 crores as on 31st March, 2012.
(4) H Ltd. to issue shares of Rs.100 each to the shareholders of B Ltd. in terms of the exchange ratio as arrived on a Fair Value basis. (Please consider weights of 1 and 3 for the value of shares arrived on Net Asset basis and Earnings capitalization method respectively for both H Ltd. and B Ltd.)
You are required to arrive at the value of the shares of both H Ltd. and B Ltd. under:
(i) Net Asset Value Method
(ii) Earnings Capitalisation Method
(iii) Exchange ratio of shares of H Ltd. to be issued to the shareholders of B Ltd. on a Fair value basis (taking into consideration the assumption mentioned in point 4 above.)
Answer:

(i) Net asset value

H Ltd.	$\frac{₹\ 1300\ Crores\ -₹\ 300\ Crores}{3.50\ Crores} = ₹\ 285.71$
B Ltd.	$\frac{₹\ 31.50\ Crores}{0.65\ Crores} = ₹\ 48.46$

(ii) Earning capitalization value

H Ltd.	$\frac{₹\ 300\ Crores / 0.08}{3.50\ Crores} = ₹\ 1071.43$
B Ltd.	$\frac{₹\ 10\ Crores / 0.08}{0.65\ Crores} = ₹\ 192.31$

(iii) Fair value

H Ltd.	$\frac{₹\ 285.71 \times 1 + ₹\ 1071.43 \times 3}{4} = ₹\ 875$
B Ltd.	$\frac{₹\ 48.46 \times 1 + ₹\ 192.31 \times 3}{4} = ₹\ 156.3475$
Exchange ratio	₹156.3475/ ₹875 = 0.1787

H Ltd should issue its 0.1787 share for each share of B Ltd.

Note: In above solution it has been assumed that the contingent liability will materialize at its full amount.

5. AB Ltd., is planning to acquire and absorb the running business of XY Ltd. The valuation is to be based on the recommendation of merchant bankers and the consideration is to be discharged in the form of equity shares to be issued by AB Ltd. As on 31.3.2006, the paid up capital of AB Ltd. consists of 80 lakhs shares of Rs.10 each. The highest and the lowest market quotation during the last 6 months were Rs.570 and Rs.430. For the purpose of the exchange, the price per share is to be reckoned as the average of the highest and lowest market price during the last 6 months ended on 31.3.06.
XY Ltd.'s Balance Sheet as at 31.3.2006 is summarised below:

	₹ lakhs
Sources	
Share Capital	
20 lakhs equity shares of ₹10 each fully paid	200
10 lakhs equity shares of ₹10 each, ₹5 paid	50
Loans	100
Total	350
Uses	
Fixed Assets (Net)	150
Net Current Assets	200
	350

An independent firm of merchant bankers engaged for the negotiation, have produced the following estimates of cash flows from the business of XY Ltd.:

Year ended	By way of	₹ lakhs
31.3.07	after tax earnings for equity	105
31.3.08	do	120
31.3.09	Do	125
31.3.10	Do	120
31.3.11	Do	100
	Terminal Value estimate	200

It is the recommendation of the merchant banker that the business of XY Ltd. may be valued on the basis of the average of (i) Aggregate of discounted cash flows at 8% and (ii) Net assets value. Present value factors at 8% for years

1-5: 0.93 0.86 0.79 0.74 0.68

You are required to:

(i) Calculate the total value of the business of XY Ltd.

(ii) The number of shares to be issued by AB Ltd.; and

(iii) The basis of allocation of the shares among the shareholders of XY Ltd.

Answer:

Price/share of AB Ltd. for determination of number of shares to be issued

= (₹ 570 + ₹ 430)/2 = ₹ 500

Value of XY Ltd based on future cash flow capitalization (105x0.93)+(120x0.86)+(125x0.79)+(120x0.74)x(300x0.68)	₹ lakhs	592.40
Value of XY Ltd based on net assets	₹ lakhs	250.00
Average value (592.40+250)/2		421.20
No. of shares in AB Ltd to be issued ₹ 4,21,20,000/500	Nos.	84240
Basis of allocation of shares		
Fully paid equivalent shares in XY Ltd. (20+5) lakhs		2500000
Distribution to fully paid shareholders 84240x20/25		67392
Distribution to partly paid shareholders 84240-67392		16848

6. The valuation of Hansel Limited has been done by an investment analyst. Based on an expected free cash flow ofRs.54 lakhs for the following year and an expected growth rate of 9 percent, the analyst has

estimated the value of Hansel Limited to beRs.1800 lakhs. However, he committed a mistake of using the book values of debt and equity.

The book value weights employed by the analyst are not known, but you know that Hansel Limited has a cost of equity of 20 percent and post tax cost of debt of 10 percent. The value of equity is thrice its book value, whereas the market value of its debt is nine-tenths of its book value. What is the correct value of Hansel Ltd? [ALSO ASKED IN RTP - MAY 2019]

Answer;

Cost of capital by applying Free Cash Flow to Firm (FCFF) Model is as follows: -

$$\text{Value of Firm} = V_0 = \frac{FCFF_1}{K_c - g_n}$$

Where –

$FCFF_1$ = Expected FCFF in the year 1

K_c= Cost of capital

g_n = Growth rate forever

Thus, ₹ 1800 lakhs = ₹ 54 lakhs /(K_c-g)

Since g = 9%, then K_c = 12%

Now, let X be the weight of debt and given cost of equity = 20% and cost of debt = 10%, then 20% (1 – X) + 10% X = 12%

Hence, X = 0.80, so book value weight for debt was 80%

∴ Correct weight should be 60 of equity and 72 of debt.

∴ Cost of capital = K_c = 20% (60/132) + 10% (72/132) = 14.5455% and correct firm's value

= ₹ 54 lakhs/(0.1454 – 0.09) = ₹ 974.73 lakhs.

7. Following information are available in respect of XYZ Ltd. which is expected to grow at a higher rate for 4 years after which growth rate will stabilize at a lower level:

Base year information:

Revenue -Rs.2,000 crores

EBIT -Rs.300 crores

Capital expenditure -Rs.280 crores

Depreciation -Rs.200 crores

Information for high growth and stable growth period are as follows:

	High Growth	Stable Growth
Growth in Revenue & EBIT	20%	10%
Growth in capital expenditure and depreciation	20%	Capital expenditure are offset by depreciation
Risk free rate	10%	9%
Equity beta	1.15	1
Market risk premium	6%	5%
Pre tax cost of debt	13%	12.86%
Debt equity ratio	1 : 1	2 : 3

For all time, working capital is 25% of revenue and corporate tax rate is 30%.

What is the value of the firm?

Answer:

High growth phase :

k_e = 0.10 + 1.15 x 0.06 = 0.169 or 16.9%.

k_d = 0.13 x (1-0.3) = 0.091 or 9.1%.

Cost of capital = 0.5 x 0.169 + 0.5 x 0.091 = 0.13 or 13%.

Stable growth phase :

k_e = 0.09 + 1.0 x 0.05 = 0.14 or 14%.

k_d = 0.1286 x (1 - 0.3) = 0.09 or 9%.

Cost of capital = 0.6 x 0.14 + 0.4 x 0.09 = 0.12 or 12%.

Determination of forecasted Free Cash Flow of the Firm (FCFF)

(₹ in crores)

	Yr. 1	Yr. 2	Yr 3	Yr. 4	Terminal Year
Revenue	2,400	2,880	3,456	4,147.20	4,561.92
EBIT	360	432	518.40	622.08	684.29
EAT	252	302.40	362.88	435.46	479.00
Capital Expenditure	96	115.20	138.24	165.89	-
Less Depreciation					
Δ Working Capital	100.00	120.00	144.00	172.80	103.68
Free Cash Flow (FCF)	56.00	67.20	80.64	96.77	375.32

Alternatively, it can also be computed as follows:

(₹ in crores)

	Yr. 1	Yr. 2	Yr 3	Yr. 4	Terminal Year
Revenue	2,400	2,880	3,456	4,147.20	4,561.92
EBIT	360	432	518.40	622.08	684.29
EAT	252	302.40	362.88	435.46	479.00
Add: Depreciation	240	288	345.60	414.72	456.19
	492	590.40	708.48	850.18	935.19
Less: Capital Exp.	336	403.20	483.84	580.61	456.19
Δ WC	100.00	120.00	144.00	172.80	103.68
	56.00	67.20	80.64	96.77	375.32

Present Value (PV) of FCFF during the explicit forecast period is:

FCFF (₹ in crores)	PVF @ 13%	PV (₹ in crores)
56.00	0.885	49.56
67.20	0.783	52.62
80.64	0.693	55.88
96.77	0.613	59.32
		₹ 217.38

Terminal Value of Cash Flow

$$\frac{375.32}{0.12-0.10} = ₹\,18,766.00 \text{Crores}$$

PV of the terminal, value is:

$$₹\,18,766.00 \text{Crores} \times \frac{1}{(1.13)^4} = ₹\,18,766.00 \text{Crores} \times 0.613 = ₹\,11,503.56 \text{Crores}$$

The value of the firm is :

₹ 217.38 Crores + ₹ 11,503.56 Crores = ₹ 11,720.94 Crores

8. Following information is given in respect of WXY Ltd., which is expected to grow at a rate of 20% p.a. for the next three years, after which the growth rate will stabilize at 8% p.a. normal level, in perpetuity.

	For the year ended March 31, 2014
Revenues	₹ 7,500 Crores
Cost of Goods Sold (COGS)	₹ 3,000 Crores
Operating Expenses	₹ 2,250 Crores
Capital Expenditure	₹ 750 Crores
Depreciation (included in Operating Expenses)	₹ 600 Crores

During high growth period, revenues & Earnings before Interest & Tax (EBIT) will grow at 20% p.a. and capital expenditure net of depreciation will grow at 15% p.a. From year 4 onwards, i.e. normal growth period revenues and EBIT will grow at 8% p.a. and incremental capital expenditure will be offset by the depreciation. During both high growth & normal growth period, net working capital requirement will be 25% of revenues.

The Weighted Average Cost of Capital (WACC) of WXY Ltd. is 15%.

Corporate Income Tax rate will be 30%.

Required:

Estimate the value of WXY Ltd. using Free Cash Flows to Firm (FCFF) & WACC methodology.
The PVIF @ 15 % for the three years are as below:

Year	t1	t2	t3
PVIF	0.8696	0.7561	0.6575

(ALSO IN RTP-NOV 2020)

Answer:

Determination of forecasted Free Cash Flow of the Firm (FCFF)

(₹ in crores)

	Yr. 1	Yr. 2	Yr 3	Terminal Year
Revenue	9000.00	10800.00	12960.00	13996.80
COGS	3600.00	4320.00	5184.00	5598.72
Operating Expenses	1980.00*	2376.00	2851.20	3079.30
Depreciation	720.00	864.00	1036.80	1119.74
EBIT	2700.00	3240.00	3888.00	4199.04
Tax @30%	810.00	972.00	1166.40	1259.71
EAT	1890.00	2268.00	2721.60	2939.33
Capital Exp. – Dep.	172.50	198.38	228.13	-
Δ Working Capital	375.00	450.00	540.00	259.20
Free Cash Flow (FCF)	1342.50	1619.62	1953.47	2680.13

* Excluding Depreciation.

Present Value (PV) of FCFF during the explicit forecast period is:

FCFF (₹ in crores)	PVF @ 15%	PV (₹ in crores)
1342.50	0.8696	1167.44
1619.62	0.7561	1224.59
1953.47	0.6575	1284.41
		3676.44

PV of the terminal, value is:

$$\frac{2680.13}{0.15 - 0.08} \times \frac{1}{(1.15)^3} = ₹\ 38287.57 \text{ Crore} \times 0.6575 = ₹\ 25174.08 \text{ Crore}$$

The value of the firm is :

₹ 3676.44 Crores + ₹ 25174.08 Crores = ₹ 28,850.52 Crores

9. With the help of the following information of Jatayu Limited compute the Economic Value Added:

Capital Structure

Equity capital Rs.160 Lakhs **Reserves and Surplus Rs.140 lakhs** **10% Debentures Rs.400 lakhs**

Cost of equity 14%

Financial Leverage 1.5 times

Income Tax Rate 30%

Answer:

Financial Leverage = PBIT/PBT

1.5 = PBIT / (PBIT – Interest)

1.5 = PBIT / (PBIT – 40)

1.5 (PBIT – 40) = PBIT

1.5 PBIT – 60 = PBIT

1.5 PBIT – PBIT = 60
0.5 PBIT = 60

$$\text{or PBIT} = \frac{60}{0.5} = ₹120 \text{ lakhs}$$

NOPAT = PBIT – Tax =Rs.120 lakhs (1 – 0.30) =Rs.84 lakhs.
Weighted Average Cost of Capital (WACC)
= 14% × (300 / 700) + (1 – 0.30) × (10%) × (400 / 700) = 10%
EVA = NOPAT – (WACC × Total Capital)
EVA =Rs.84 lakhs – 0.10 ×Rs.700 lakhs
EVA =Rs.14 lakhs

10. RST Ltd.'s current financial year's income statement reported its net income after tax as Rs.25,00,000. The applicable corporate income tax rate is 30%.
Following is the capital structure of RST Ltd. at the end of current financial year:

	Rs.
Debt (Coupon rate = 11%)	40 lakhs
Equity (Share Capital + Reserves & Surplus)	125 lakhs
Invested Capital	165 lakhs

Following data is given to estimate cost of equity capital:

Equity Beta of RST Ltd.	1.36
Risk –free rate i.e. current yield on Govt. bonds	8.5%
Average market risk premium (i.e. Excess of return on market portfolio over risk-free rate)	9%

Required:
(i) Estimate Weighted Average Cost of Capital (WACC) of RST Ltd.; and
(ii) Estimate Economic Value Added (EVA) of RST Ltd.
Answer:

Cost of Equity as per CAPM

$k_e = R_f + \beta \times \text{Market Risk Premium}$
$= 8.5\% + 1.36 \times 9\%$
$= 8.5\% + 12.24\% = 20.74\%$

Cost of Debt $k_d = 11\%(1 - 0.30) = 7.70\%$

WACC (k_o) $= k_e \times \frac{E}{E+D} + k_d \times \frac{D}{E+D}$

$= 20.74 \times \frac{125}{165} + 7.70 \times \frac{40}{165} = 15.71 + 1.87 = 17.58\%$

Taxable Income = ₹ 25,00,000/(1 - 0.30)

= ₹ 35,71,429 or ₹ 35.71 lakhs

Operating Income = Taxable Income + Interest

= ₹ 35,71,429 + ₹ 4,40,000

= ₹ 40,11,429 or ₹ 40.11 lacs

EVA = EBIT (1-Tax Rate) – WACC x Invested Capital

= ₹ 40,11,429 (1 – 0.30) – 17.58% x ₹ 1,65,00,000

= ₹ 28,08,000 – ₹ 29,00,700 = - ₹ 92,700

11. Tender Ltd has earned a net profit ofRs.15 lacs after tax at 30%. Interest cost charged by financial institutions wasRs.10 lacs. The invested capital isRs.95 lacs of which 55% is debt. The company maintains a weighted average cost of capital of 13%. Required,

(a) Compute the operating income.

(b) Compute the Economic Value Added (EVA).

(c) Tender Ltd. has 6 lac equity shares outstanding. How much dividend can the company pay before the value of the entity starts declining?

Answer:

Taxable Income = ₹ 15 lac/(1-0.30)

= ₹ 21.43 lacs or ₹ 21,42,857

Operating Income = Taxable Income + Interest

= ₹ 21,42,857 + ₹ 10,00,000

= ₹ 31,42,857 or ₹ 31.43 lacs

EVA = EBIT (1-Tax Rate) – WACC x Invested Capital

= ₹ 31,42,857(1 – 0.30) – 13% x ₹ 95,00,000

= ₹ 22,00,000 – ₹ 12,35,000 = ₹ 9,65,000

EVA Dividend $= \frac{₹\,9,65,000}{₹\,6,00,000} = ₹\,1.6083$

12. The following information is given for 3 companies that are identical except for their capital structure:

	Orange	Grape	Apple
Total invested capital	1,00,000	1,00,000	1,00,000
Debt/assets ratio	0.8	0.5	0.2
Shares outstanding	6,100	8,300	10,000
Pre tax cost of debt	16%	13%	15%
Cost of equity	26%	22%	20%
Operating Income (EBIT)	25,000	25,000	25,000

The tax rate is uniform 35% in all cases.

(i) Compute the Weighted average cost of capital for each company.

(ii) Compute the Economic Valued Added (EVA) for each company.

(iii) Based on the EVA, which company would be considered for best investment? Give reasons.

(iv) If the industry PE ratio is 11x, estimate the price for the share of each company.

(v) Calculate the estimated market capitalisation for each of the Companies.

[ALSO IN MTP - MARCH 2018 & OCTOBER 2019]

Answer:

(i) Working for calculation of WACC

	Orange	Grape	Apple
Total debt	80,000	50,000	20,000
Post tax Cost of debt	10.40%	8.45%	9.75%
Equity Fund	20,000	50,000	80,000

WACC

Orange:	(10.4 x 0.8) + (26 x 0.2)	=	13.52%
Grape:	(8.45 x 0.5) + (22 x 0.5)	=	15.225%
Apple:	(9.75 x 0.2) + (20 x 0.8)	=	17.95%

(ii)

	Orange	Grape	Apple
WACC	13.52	15.225	17.95
EVA [EBIT (1-T)-(WACC x Invested Capital)]	2,730	1,025	-1,700

(iii) Orange would be considered as the best investment since the EVA of the company is highest and its weighted average cost of capital is the lowest

(iv) Estimated Price of each company shares

	Orange	Grape	Apple
EBIT (₹)	25,000	25,000	25,000
Interest (₹)	12,800	6,500	3,000
Taxable Income (₹)	12,200	18,500	22,000
Tax 35% (₹)	4,270	6,475	7,700
Net Income (₹)	7,930	12,025	14,300
Shares	6,100	8,300	10,000
EPS (₹)	1.30	1.45	1.43
Stock Price (EPS x PE Ratio) (₹)	14.30	15.95	15.73

Since the three entities have different capital structures they would be exposed to different degrees of financial risk. The PE ratio should therefore be adjusted for the risk factor.

(v) **Market Capitalisation**

Estimated Stock Price (₹)	14.30	15.95	15.73
No. of shares	6,100	8,300	10,000
Estimated Market Cap (₹)	87,230	1,32,385	1,57,300

13. Delta Ltd.'s current financial year's income statement reports its net income asRs.15,00,000. Delta's marginal tax rate is 40% and its interest expense for the year wasRs.15,00,000. The company hasRs.1,00,00,000 of invested capital, of which 60% is debt. In addition, Delta Ltd. tries to maintain a Weighted Average Cost of Capital (WACC) of 12.6%.
(i) Compute the operating income or EBIT earned by Delta Ltd. in the current year.
(ii) What is Delta Ltd.'s Economic Value Added (EVA) for the current year?
(iii) Delta Ltd. has 2,50,000 equity shares outstanding. According to the EVA you computed in (ii), how much can Delta pay in dividend per share before the value of the company would start to decrease? If Delta does not pay any dividends, what would you expect to happen to the value of the company?
[ALSO IN MTP - MARCH 2019 - 8 MARKS]
Answer:
(i) Taxable income = Net Income /(1 – 0.40)
or, Taxable income =Rs.15,00,000/(1 – 0.40) =Rs.25,00,000
Again, taxable income = EBIT – Interest
or, EBIT = Taxable Income + Interest
=Rs.25,00,000 +Rs.15,00,000 =Rs.40,00,000
(ii) EVA = EBIT (1 – T) – (WACC Invested capital)
=Rs.40,00,000 (1 – 0.40) – (0.126 Rs.1,00,00,000)
=Rs.24,00,000 –Rs.12,60,000 =Rs.11,40,000
(iii) EVA Dividend =Rs.11,40,000/2,50,000 =Rs.4.56
If Delta Ltd. does not pay a dividend, we would expect the value of the firm to increase because it will achieve higher growth, hence a higher level of EBIT. If EBIT is higher, then all else equal, the value of the firm will increase.

14. The following data pertains to XYZ Inc. engaged in software consultancy business as on 31 December 2010.

($ Million)

Income from consultancy	935.00
EBIT	180.00
Less: Interest on Loan	18.00
EBT	162.00
Tax @ 35%	56.70
	105.30

Balance Sheet

($ Million)

Liabilities	Amount	Assets		Amount
Equity Stock (10 million share @ $ 10 each)	100	Land and Building		200
		Computers & Softwares		295
Reserves & Surplus	325	Current Assets:		
Loans	180	Debtors	150	
Current Liabilities	180	Bank	100	
		Cash	40	290
	785			785

With the above information and following assumption you are required to compute
(a) Economic Value Added
(b) Market Value Added.
Assuming that:
(i) WACC is 12%.
(ii) The share of company currently quoted at $ 50 each
Answer:

(a) Determination of Economic Value Added (EVA)

	$ Million
EBIT	180.00
Less: Taxes @ 35%	63.00
Net Operating Profit after Tax	117.00
Less: Cost of Capital Employed [W. No.1]	72.60
Economic Value Added	44.40

(b) Determination of Market Value Added (MVA)

	$ Million
Market value of Equity Stock [W. No. 2]	500
Equity Fund [W. No. 3]	425
Market Value Added	75

Working Notes:

(1)	Total Capital Employed	
	Equity Stock	$ 100 Million
	Reserve and Surplus	$ 325 Million
	Loan	$ 180 Million
		$ 605 Million
	WACC	12%
	Cost of Capital employed $ 605 Million x 12%	$ 72.60 Million
(2)	Market Price per equity share (A)	$ 50
	No. of equity share outstanding (B)	10 Million
	Market value of equity stock (A) x (B)	$ 500 Million
(3)	Equity Fund	
	Equity Stock	$ 100 Million
	Reserves & Surplus	$ 325 Million
		$ 425 Million

15. Herbal Gyan is a small but profitable producer of beauty cosmetics using the plant Aloe Vera. This is not a high-tech business, but Herbal's earnings have averaged aroundRs.12 lakh after tax, largely on the strength of its patented beauty cream for removing the pimples.
The patent has eight years to run, and Herbal has been offeredRs.40 lakhs for the patent rights. Herbal's assets includeRs.20 lakhs of working capital andRs.80 lakhs of property, plant, and equipment. The patent is not shown on Herbal's books. Suppose Herbal's cost of capital is 15 percent. What is its Economic Value Added (EVA)?

Answer:

EVA = Income earned – (Cost of capital x Total Investment)

Total Investments

Particulars	**Amount**
Working capital	₹ 20 lakhs
Property, plant, and equipment	₹ 80 lakhs
Patent rights	₹ 40 lakhs
Total	**₹ 140 lakhs**

Cost of Capital 15%
EVA=Rs.12 lakh – (0.15 xRs.140 lakhs) =Rs.12 lakh –Rs.21 lakh = -` 9 lakh
Thus, Herbal Gyan has a negative EVA ofRs.9 lakhs.

16. Constant Engineering Ltd. has developed a high tech product which has reduced the Carbon emission from the burning of the fossil fuel. The product is in high demand. The product has been patented and has a market value ofRs.100 Crore, which is not recorded in the books. The Net Worth (NW) of Constant Engineering Ltd. isRs.200 Crore. Long term debt isRs.400 Crore. The product generates a revenue ofRs.84 Crore. The rate on 365 days Government bond is 10 percent per annum. Market portfolio generates a return of 12 percent per annum. The stock of the company moves in tandem with the market. Calculate Economic Value added of the company.

Answer:

EVA = Income Earned – (Cost of Capital x Total Investment)

Total Investments

	Amount (₹ Crore)
Net Worth	200.00
Long Term Debts	400.00
Patent Rights	100.00
Total	700.00

WACC (ko) $= k_e \times \frac{E}{E+D} + k_d \times \frac{D}{E+D}$

$= 12 \times \frac{300}{700} + 10 \times \frac{400}{700}$

= 5.14% + 5.71% = 10.85%

EVA = Profit Earned – WACC x Invested Capital

= ₹ 84 crore – 10.85% x ₹ 700 crore

= ₹ 8.05 crore

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Herbal World is a small, but profitable producer of beauty cosmetics using the plant Aloe Vera. Though it is not a high-tech business, yet Herbal's earnings have averaged around Rs. 18.5 lakh after tax, mainly on the strength of its patented beauty cream to remove the pimples.
The patent has nine years to run, and Herbal has been offered Rs. 50 lakhs for the patent rights. Herbal's assets include Rs. 50 lakhs of property, plant and equipment and Rs. 25 lakhs of working capital. However, the patent is not shown in the books of Herbal World. Assuming Herbal's cost of capital being 14 percent, calculate its Economic Value Added (EVA).
[MAY 2018 - 5 MARKS]
Answer:

EVA = NOPAT – WACC x Capital Employed.

Capital Employed:	Rs. lacs
Property, etc.	50
Working Capital	25
Patent Value	50
Effective or Invested Capital	125

WACC x CE = 14% x Rs. 125 lacs= Rs. 17.5 lacs
EVA = Rs. 18.5 lacs – Rs. 17.5 lacs = Rs. 1 lac

2. An established company is going to be de merged in two separate entities. The valuation of the company is done by a well-known analyst. He has estimated a value of Rs. 5,000 lakhs, based on the expected free cash flow for next year of Rs. 200 lakhs and an expected growth rate of 5%. While going through the valuation procedure, it was found that the analyst has made the mistake of using the book values of debt and equity in his calculation. While you do not know the book value weights he used, you have been provided with the following information:
(i) The market value of equity is 4 times the book value of equity, while the market value of debt is equal to the book value of debt,
(ii) Company has a cost of equity of 12%,
(iii) After tax cost of debt is 6%.
You are required to advise the correct value of the company.
[MAY 2018 - 8 MARKS]
Answer:

Value of the Company = $\frac{\text{Free Cash Flow at year end 1}}{Kc-g}$, where Kc = weighted average cost of capital.

Value of the company = 5000 = $\frac{200}{Kc-5}$

Kc – 5 = 200/5000 = 4%

Kc = 4% + 5% = 9%

We do not know the weights the analyst had taken for arriving at the cost of capital. Let w be the proportion of equity. Then, (1-w) will be the proportion of debt.

Kc = 9 = w x 12 + (1-w) x 6

9 = 6 + 6w

6w = 3.

Hence w = 3/ 6 = 0.5 = 50 % or 1:1

The weights are equal i.e. 1:1 for equity and debt.

The correct weights should be market value of equity : market value of debts.

i.e. 4 times book value of equity : book value of debts. i.e. 4:1 equity : debt

Revised Kc = 4/5 x 12 + 1/5 x 6= 10.8 %

Revised value of the company = $\frac{200}{10.8-5}$ = 200 / 5.8% = 3448.28 lacs.

3. Compute Economic Value Added (EVA) of Good luck Ltd. from the following information:

Profit & Loss Statement

Particulars	(₹ in Lakh)
(a) Income -	
Revenue from Operations	2000
(b) Expenses -	
Direct Expenses	800
Indirect Expenses	400
(c) Profit before interest & tax(a-b)	800
(d) Interest	30
(e) Profit before tax (c - d)	770
(f) Tax	231
(g) Profit after tax (e - f)	**539**

Balance Sheet

Particulars	(₹ in Lakh)
Equity and Liabilities :	
(a) Shareholder's Fund -	
Equity Share Capital	1000
Reserve and Surplus	600
(b) Non- Current Liabilities -	
Long Term Borrowings	200
(c) Current Liabilities	800
Total	**2600**
Assets :	
(a) Non - Current Assets	2000
(b) Current Assets	600
Total	**2600**

Other Information:
(1) Cost of Debts is 15%.
(2) Cost of Equity (i.e. shareholders' expected return) is 12%.
(3) Tax Rate is 30%.
(4) Bad Debts Provision of Rs. 40 lakhs is included in indirect expenses and Rs. 40 lakhs reduced from receivables in current assets.
[MAY 2019 - 8 MARKS]
Answer:

EVA = NOPAT – (Invested Capital x WACC)

NOPAT = EBIT – Tax + Non-Cash Expenses

= 800 lakhs – 231 lakhs + 40 lakhs

= ₹ 609 lakh

(OR)

Operating Income = Taxable Income + Interest + Non-cash Expenses

= 539 +30+40 = ₹ 609 lakh

Invested Capital = 1000 + 600 + 200 = 1800

= 1800 + 40 (Non-cash expenses)

= ₹ 1840 lakhs

$$\text{WACC} = \frac{1600}{1800} \times 12\% + \frac{200}{1800} \times 15\% (1-0.3)$$

= 10.67% + 1.17% = 11.84%

Now, EVA = 609 – (1840 x 11.84%)

= 609 – 217.86

= ₹ 391.14 lakhs

OR

$$\text{WACC} = \frac{1000}{1200} \times 12\% + \frac{200}{1200} \times 15\% (1-0.3)$$

= 10.00% + 1.75% = 11.75%

Now, EVA = 609 – (1840 x 11.75%)

= 609 – 216.20

= ₹ 392.80 lakhs

4. BRS Inc deals in computer and IT hardwares and peripherals. The expected revenue forthe next 8 years is as follows:

Years	Sales Revenue ($ Million)
1	8
2	10
3	15
4	22
5	30
6	26
7	23
8	20

Summarized financial position as on 31 March 2012 was as follows:

$ Million

Liabilities	Amount	Assets	Amount
Equity Stocks	12	Fixed Assets (Net)	17
12% Bonds	8	Current Assets	3
	20		20

Additional Information:

(a) Its variable expenses is 40% of sales revenue and fixed operating expenses (cash) are estimated to be as follows:

Period	Amount ($ Million)
1- 4 years	1.6
5-8 years	2

(b) An additional advertisement and sales promotion campaign shall be launched requiring expenditure as per following details:

Period	Amount ($ Million)
1 year	0.50
2-3 years	1.50
4-6 years	3.00
7-8 years	1.00

(c) Fixed assets are subject to depreciation at 15% as per WDV method.

(d) The company has planned additional capital expenditures (in the beginning of each year) for the coming 8 years as follows:

Period	Amount ($ Million)
1	0.50
2	0.80
3	2.00
4	2.50
5	3.50
6	2.50
7	1.50
8	1.00

(e) Investment in Working Capital is estimated to be 20% of Revenue.

(f) Applicable tax rate for the company is 30%.

(g) Cost of Equity is estimated to be 16%.

(h) The Free Cash Flow of the firm is expected to grow at 5% per annum after 8 years.

CALCULATE:

(i) Value of Firm

(ii) Value of Equity

[RTP - MAY 2018]

Answer:

Working Notes:

(a) Determination of Weighted Average Cost of Capital

Sources of funds	Cost (%)	Proportions	Weights	Weighted Cost
Equity Stock	16	12/20	0.60	9.60
12% Bonds	12%(1-0.30) = 8.40	8/20	0.40	3.36
				12.96 say 13

(b) Schedule of Depreciation

$ Million

Year	Opening Balance of Fixed Assets	Addition during the year	Total	Depreciation @ 15%
1	17.00	0.50	17.50	2.63
2	14.87	0.80	15.67	2.35
3	13.32	2.00	15.32	2.30
4	13.02	2.50	15.52	2.33
5	13.19	3.50	16.69	2.50
6	14.19	2.50	16.69	2.50
7	14.19	1.50	15.69	2.35
8	13.34	1.00	14.34	2.15

(c) Determination of Investment

$ Million

Year	Investment Required			Existing Investment in CA	Additional Investment required
	For Capital Expenditure	CA (20% of Revenue)	Total		
1	0.50	1.60	2.10	3.00	0.00
2	0.80	2.00	2.80	2.50*	0.30
3	2.00	3.00	5.00	2.00**	3.00
4	2.50	4.40	6.90	3.00	3.90
5	3.50	6.00	9.50	4.40	5.10
6	2.50	5.20	7.70	6.00	1.70
7	1.50	4.60	6.10	5.20	0.90
8	1.00	4.00	5.00	4.60	0.40

* Balance of CA in Year 1 ($3 Million) – Capital Expenditure in Year 1($ 0.50 Million)

** Similarly balance of CA in Year 2 ($2.80) – Capital Expenditure in Year 2($ 0.80 Million)

(d) Determination of Present Value of Cash Inflows

$ Million

Particulars	Years							
	1	2	3	4	5	6	7	8
Revenue (A)	8.00	10.00	15.00	22.00	30.00	26.00	23.00	20.00

Less: Expenses								
Variable Costs	3.20	4.00	6.00	8.80	12.00	10.40	9.20	8.00
Fixed cash operating cost	1.60	1.60	1.60	1.60	2.00	2.00	2.00	2.00
Advertisement Cost	0.50	1.50	1.50	3.00	3.00	3.00	1.00	1.00
Depreciation	2.63	2.35	2.30	2.33	2.50	2.50	2.35	2.15
Total Expenses (B)	7.93	9.45	11.40	15.73	19.50	17.90	14.55	13.15
EBIT (C) = (A) - (B)	0.07	0.55	3.60	6.27	10.50	8.10	8.45	6.85
Less: Taxes@30% (D)	0.02	0.16	1.08	1.88	3.15	2.43	2.53	2.06
NOPAT (E) = (C) - (D)	0.05	0.39	2.52	4.39	7.35	5.67	5.92	4.79
Gross Cash Flow (F) = (E) + Dep	2.68	2.74	4.82	6.72	9.85	8.17	8.27	6.94
Less: Investment in Capital Assets plus Current Assets (G)	0	0.30	3.00	3.90	5.10	1.70	0.90	0.40
Free Cash Flow (H) = (F) - (G)	2.68	2.44	1.82	2.82	4.75	6.47	7.37	6.54
PVF@13% (I)	0.885	0.783	0.693	0.613	0.543	0.480	0.425	0.376
PV (H)(I)	2.371	1.911	1.261	1.729	2.579	3.106	3.132	2.46

Total present value = $ 18.549 million

(e) Determination of Present Value of Continuing Value (CV)

$$CV = \frac{FCF_9}{k-g} = \frac{\$6.54\,\text{million}(1.05)}{0.13-0.05} = \frac{\$6.867\,\text{million}}{0.08} = \$85.8375\ \text{million}$$

Present Value of Continuing Value (CV) = $85.8376 million X $PVF_{13\%,8}$ = $85.96875 million X 0.376 = $32.2749 million

(i) Value of Firm

	$ Million
Present Value of cash flow during explicit period	18.5490
Present Value of Continuing Value	32.2749
Total Value	50.8239

(ii) Value of Equity

	$ Million
Total Value of Firm	50.8239
Less: Value of Debt	8.0000
Value of Equity	42.8239

5. A valuation done of an established company by a well-known analyst has estimated a value of Rs. 500 lakhs, based on the expected free cash flow for next year of Rs. 20 lakhs and an expected growth rate of 5%.

While going through the valuation procedure, you found that the analyst has made the mistake of using the book values of debt and equity in his calculation. While you do not know the book value weights he used, you have been provided with the following information:
(i) Company has a cost of equity of 12%,
(ii) After tax cost of debt is 6%,
(iii) The market value of equity is three times the book value of equity, while the market value of debt is equal to the book value of debt.
You are required to estimate the correct value of the company
[RTP - NOV 2019]
Answer:

Cost of capital by applying Free Cash Flow to Firm (FCFF) Model is as follows:-

$$\text{Value of Firm} = V_0 = \frac{FCFF_1}{K_c - g_n}$$

Where –

$FCFF_1$ = Expected FCFF in the year 1

K_c = Cost of capital

g_n = Growth rate forever

Thus, ₹ 500 lakhs = ₹ 20 lakhs /(K_c-g)

Since g = 5%, then K_c = 9%

Now, let X be the weight of debt and given cost of equity = 12% and cost of debt = 6%, then 12% (1 – X) + 6% X = 9%

Hence, X = 0.50, so book value weight for debt was 50%

∴ Correct weight should be 150% of equity and 50% of debt.

∴ Cost of capital = K_c = 12% (0.75) + 6% (0.25) = 10.50%

and correct firm's value = ₹ 20 lakhs/(0.105 – 0.05) = ₹ 363.64 lakhs.

6. STR Ltd.'s current financial year's income statement reported its net income after tax as Rs.50 Crore. Following is the capital structure of STR Ltd. at the end of current financial year:

	Rs.
Debt (Coupon rate = 11%)	80 Crore
Equity (Share Capital + Reserves & Surplus)	250 Crore
Invested Capital	330 Crore

Following data is given to estimate cost of equity capital:

Asset Beta of TSR Ltd.	1.11
Risk –free Rate of Return	8.5%
Average market risk premium	9%

The applicable corporate income tax rate is 30%.
Estimate Economic Value Added (EVA) of RST Ltd. inRs.lakh. (MTP-OCT 2020-8 Marks)
Answer:

First of all, to calculate Cost of Equity we shall compute the Equity Beta of STR Ltd. as follows:

$$\beta_a = \beta_e \left[\frac{E}{E + D(1-t)}\right]$$

$$1.11 = \beta_e \left[\frac{250}{250 + 80(1-0.30)}\right]$$

β_e = 1.36

then we shall compute the Cost of Equity as per CAPM as follows:

k_e = R_f + β x Market Risk Premium

= 8.5% + 1.36 x 9%

= 8.5% + 12.24% = 20.74%

Cost of Debt (k_d) = 11%(1 – 0.30) = 7.70%

WACC (k_o) $= k_e \times \frac{E}{E+D} + k_d \times \frac{D}{E+D}$

$= 20.74 \times \frac{250}{330} + 7.70 \times \frac{80}{330}$

= 15.71 + 1.87 = 17.58%

Taxable Income = ₹ 50 Crore/(1 - 0.30)

= ₹ 7142.86 lakhs

Operating Income = Taxable Income + Interest

= ₹ 7142.86 lakhs + ₹ 880 lakhs

= ₹ 8022.86 lakhs

EVA = EBIT (1-Tax Rate) – WACC x Invested Capital

= ₹ 8022.86 lakhs (1 – 0.30) – 17.58% x ₹ 330 Crore

7. Explain the term Angel Investor. (MTP-OCT 2020-4 Marks)

Answer:

Despite being a country of many cultures and communities traditionally inclined to business and entrepreneurship, India still ranks low on comparative ratings across entrepreneurship,

innovation and ease of doing business. The reasons are obvious. These include our old and outdated draconian rules and regulations which provides a hindrance to our business environment for a long time. Other reasons are red tapism, our time consuming procedures, and lack of general support for entrepreneurship. Off course, things are changing in recent times. As per Investopedia, Angel investors invest in small startups or entrepreneurs. Often, angel investors are among an entrepreneur's family and friends. The capital angel investors provide may be a one-time investment to help the business propel or an ongoing injection of money to support and carry the company through its difficult early stages. Angel investors provide more favorable terms compared to other lenders, since they usually invest in the entrepreneur starting the business rather than the viability of the business. Angel investors are focused on helping startups take their first steps,

rather than the possible profit they may get from the business. Essentially, angel investors are the opposite of venture capitalists.
Angel investors are also called informal investors, angel funders, private investors, seed investors or business angels. These are affluent individuals who inject capital for startups in exchange for ownership equity or convertible debt. Some angel investors invest through crowdfunding platforms online or build angel investor networks to pool in capital.

sAngel investors typically use their own money, unlike venture capitalists who take care of pooled money from many other investors and place them in a strategically managed fund.
Though angel investors usually represent individuals, the entity that actually provides the fund may be a limited liability company, a business, a trust or an investment fund, among many other kinds of vehicles.
Angel investors who seed startups that fail during their early stages lose their investments completely. This is why professional angel investors look for opportunities for a defined exit strategy, acquisitions or initial public offerings (IPOs).

CHAPTER-13. MERGERS, ACQUISITIONS & CORPORATE RESTRUCTURING

QUESTIONS FROM STUDY MATERIAL

Practical Illustrations

1. The following is the Balance-sheet of XYZ Company Ltd as on March 31st, 2013. (Rs. in lakh)

Liabilities	Amount	Assets	Amount
6 lakh equity shares of ₹100/- each	600	Land & Building	200
2 lakh 14% Preference shares of ₹100/- each	200	Plant & Machinery	300
		Furniture & Fixtures	50
13% Debentures	200	Inventory	150
Debenture Interest accrued and Payable	26	Sundry debtors	70
Loan from Bank	74	Cash at Bank	130
Trade Creditors	300	Preliminary Expenses	10
		Cost of Issue of debentures	5
		Profit & Loss A/c	485
	1,400		1,400

The XYZ Company did not perform well and has suffered sizable losses during the last few years. However, it is now felt that the company can be nursed back to health by proper financial restructuring and consequently the following scheme of reconstruction has been devised:

(i) Equity shares are to be reduced to Rs. 25/- per share, fully paid up;

(ii) Preference shares are to be reduced (with coupon rate of 10%) to equal number of shares of Rs.50 each, fully paid up.

(iii) Debenture holders have agreed to forego interest accrued to them. Beside this, they have agreed to accept new debentures carrying a coupon rate of 9%.

(iv) Trade creditors have agreed to forgo 25 per cent of their existing claim; for the balance sum they have agreed to convert their claims into equity shares of Rs. 25/- each.

(v) In order to make payment for bank loan and augment the working capital, the company issues 6 lakh equity shares at Rs. 25/- each; the entire sum is required to be paid on application. The existing shareholders have agreed to subscribe to the new issue.

(vi) While Land and Building is to be revalued at Rs. 250 lakh, Plant & Machinery is to be written down to Rs. 104 lakh. A provision amounting to Rs. 5 lakh is to be made for bad and doubtful debts.

You are required to show the impact of financial restructuring/re-construction. Also, prepare the new balance sheet assuming the scheme of re-construction is implemented in letter and spirit.

Answer:

Impact of Financial Restructuring

(i) Benefits to XYZ Ltd.

		₹ in lakhs
(a)	Reduction of liabilities payable	
	Reduction in equity share capital (6 lakh shares x ₹75 per share)	450
	Reduction in preference share capital (2 lakh shares x ₹50 per share)	100
	Waiver of outstanding debenture Interest	26
	Waiver from trade creditors (₹300 lakhs x 0.25)	75
		651
(b)	Revaluation of Assets	
	Appreciation of Land and Building (₹250 lakhs - ₹200 lakhs)	50
		701

(ii) Amount of ₹701 lakhs utilized to write off losses, fictious assets and over- valued assets.

	₹ in lakhs
Writing off profit and loss account	485
Cost of issue of debentures	5
Preliminary expenses	10
Provision for bad and doubtful debts	5
Revaluation of Plant and Machinery (₹300 lakhs – ₹104 lakhs)	196
	701

Balance sheet of XYZ Ltd as at_____ (after re-construction)

(₹ in lakhs)

Liabilities	Amount	Assets		Amount
21 lakhs equity shares of ₹25/- each	525	Land & Building		250
2 lakhs 10% Preference shares of ₹50/- each	100	Plant & Machinery		104
9% Debentures	200	Furnitures& Fixtures		50
		Inventory		150
		Sundry debtors	70	
			-5	65
		Cash-at-Bank (Balancing figure)*		206
	825			825

*Opening Balance of ₹130/- lakhs + Sale proceeds from issue of new equity shares ₹150/- lakhs – Payment of bank loan of ₹74/- lakhs = ₹206 lakhs.

2. Company X is contemplating the purchase of Company Y, Company X has 3,00,000 shares having a market price of Rs. 30 per share, while Company Y has 2,00,000 shares selling at Rs. 20 per share. The EPS are Rs. 4.00 and Rs. 2.25 for Company X and Y respectively.

Managements of both companies are discussing two alternative proposals for exchange of shares as indicated below:

(i) in proportion to the relative earnings per share of two companies.
(ii) 0.5 share of Company X for one share of Company Y (0.5:1).
You are required:
(i) to calculate the Earnings Per share (EPS) after merger under two alternatives; and
(ii) to show the impact of EPS for the shareholders of two companies under both the alternatives.
Answer:

Working Notes: Calculation of total earnings after merger

Particulars	Company X	Company Y	Total
Outstanding shares	3,00,000	2,00,000	
EPS (₹)	4	2.25	
Total earnings (₹)	12,00,000	4,50,000	16,50,000

(i) (a) Calculation of EPS when exchange ratio is in proportion to relative EPS of two companies

Company X		3,00,000
Company Y	2,00,000 x 2.25/4	1,12,500
Total number of shares after merger		4,12,500

Company X

EPS before merger	=	₹ 4
EPS after merger = ₹ 16,50,000/4,12,500 shares	=	₹ 4

Company Y

EPS before merger	=	₹ 2.25
EPS after merger = EPS of Merged Entity after merger x Share Exchange ratio on EPS basis $= ₹ 4 \times \frac{2.25}{4}$	=	₹ 2.25

(ii) Impact of merger on EPS for shareholders of Company X and Company Y

(a) Impact on Shareholders of Company X

	(₹)
EPS before merger	4.000
EPS after merger	4.125
Increase in EPS	0.125

(b) Impact on Shareholders of Company Y

	(₹)
Equivalent EPS before merger	2.2500
Equivalent EPS after merger	2.0625
Decrease in EPS	0.1875

3. Simpson Ltd. is considering a merger with Wilson Ltd. The data below are in the hands of both Board of Directors. The issue at hand is how many shares of Simpson should be exchanged for Wilson Ltd. Both boards are considering three possibilities 20,000, 25,000 and 30,000 shares. You are required to construct a table demonstrating the potential impact of each scheme on each set of shareholders:

		Simpson Ltd.	Wilson Ltd.	Combined Post merger Firm 'A'
1.	Current earnings per year	2,00,000	1,00,000	3,50,000
2.	Shares outstanding	50,000	10,000	?
3.	Earnings per share (₹) (1÷ 2)	4	10	?
4.	Price per share (₹)	40	100	?
5.	Price-earning ratio [4 ÷ 3]	10	10	10
6.	Value of firm (₹)	20,00,000	10,00,000	35,00,000
7.	Expected Annual growth rate in earnings in foreseeable future	0	0	0

Answer:

The following table demonstrates the potential impact of the three possible schemes, on each set of shareholders:-

Number of Simpson Ltd.'s shares issued to shareholders of Wilson Ltd.	Exchange ratio [(1)/10,000 shares of Wilson Ltd.]	Number of Simpson Ltd.'s shares outstanding after merger [50,000+(1)]	Fraction of Simpson Ltd. (Post merger) owned by Wilson Ltd.'s shareholders [(1)/(3)]	Value of shares owned by Wilson Ltd.'s shareholders [(4)x 35,00,000]	Fraction of Simpson Ltd. (combined Post-merger owned by Simpson Ltd.'s share-holders [50,000/(3)]	Value of shares owned by Simpson Ltd.'s shareholders [(6) x 35,00,000]
(1)	(2)	(3)	(4)	(5)	(6)	(7)
20,000	2	70,000	2/7	10,00,000	5/7	25,00,000
25,000	2.5	75,000	1/3	11,66,667	2/3	23,33,333
30,000	3	80,000	3/8	13,12,500	5/8	21,87,500

4. A Ltd. is studying the possible acquisition of B Ltd. by way of merger. The following data are available:

Firm	After-tax earnings	No. of equity shares	Market price per share
A Ltd.	₹ 10,00,000	2,00,000	₹ 75
B Ltd.	₹ 3,00,000	50,000	₹ 60

(i) If the merger goes through by exchange of equity shares and the exchange ratio is set according to the current market prices, what is the new earnings per share for A Ltd..
(ii) B Ltd. wants to be sure that its earning per share is not diminished by the merger. What exchange ratio is relevant to achieve the objective?

Answer:

(i) The current market price is the basis of exchange of equity shares, in the proposed merger, shareholders of B Ltd. will get only 40,000 shares in all or 4 shares of A Ltd. for every 5 shares held by them, i.e., (50,000 x 60) / 75 = 40,000

The total number of shares in A Ltd. will then be 2,40,000 and, ignoring any synergistic effect, the profit will be Rs. 13,00,000.The new earning per share (EPS) of A Ltd. will be Rs. 5.42, i.e., Rs. 13,00,000/2,40,000.

(ii) The present earnings per share of B Ltd. is Rs.6/- (Rs. 3,00,000 ÷ 50,000) and that of A Ltd. is Rs.5/-, i.e., Rs. 10,00,000 ÷ 2,00,000.If B Ltd. wants to ensure that, even after merger, the earning per share of its shareholders should remain unaffected, then the exchange ratio will be 6 shares for every 5 shares. The total number of shares of A Ltd. that will produce Rs. 3,00,000 profit is 60,000, (3,00,000 ÷5), to be distributed among, shareholders of B Ltd., giving a ratio of 6 shares in A for 5 shares in B.

The shareholders of B Ltd. will get in all 60,000 share for 50,000 shares. It means after merger, their earning per share will be Rs. 5/-, i.e. (Rs. 13,00,000 / 2,60,000).
In all they will get Rs.3,00,000, i.e., 60,000 x 5, as before.

Theoretical Questions

1. Explain synergy in the context of Mergers and Acquisitions.

Answer:

Synergistic operating economics: Synergy May be defined as follows:

V (AB) > V(A) + V (B).

In other words the combined value of two firms or companies shall be more than their individual value Synergy is the increase in performance of the combined firm over what the two firms are already expected or required to accomplish as independent firms (Mark L Sirower of Boston Consulting Group, in his book "The Synergy Trap"). This may be result of complimentary services economics of scale or both.

A good example of complimentary activities can a company may have a good networking of branches and other company may have efficient production system. Thus the merged companies will be more efficient than individual companies. On similar lines, economies of large scale is also one of the reasons for synergy benefits. The main reason is that, the large scale production results in lower average cost of production e.g. reduction in overhead costs on account of sharing of central services such as accounting and finances, office executives, top level management, legal, sales promotion and advertisement etc. These economies can be "real" arising out of reduction in factor input per unit of output, whereas pecuniary economics are realized from paying lower prices for factor inputs for bulk transactions.

2. What is take over by reverse bid or Reverse Merger.

Answer:

In ordinary case, the company taken over is the smaller company; in a 'reverse takeover', a smaller company gains control of a larger one. The concept of takeover by reverse bid, or of reverse merger, is thus not the usual case of amalgamation of a sick unit which is non-viable with a healthy or prosperous unit but is a case whereby the entire undertaking of the healthy and prosperous company is to be merged and vested in the sick company which is non-viable. A company becomes a sick industrial company when there is erosion in its net worth. This alternative is also known as taking over by reverse bid.

The three tests should be fulfilled before an arrangement can be termed as a reverse takeover is specified as follows:

(i) the assets of the transferor company are greater than the transferee company,

(ii) equity capital to be issued by the transferee company pursuant to the acquisition exceeds its original issued capital, and

(iii) the change of control in the transferee company through the introduction of a minority holder or group of holders.

This type of merger is also known as 'back door listing'. This kind of merger has been started as an alternative to go for public issue without incurring huge expenses and passing through cumbersome process. Thus, it can be said that reverse merger leads to the following benefits for acquiring company:

- Easy access to capital market.
- Increase in visibility of the company in corporate world.
- Tax benefits on carry forward losses acquired (public) company.
- Cheaper and easier route to become a public company.

3. What is an equity curve out? How does it differ from a spin off.

Answer:

This is like spin off, however, some shares of the new company are sold in the market by making a public offer, so this brings cash. More and more companies are using equity carve-outs to boost shareholder value. A parent firm makes a subsidiary public through an initial public offering (IPO) of shares, amounting to a partial sell-off. A new publicly-listed company is created, but the parent keeps a controlling stake in the newly traded subsidiary. A carve-out is a strategic avenue a parent firm may take when one of its subsidiaries is growing faster and carrying higher valuations than other businesses owned by the parent. A carve-out generates cash because shares in the subsidiary are sold to the public, but the issue also unlocks the value of the subsidiary unit and enhances the parent's shareholder value. The new legal entity of a carve-out has a separate board, but in most carve-outs, the parent retains some control over it. In these cases, some portion of the parent firm's board of directors may be shared. Since the parent has a controlling stake, meaning that both firms have common shareholders, the connection between the two is likely to be strong. That said, sometimes companies carve-out a subsidiary not because it is doing well, but because it is a burden. Such an intention won't lead to a successful result, especially if a carved-out subsidiary is too loaded with debt or trouble, even when it was a part of the parent and lacks an established track record for growing revenues and profits.

4. Write a short note on Horizontal Merger and Vertical Merger.

Answer:

A merger is generally understood to be a fusion of two companies. The term "merger" means and signifies the dissolution of one or more companies or firms or proprietorships to form or get absorbed into another company. By concept, merger increases the size of the undertakings.

(i) Horizontal Merger: The two companies which have merged are in the same industry, normally the market share of the new consolidated company would be larger and it is possible that it may move closer to being a monopoly or a near monopoly to avoid competition.

(ii) Vertical Merger: This merger happens when two companies that have 'buyer-seller' relationship (or potential buyer-seller relationship) come together.

Practical Questions

1. B Ltd. is a highly successful company and wishes to expand by acquiring other firms. Its expected high growth in earnings and dividends is reflected in its PE ratio of 17. The Board of Directors of B Ltd. has been advised that if it were to take over firms with a lower PE ratio than it own, using a share-for-share exchange, then it could increase its reported earnings per share. C Ltd. has been suggested as a possible target for a takeover, which has a PE ratio of 10 and 1,00,000 shares in issue with a share price ofRs.15. B Ltd. has 5,00,000 shares in issue with a share price ofRs.12.

Calculate the change in earnings per share of B Ltd. if it acquires the whole of C Ltd. by issuing shares at its market price ofRs.12. Assume the price of B Ltd. shares remains constant.

Answer:

Total market value of C Ltd is = 1,00,000 x ₹ 15	= ₹ 15,00,000
PE ratio (given)	= 10
Therefore, earnings	= ₹ 15,00,000 /10
	= ₹ 1,50,000
Total market value of B Ltd. is = 5,00,000 x ₹ 12	= ₹ 60,00,000
PE ratio (given)	= 17
Therefore, earnings	= ₹ 60,00,000/17
	= ₹ 3,52,941

The number of shares to be issued by B Ltd.

₹ 15,00,000 ÷ 12	= 1,25,000
Total number of shares of B Ltd	= 5,00,000 + 1,25,000 = 6,25,000
The EPS of the new firm is	= (₹ 3,52,941+₹1,50,000)/6,25,000
	= ₹ 0.80
The present EPS of B Ltd is	= ₹ 3,52,941 /5,00,000
	= ₹ 0.71

So the EPS affirm B will increase from Re. 0.71 to ₹ 0.80 as a result of merger

2. Elrond Limited plans to acquire Doom Limited. The relevant financial details of the two firms prior to the merger announcement are:

	Elrond Limited	Doom Limited
Market price per share	₹ 50	₹ 25
Number of outstanding shares	20 lakhs	10 Lakhs

The merger is expected to generate gains, which have a present value ofRs.200 lakhs. The exchange ratio agreed to is 0.5. What is the true cost of the merger from the point of view of Elrond Limited?

Answer:

Shareholders of Doom Ltd. will get 5 lakh share of Elrond Limited, so they will get:

$= \frac{5 \text{ lakh}}{20 \text{ lakh} + 5 \text{ lakh}} = 20\%$ of shares Elrond Limited

The value of Elrond Ltd. after merger will be:

= ₹ 50 x 20 lakh + ₹ 25 x 10 lakh + ₹ 200 lakh

= ₹ 1000 lakh + ₹ 250 lakh + ₹ 200 lakh = ₹ 1450 lakh

True Cost of Merger will be:

(₹ 1450 x 20%) ₹ 290 lakhs – ₹ 250 lakhs = ₹ 40 lakhs

3. MK Ltd. is considering acquiring NN Ltd. The following information is available:

Company	Earning after Tax (₹)	No. of Equity Shares	Market Value Per Share (₹)
MK Ltd.	60,00,000	12,00,000	200.00
NN Ltd.	18,00,000	3,00,000	160.00

Exchange of equity shares for acquisition is based on current market value as above. There is no synergy advantage available.

(i) Find the earning per share for company MK Ltd. after merger, and

(ii) Find the exchange ratio so that shareholders of NN Ltd. would not be at a loss.

Answer:

(i) Earning per share of company MK Ltd after merger:-

Exchange ratio 160 : 200 = 4 : 5.

that is 4 shares of MK Ltd. for every 5 shares of NN Ltd.

∴ Total number of shares to be issued = 4/5 × 3,00,000 = 2,40,000 Shares.

∴ Total number of shares of MK Ltd. and NN Ltd.=12,00,000 (MK Ltd.)+2,40,000 (NN Ltd.)

= 14,40,000 Shares

Total profit after tax = ₹ 60,00,000 MK Ltd.

= ₹ 18,00,000 NN Ltd.

= ₹ 78,00,000

∴ EPS. (Earning Per Share) of MK Ltd. after merger

₹ 78,00,000/14,40,000 = ₹ 5.42 per share

(ii) To find the exchange ratio so that shareholders of NN Ltd. would not be at a Loss:

Present earning per share for company MK Ltd.

= ₹ 60,00,000/12,00,000 = ₹ 5.00

Present earning per share for company NN Ltd.

= ₹ 18,00,000/3,00,000 = ₹ 6.00

∴ Exchange ratio should be 6 shares of MK Ltd. for every 5 shares of NN Ltd.

∴ Shares to be issued to NN Ltd. = 3,00,000 × 6/5 = 3,60,000 shares

Now, total No. of shares of MK Ltd. and NN Ltd. =12,00,000 (MK Ltd.) + 3,60,000 (NN Ltd.)

= 15,60,000 shares

∴ EPS after merger = ₹ 78,00,000/15,60,000 = ₹ 5.00 per share

Total earnings available to shareholders of NN Ltd. after merger = 3,60,000 shares × ₹ 5.00 = ₹ 18,00,000.

This is equal to earnings prior merger for NN Ltd.

∴ Exchange ratio on the basis of earnings per share is recommended.

4. ABC Ltd. is intending to acquire XYZ Ltd. by merger and the following information is available in respect of the companies:

	ABC Ltd.	XYZ Ltd.
Number of equity shares	10,00,000	6,00,000
Earnings after tax (₹)	50,00,000	18,00,000
Market value per share (₹)	42	28

Required:

(i) What is the present EPS of both the companies?

(ii) If the proposed merger takes place, what would be the new earning per share for ABC Ltd.? Assume that the merger takes place by exchange of equity shares and the exchange ratio is based on the current market price.

(iii) What should be exchange ratio, if XYZ Ltd. wants to ensure the earnings to members are same as before the merger takes place?

Answer:

(i) Earnings per share = Earnings after tax /No. of equity shares

ABC Ltd. = ₹ 50,00,000/10,00,000 = ₹ 5

XYZ Ltd. = ₹ 18,00,000 / 6,00,000 = ₹ 3

(ii) Number of Shares XYZ limited's shareholders will get in ABC Ltd. based on market value per share = ₹ 28/ 42 × 6,00,000 = 4,00,000 shares

Total number of equity shares of ABC Ltd. after merger = 10,00,000 + 4,00,000 = 14,00,000 shares

Earnings per share after merger = ₹ 50,00,000 + 18,00,000/14,00,000 = ₹ 4.86

(iii) Calculation of exchange ratio to ensure shareholders of XYZ Ltd. to earn the same as was before merger:

Shares to be exchanged based on EPS = (₹ 3/₹ 5) × 6,00,000 = 3,60,000 shares

EPS after merger = (₹ 50,00,000 + 18,00,000)/13,60,000 = ₹ 5

Total earnings in ABC Ltd. available to shareholders of XYZ Ltd. = 3,60,000 × ₹ 5 = ₹ 18,00,000.

Thus, to ensure that Earning to members are same as before, the ratio of exchange should be 0.6 share for 1 share.

5. The CEO of a company thinks that shareholders always look for EPS. Therefore, he considers maximization of EPS as his company's objective. His company's current Net Profits areRs.80.00 lakhs and P/E multiple is 10.5. He wants to buy another firm which has current income ofRs.15.75 lakhs & P/E multiple of 10.

What is the maximum exchange ratio which the CEO should offer so that he could keep EPS at the current level, given that the current market price of both the acquirer and the target company areRs.42 andRs.105 respectively?

If the CEO borrows funds at 15% and buys out Target Company by paying cash, how much cash should he offer to maintain his EPS? Assume tax rate of 30%.

Answer:

(i)

	Acquirer Company	Target Company
Net Profit	₹ 80 lakhs	₹ 15.75 lakhs
PE Multiple	10.50	10.00
Market Capitalization	₹ 840 lakhs	₹ 157.50 lakhs
Market Price	₹ 42	₹ 105
No. of Shares	20 lakhs	1.50 lakhs
EPS	₹ 4	₹ 10.50

Maximum Exchange Ratio 4 : 10.50 or 1 : 2.625

Thus, for every one share of Target Company 2.625 shares of Acquirer Company.

(ii) Let x lakhs be the amount paid by Acquirer company to Target Company. Then to maintain same EPS i.e. ₹ 4 the number of shares to be issued will be:

$$\frac{(80 \text{ lakhs} + 15.75 \text{ lakhs}) - 0.70 \times 15\% \times x}{20 \text{ lakhs}} = 4$$

$$\frac{95.75 - 0.105x}{20} = 4$$

x = ₹ 150 lakhs

Thus,Rs. 150 lakhs shall be offered in cash to Target Company to maintain same EPS.

6. A Ltd. wants to acquire T Ltd. and has offered a swap ratio of 1:2 (0.5 shares for every one share of T Ltd.). Following information is provided:

	A Ltd.	T. Ltd.
Profit after tax	₹18,00,000	₹3,60,000
Equity shares outstanding (Nos.)	6,00,000	1,80,000
EPS	₹3	₹2
PE Ratio	10 times	7 times
Market price per share	₹30	₹14

Required:

(i) The number of equity shares to be issued by A Ltd. for acquisition of T Ltd.

(ii) What is the EPS of A Ltd. after the acquisition?

(iii) Determine the equivalent earnings per share of T Ltd.

(iv) What is the expected market price per share of A Ltd. after the acquisition, assuming its PE multiple remains unchanged?

(v) Determine the market value of the merged firm.

Answer:

(i) The number of shares to be issued by A Ltd.:

The Exchange ratio is 0.5

So, new Shares = 1,80,000 x 0.5 = 90,000 shares.

(ii) EPS of A Ltd. After a acquisition:

Total Earnings	(₹ 18,00,000 + ₹ 3,60,000)	₹ 21,60,000
No. of Shares	(6,00,000 + 90,000)	6,90,000
EPS	(₹ 21,60,000)/6,90,000)	₹ 3.13

(iii) Equivalent EPS of T Ltd.:

No. of new Shares	0.5
EPS	₹ 3.13
Equivalent EPS (₹ 3.13 x 0.5)	₹ 1.57

(iv) New Market Price of A Ltd. (P/E remaining unchanged):

Present P/E Ratio of A Ltd.	10 times
Expected EPS after merger	₹ 3.13
Expected Market Price (₹3.13 x 10)	₹ 31.30

(v) Market Value of merged firm:

Total number of Shares	6,90,000
Expected Market Price	₹ 31.30
Total value (6,90,000 x 31.30)	₹ 2,15,97,000

7. The following information is provided related to the acquiring Firm Mark Limited and the target Firm Mask Limited:

	Firm Mark Limited	Firm Mask Limited
Earning after tax (₹)	2,000 lakhs	400 lakhs
Number of shares outstanding	200 lakhs	100 lakhs
P/E ratio (times)	10	5

Required:

(i) What is the Swap Ratio based on current market prices?

(ii) What is the EPS of Mark Limited after acquisition?

(iii) What is the expected market price per share of Mark Limited after acquisition, assuming P/E ratio of Mark Limited remains unchanged?

(iv) Determine the market value of the merged firm.

(v) Calculate gain/loss for shareholders of the two independent companies after acquisition.

Answer:

Particulars	Mark Ltd.	Mask Ltd.
EPS	₹ 2,000 Lakhs/ 200 lakhs	₹ 400 lakhs / 100 lakhs
	= ₹ 10	₹ 4
Market Price	₹ 10 × 10 = ₹ 100	₹ 4 × 5 = ₹ 20

(i) The Swap ratio based on current market price is

₹ 20 / ₹ 100 = 0.2 or 1 share of Mark Ltd. for 5 shares of Mask Ltd.

No. of shares to be issued = 100 lakh × 0.2 = 20 lakhs.

(ii) EPS after merger = $\frac{₹\ 2{,}000 \text{ lakhs} + ₹\ 400 \text{ lakhs}}{200 \text{ lakhs} + 20 \text{ lakhs}}$ = ₹ 10.91

(iii) Expected market price after merger assuming P/E 10 times.

= ₹ 10.91 × 10 = ₹ 109.10

(iv) Market value of merged firm

= ₹ 109.10 market price × 220 lakhs shares = 240.02 crores

(v) Gain from the merger

Post merger market value of the merged firm	₹ 240.02 crores
Less: Pre-merger market value	
Mark Ltd. 200 Lakhs × ₹ 100 = 200 crores	
Mask Ltd. 100 Lakhs × ₹ 20 = 20 crores	₹ 220.00 crores
Gain from merger	₹ 20.02 crores

Appropriation of gains from the merger among shareholders:

	Mark Ltd.	*Mask Ltd.*
Post merger value	218.20 crores	21.82 crores
Less: Pre-merger market value	200.00 crores	20.00 crores
Gain to Shareholders	18.20 crores	1.82 crores

8. XYZ Ltd. wants to purchase ABC Ltd. by exchanging 0.7 of its share for each share of ABC Ltd. Relevant financial data are as follows:

Equity shares outstanding	10,00,000	4,00,000
EPS (₹)	40	28
Market price per share (₹)	250	160

(i) Illustrate the impact of merger on EPS of both the companies.
(ii) The management of ABC Ltd. has quoted a share exchange ratio of 1:1 for the merger. Assuming that P/E ratio of XYZ Ltd. will remain unchanged after the merger, what will be the gain from merger for ABC Ltd.?
(iii) What will be the gain/loss to shareholders of XYZ Ltd.?
(iv) Determine the maximum exchange ratio acceptable to shareholders of XYZ Ltd.

Answer:

Working Notes

(a)

	XYZ Ltd.	*ABC Ltd.*
Equity shares outstanding (Nos.)	10,00,000	4,00,000
EPS	₹ 40	₹ 28
Profit	₹ 400,00,000	₹ 112,00,000
PE Ratio	6.25	5.71
Market price per share	₹ 250	₹ 160

(b) EPS after merger

No. of shares to be issued (4,00,000 x 0.70)	2,80,000
Exiting Equity shares outstanding	10,00,000
Equity shares outstanding after merger	12,80,000
Total Profit (₹ 400,00,000 + ₹ 112,00,000)	₹ 512,00,000
EPS	₹ 40

(i) **Impact of merger on EPS of both the companies**

	XYZ Ltd.	*ABC Ltd.*
EPS after Merger	₹ 40	₹ 28
EPS before Merger	₹ 40	₹ 28*
	Nil	Nil

* ₹ 40 x 0.70

(ii) **Gain from the Merger if exchange ratio is 1: 1**

No. of shares to be issued	4,00,000
Exiting Equity shares outstanding	10,00,000
Equity shares outstanding after merger	14,00,000
Total Profit (₹ 400,00,000 + ₹ 112,00,000)	₹ 512,00,000
EPS	₹ 36.57
Market Price of Share (₹ 36.57 x 6.25)	₹ 228.56
Market Price of Share before Merger	₹ 160.00
Impact (Increase/ Gain)	₹ 68.56

(iii) **Gain/ loss from the Merger to the shareholders of XYZ Ltd.**

Market Price of Share	₹ 228.56
Market Price of Share before Merger	₹ 250.00
Loss from the merger (per share)	₹ 21.44

(iv) **Maximum Exchange Ratio acceptable to XYZ Ltd. shareholders**

	₹ Lakhs
Market Value of Merged Entity (₹ 228.57 x 1400000)	3199.98
Less: Value acceptable to shareholders of XYZ Ltd.	2500.00
Value of merged entity available to shareholders of ABC Ltd.	699.98
Market Price Per Share	250
No. of shares to be issued to the shareholders of ABC Ltd. (lakhs)	2.80

Thus maximum ratio of issue shall be 2.80 : 4.00 or 0.70 share of XYZ Ltd. for one share of ABC Ltd.

Alternatively, it can also be computed as follows:

Earning after Merger (40 x 1000000 + 28 x 400000)	₹ 512 lakhs
PE Ratio of XYZ Ltd.	6.25
Market Value of Firm after Merger (512 x 6.25)	₹ 3200 lakhs
Existing Value of Shareholders of XYZ Ltd.	₹ 2500 lakhs
Value of Merged entity available to Shareholders of ABC Ltd.	₹ 700 lakhs
Market Price per Share	₹ 250
Total No. of shares to be issued	2.8 lakh

Thus, maximum acceptable ratio shall be 2.80:4.00 i.e. 0.70 share of XYZ Ltd. for one share of ABC Ltd.

9. XYZ Ltd., is considering merger with ABC Ltd. XYZ Ltd.'s shares are currently traded atRs.20. It has 2,50,000 shares outstanding and its earnings after taxes (EAT) amount toRs.5,00,000. ABC Ltd., has 1,25,000 shares outstanding; its current market price isRs.10 and its EAT areRs.1,25,000. The merger will be effected by means of a stock swap (exchange). ABC Ltd., has agreed to a plan under which XYZ Ltd., will offer the current market value of ABC Ltd.'s shares:

(i) What is the pre-merger earnings per share (EPS) and P/E ratios of both the companies?

(ii) If ABC Ltd.'s P/E ratio is 6.4, what is its current market price? What is the exchange ratio? What will XYZ Ltd.'s post-merger EPS be?

(iii) What should be the exchange ratio; if XYZ Ltd.'s pre-merger and post-merger EPS are to be the same?

Answer:

(i) **Pre-merger EPS and P/E ratios of XYZ Ltd. and ABC Ltd.**

Particulars	XYZ Ltd.	ABC Ltd.
Earnings after taxes	5,00,000	1,25,000
Number of shares outstanding	2,50,000	1,25,000
EPS	2	1
Market Price per share	20	10
P/E Ratio (times)	10	10

(ii) **Current Market Price of ABC Ltd.** if P/E ratio is 6.4 = ₹ 1 × 6.4 = ₹ 6.40

$$\text{Exchange ratio} = \frac{₹\,20}{₹\,6.40} = 3.125 \text{ or } \frac{₹\ 6.40}{₹\ 20} = 0.32$$

Post merger EPS of XYZ Ltd.

$$= \frac{₹\,5,00,000 + ₹\,1,25,000}{2,50,000 + (1,25,000/3.125)}$$

$$= \frac{₹\ 6,25,000}{2,90,000} = 2.16$$

(iii) **Desired Exchange Ratio**

Total number of shares in post-merged company

$$= \frac{\text{Post-merger earnings}}{\text{Pre-merger EPS of XYZ Ltd}} = \frac{₹\,6,25,000}{2} = 3,12,500$$

Number of shares required to be issued

= 3,12,500 – 2,50,000 = 62,500

Therefore, the exchange ratio is

62,500 : 1,25,000

$$= \frac{62,500}{1,25,000} = 0.50$$

10. Following information is provided relating to the acquiring company Mani Ltd. and the target company Ratnam Ltd:

Mani Ltd. Ratnam Ltd.

Earnings after tax (` lakhs) 2,000 4,000

No. of shares outstanding (lakhs) 200 1,000

P/E ratio (No. of times) 10 5

Required:

(i) What is the swap ratio based on current market prices?

(ii) What is the EPS of Mani Ltd. after the acquisition?

(iii) What is the expected market price per share of Mani Ltd. after the acquisition, assuming its P/E ratio is adversely affected by 10%?

(iv) Determine the market value of the merged Co.

(v) Calculate gain/loss for the shareholders of the two independent entities, due to the merger.

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Answer:

(i) SWAP ratio based on current market prices:

EPS before acquisition:	
Mani Ltd. : ₹2,000 lakhs / 200 lakhs:	₹10
Ratnam Ltd.: ₹4,000 lakhs / 1,000 lakhs:	₹ 4
Market price before acquisition:	
Mani Ltd.: ₹10 × 10	₹100
Ratnam Ltd.: ₹4 × 5	₹ 20
SWAP ratio: 20/100 or 1/5 i.e.	0.20

(ii) EPS after acquisition:

$$\frac{₹(2,000+4,000)\ \text{Lakhs}}{(200+200)\ \text{Lakhs}} = ₹15.00$$

(iii) Market Price after acquisition:

EPS after acquisition :	₹15.00
P/E ratio after acquisition 10 × 0.9	9
Market price of share (₹ 15 X 9)	₹135.00

(iv) Market value of the merged Co.:

₹135 × 400 lakhs shares = ₹ 540.00 Crores or ₹ 54,000 Lakhs

(v) Gain/loss per share:

	₹ Crore	
	Mani Ltd.	*Ratnam Ltd.*
Total value before Acquisition	200	200
Value after acquisition	270	270
Gain (Total)	70	70
No. of shares (pre-merger) (lakhs)	200	1,000
Gain per share (₹)	35	7

11. You have been provided the following Financial data of two companies:

	Krishna Ltd.	Rama Ltd.
Earnings after taxes	₹ 7,00,000	₹ 10,00,000
No. of Equity shares (outstanding)	2,00,000	4,00,000
EPS	3.5	2.5
P/E ratio	10 times	14 times
Market price per share	₹ 35	₹ 35

Company Rama Ltd. is acquiring the company Krishna Ltd., exchanging its shares on a one-to-one basis for company Krishna Ltd. The exchange ratio is based on the market prices of the shares of the two companies.
Required:
(i) What will be the EPS subsequent to merger?
(ii) What is the change in EPS for the shareholders of companies Rama Ltd. and Krishna Ltd.?
(iii) Determine the market value of the post-merger firm. PE ratio is likely to remain the same.
(iv) Ascertain the profits accruing to shareholders of both the companies.
Answer:

(i)	Exchange Ratio	1:1
	New Shares to be issued	2,00,000
	Total shares of Rama Ltd. (4,00,000+2,00,000)	6,00,000
	Total earnings (₹ 10,00,000 + ₹ 7,00,000)	₹ 17,00,000
	New EPS (₹ 17,00,000/6,00,000)	₹ 2.83
(ii)	Existing EPS of Rama Ltd.	₹ 2.50
	Increase in EPS of Rama Ltd (₹ 2.83 – ₹ 2.50)	₹ 0.33
	Existing EPS of Krishna Ltd.	₹ 3.50
	Decrease in EPS of Krishna Ltd. (₹ 3.50 – ₹ 2.83)	₹ 0.67
(iii)	P/E ratio of new firm (expected to remain same)	14 times
	New market price (14 × ₹ 2.83)	₹ 39.62
	Total No. of Shares	6,00,000
	Total market Capitalization (6,00,000 × ₹ 39.62)	₹ 2,37,72,000
	Existing market capitalization (₹ 70,00,000 + ₹ 1,40,00,000)	₹ 2,10,00,000
	Total gain	₹ 27,72,000

(iv)

	Rama Ltd.	Krishna Ltd	Total
No. of shares after merger	4,00,000	2,00,000	6,00,000
Market price	₹ 39.62	₹ 39.62	₹ 39.62
Total Mkt. Values	₹ 1,58,48,000	₹ 79,24,000	₹ 2,37,72,000
Existing Mkt. values	₹ 1,40,00,000	₹ 70,00,000	₹ 2,10,00,000
Gain to share holders	₹ 18,48,000	₹ 9,24,000	₹ 27,72,000

or ₹ 27,72,000 ÷3 = ₹ 9,24,000 to Krishna Ltd. and ₹ 18,48,000 to Rama Ltd. (in 2: 1 ratio)

12. M Co. Ltd. is studying the possible acquisition of N Co. Ltd., by way of merger. The following data are available in respect of the companies:

Particulars	M Co. Ltd.	N Co. Ltd.
Earnings after tax (₹)	80,00,000	24,00,000
No. of equity shares	16,00,000	4,00,000
Market value per share (₹)	200	160

(i) If the merger goes through by exchange of equity and the exchange ratio is based on the current market price, what is the new earning per share for M Co. Ltd.?

(ii) N Co. Ltd. wants to be sure that the earnings available to its shareholders will not be diminished by the merger. What should be the exchange ratio in that case?

Answer:

(i) Calculation of new EPS of M Co. Ltd.

No. of equity shares to be issued by M Co. Ltd. to N Co. Ltd.

= 4,00,000 shares ×Rs. 160/` 200 = 3,20,000 shares

Total no. of shares in M Co. Ltd. after acquisition of N Co. Ltd.

= 16,00,000 + 3,20,000 = 19,20,000

Total earnings after tax [after acquisition]

= 80,00,000 + 24,00,000 = 1,04,00,000

$$\text{EPS} = \frac{₹\ 1,04,00,000}{19,20,000 \text{ equity shares}} = ₹\ 5.42$$

(ii) Calculation of exchange ratio which would not diminish the EPS of N Co. Ltd. after its merger with M Co. Ltd.

Current EPS:

$$\text{M Co. Ltd.} = \frac{₹\ 80,00,000}{16,00,000 \text{ equity shares}} = ₹\ 5$$

$$\text{N Co. Ltd.} = \frac{₹\ 24,00,000}{4,00,000 \text{ equity shares}} = ₹\ 6$$

Exchange ratio = 6/5 = 1.20

No. of new shares to be issued by M Co. Ltd. to N Co. Ltd.

= 4,00,000 × 1.20 = 4,80,000 shares

Total number of shares of M Co. Ltd. after acquisition

= 16,00,000 + 4,80,000 = 20,80,000 shares

$$\text{EPS [after merger]} = \frac{₹\ 1,04,00,000}{20,80,000 \text{ shares}} = ₹\ 5$$

Total earnings in M Co. Ltd. available to new shareholders of N Co. Ltd.

= 4,80,000 × ₹ 5 = ₹ 24,00,000

Recommendation: The exchange ratio (6 for 5) based on market shares is beneficial to shareholders of 'N' Co. Ltd.

13. Longitude Limited is in the process of acquiring Latitude Limited on a share exchange basis. Following relevant data are available:

		Longitude Limited	Latitude Limited
Profit after Tax (PAT)	₹ in Lakhs	120	80
Number of Shares	Lakhs	15	16
Earning per Share (EPS)	₹	8	5
Price Earnings Ratio (P/E Ratio)		15	10
(Ignore Synergy)			

You are required to determine:
(i) Pre-merger Market Value per Share, and
(ii) The maximum exchange ratio Longitude Limited can offer without the dilution of
(1) EPS and
(2) Market Value per Share
Calculate Ratio/s up to four decimal points and amounts and number of shares up to two decimal points.

Answer:

(i) Pre Merger Market Value of Per Share

P/E Ratio X EPS

Longitude Ltd. ₹ 8 X 15 = ₹ 120.00

Latitude Ltd. ₹ 5 X 10 = ₹ 50.00

(ii) (1) Maximum exchange ratio without dilution of EPS

Pre Merger PAT of Longitude Ltd.	₹ 120 Lakhs
Pre Merger PAT of Latitude Ltd.	₹ 80 Lakhs
Combined PAT	₹ 200 Lakhs
Longitude Ltd. 's EPS	₹ 8

Maximum number of shares of Longitude after merger (₹ 200 lakhs/₹ 8)	25 Lakhs
Existing number of shares	15 Lakhs
Maximum number of shares to be exchanged	10 Lakhs

Maximum share exchange ratio 10:16 or 5:8

(2) Maximum exchange ratio without dilution of Market Price Per Share

Pre Merger Market Capitalization of Longitude Ltd. (₹ 120 × 15 Lakhs)	₹ 1800 Lakhs
Pre Merger Market Capitalization of Latitude Ltd. (₹ 50 × 16 Lakhs)	₹ 800 Lakhs
Combined Market Capitalization	₹ 2600 Lakhs
Current Market Price of share of Longitude Ltd.	₹ 120
Maximum number of shares to be exchanged of Longitude (surviving company) (₹ 2600 Lakhs/₹ 120)	21.67 Lakhs
Current Number of Shares of Longitude Ltd.	15.00 Lakhs
Maximum number of shares to be exchanged (Lakhs)	6.67 Lakhs

Maximum share exchange ratio 6.67:16 or 0.4169:1

14. P Ltd. is considering take-over of R Ltd. by the exchange of four new shares in P Ltd. for every five shares in R Ltd. The relevant financial details of the two companies prior to merger announcement are as follows:

	P Ltd	R Ltd
Profit before Tax (₹ Crore)	15	13.50
No. of Shares (Crore)	25	15
P/E Ratio	12	9

Corporate Tax Rate 30%

You are required to determine:
(i) Market value of both the company.
(ii) Value of original shareholders.
(iii) Price per share after merger.
(iv) Effect on share price of both the company if the Directors of P Ltd. expect their own pre-merger P/E ratio to be applied to the combined earnings.

Answer:

	P Ltd.	R Ltd.
Profit before Tax (₹ in crore)	15	13.50
Tax 30% (₹ in crore)	4.50	4.05
Profit after Tax (₹ in crore)	10.50	9.45
Earning per Share (₹)	$\frac{10.50}{25}$ = ₹ 0.42	$\frac{9.45}{15}$ = ₹ 0.63
Price of Share before Merger (EPS x P/E Ratio)	₹ 0.42 x 12 = ₹ 5.04	₹0.63 x 9 = ₹ 5.67

(i) ∴ Market Value of company

P Ltd. = ₹ 5.04 x 25 Crore = ₹ 126 crore

R Ltd. = ₹ 5.67 x 15 Crore = ₹ 85.05 crore

Combined = ₹ 126 + ₹ 85.05 = ₹ 211.05 Crores

After Merger

	P Ltd.	R Ltd.
No. of Shares	25 crores	$15x\frac{4}{5}$ = 12 crores
Combined	37 crores	
% of Combined Equity Owned	$\frac{25}{37}x100 = 67.57\%$	$\frac{12}{37}x100 = 32.43\%$

(ii) ∴ Value of Original Shareholders

P Ltd.	R Ltd.
₹ 211.05 crore x 67.57% = ₹ 142.61	₹ 211.05 crore x 32.43% = ₹ 68.44

Alternatively, it can also be computed as follows:

Combined Value of Entity	211.05 crore
No. of shares after Merger	37 crore
Value of Per Share	₹ 5.70405
Value of P Ltd. Shareholders (25 crores x ₹ 5.70405)	₹ 142.60 crore
Value of R Ltd. Shareholders (12 crores x ₹ 5.70405)	₹ 68.45 crore

(iii) ∴ Price per Share after Merger

$$EPS = \frac{₹19.95\,crore}{37\,crore} = ₹\ 0.539 \text{ per share}$$

P/E Ratio = 12

Market Value Per Share = ₹ 0.539 X 12 = ₹ 6.47

Total Market Value = ₹ 6.47 x 37 crore = ₹ 239.39 crore

$$\text{Price of Share} = \frac{\text{Market Value}}{\text{Number of Shares}} = \frac{239.39\,crore}{37\,crore} = ₹\ 6.47$$

(iv) Effect on Share Price

P Ltd.

Gain/loss (-) per share = ₹ 6.47 – ₹ 5.04 = ₹ 1.43

i.e. $\frac{6.47-5.04}{5.04}\times 100 = 0.284$ or 28.4%

∴ Share price would rise by 28.4%

R Ltd.

$6.47 \times \frac{4}{5} = ₹ 5.18$

Gain/loss (-) per share = ₹ 5.18 – ₹ 5.67 = (-₹ 0.49)

i.e. $\frac{5.18 - 5.67}{5.67} \times 100$ (-) 0.0864 or (-) 8.64%

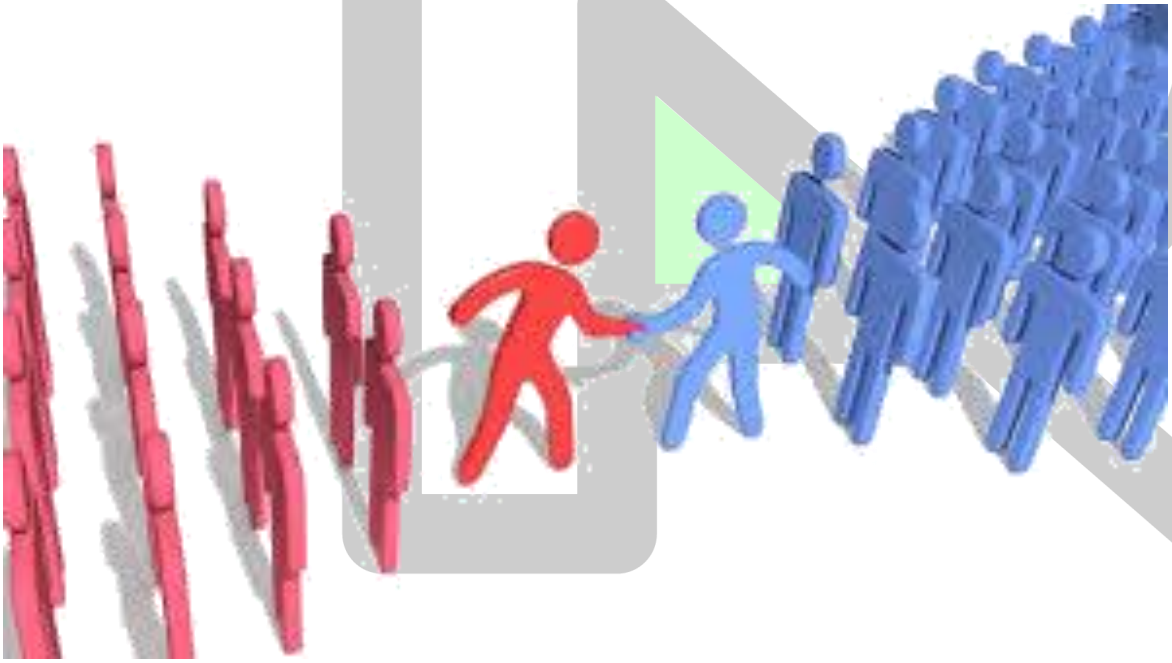
∴ Share Price would decrease by 8.64%.

15. Simple Ltd. and Dimple Ltd. are planning to merge. The total value of the companies are dependent on the fluctuating business conditions. The following information is given for the total value (debt + equity) structure of each of the two companies.

Business Condition	Probability	Simple Ltd. ₹ Lacs	Dimple Ltd. ₹ Lacs
High Growth	0.20	820	1050
Medium Growth	0.60	550	825
Slow Growth	0.20	410	590

The current debt of Dimple Ltd. isRs.65 lacs and of Simple Ltd. isRs.460 lacs. Calculate the expected value of debt and equity separately for the merged entity.

Answer:



Compute Value of Equity

Simple Ltd.

₹ in Lacs

	High Growth	Medium Growth	Slow Growth
Debit + Equity	820	550	410
Less: Debt	460	460	460
Equity	360	90	-50

Since the Company has limited liability the value of equity cannot be negative therefore the value of equity under slow growth will be taken as zero because of insolvency risk and the value of debt is taken at 410 lacs. The expected value of debt and equity can then be calculated as:

Simple Ltd.

₹ in Lacs

	High Growth		Medium Growth		Slow Growth		Expected Value
	Prob.	Value	Prob.	Value	Prob.	Value	
Debt	0.20	460	0.60	460	0.20	410	450
Equity	0.20	360	0.60	90	0.20	0	126
		820		550		410	576

Dimple Ltd.

₹ in Lacs

	High Growth		Medium Growth		Slow Growth		Expected Value
	Prob.	Value	Prob.	Value	Prob.	Value	
Equity	0.20	985	0.60	760	0.20	525	758
Debt	0.20	65	0.60	65	0.20	65	65
		1050		825		590	823

Expected Values

₹ in Lacs

Equity		Debt	
Simple Ltd.	126	Simple Ltd.	450
Dimple Ltd.	758	Dimple Ltd.	65
	884		515

16. Yes Ltd. wants to acquire No Ltd. and the cash flows of Yes Ltd. and the merged entity are given below:

(₹ In lakhs)

Year	1	2	3	4	5
Yes Ltd.	175	200	320	340	350
Merged Entity	400	450	525	590	620

Earnings would have witnessed 5% constant growth rate without merger and 6% with merger on account of economies of operations after 5 years in each case. The cost of capital is 15%.

The number of shares outstanding in both the companies before the merger is the same and the companies agree to an exchange ratio of 0.5 shares of Yes Ltd. for each share of No Ltd.
PV factor at 15% for years 1-5 are 0.870, 0.756; 0.658, 0.572, 0.497 respectively.
You are required to:
(i) Compute the Value of Yes Ltd. before and after merger.
(ii) Value of Acquisition and
(iii) Gain to shareholders of Yes Ltd. [ALSO ASKED IN RTP - NOV 2018]
Answer:

(i) **Working Notes:**

Present Value of Cash Flows (CF) upto 5 years

Year End	CF of Yes Ltd. (₹ lakhs)	PVF @15%	PV of CF (₹ lakhs)	CF of Merged Entity (₹ lakhs)	PV of CF of Merged Entity (₹ lakhs)
1	175	0.870	152.25	400	348.00
2	200	0.756	151.20	450	340.20
3	320	0.658	210.56	525	345.45
4	340	0.572	194.48	590	337.48
5	350	0.497	173.95	620	308.14
			882.44		1679.27

PV of Cash Flows of Yes Ltd. after the forecast period

$$TV_5 = \frac{CF_5(1+g)}{K_e - g} = \frac{350(1+0.05)}{0.15-0.05} = \frac{367.50}{0.10} = ₹3675 \text{ lakhs}$$

PV of TV_5 = ₹3675 lakhs x 0.497 = ₹1826.475 lakhs

PV of Cash Flows of Merged Entity after the forecast period

$$TV_5 = \frac{CF_5(1+g)}{K_e - g} = \frac{620(1+0.06)}{0.15-0.06} = \frac{657.20}{0.09} = ₹7302.22 \text{ lakhs}$$

PV of TV_5 = ₹7302.22 lakhs x 0.497 = ₹3629.20 lakhs

Value of Yes Ltd.

	Before merger (₹lakhs)	After merger (₹lakhs)
PV of CF (1-5 years)	882.440	1679.27
Add: PV of TV_5	1826.475	3629.20
	2708.915	5308.47

(ii) Value of Acquisition
= Value of Merged Entity – Value of Yes Ltd.
=Rs.5308.47 lakhs –Rs.2708.915 lakhs =Rs.2599.555 lakhs
(iii) Gain to Shareholders of Yes Ltd.
Share of Yes Ltd. in merged entity =Rs.5308.47 lakhs x =Rs.3538.98 lakhs 1 1.5
Gain to shareholder = Share of Yes Ltd. in merged entity – Value of Yes Ltd. before merger
=Rs.3538.98 lakhs -Rs.2708.915 =Rs.830.065 lakhs

17. The following information is provided relating to the acquiring company Efficient Ltd. and the target Company Healthy Ltd. Efficient Ltd.

	Efficient Ltd.	Healthy Ltd.
No. of shares (F.V. ₹ 10 each)	10.00 lakhs	7.5 lakhs
Market capitalization	500.00 lakhs	750.00 lakhs
P/E ratio (times)	10.00	5.00
Reserves and Surplus	300.00 lakhs	165.00 lakhs
Promoter's Holding (No. of shares)	4.75 lakhs	5.00 lakhs

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 Earning, Book Value and Market Price of share of each company:

(i) Calculate the swap ratio and also calculate Promoter's holding % after acquisition.

(ii) What is the EPS of Efficient Ltd. after acquisition of Healthy Ltd.?

(iii) What is the expected market price per share and market capitalization of Efficient Ltd. after acquisition, assuming P/E ratio of Firm Efficient Ltd. remains unchanged.

(iv) Calculate free float market capitalization of the merged firm.

Answer:

Swap Ratio

	Efficient Ltd.	Healthy Ltd.
Market capitalization	500 lakhs	750 lakhs
No. of shares	10 lakhs	7.5 lakhs
Market Price per share	₹ 50	₹ 100
P/E ratio	10	5
EPS	₹ 5	₹ 20
Profit	₹ 50 lakh	₹ 150 lakh
Share capital	₹ 100 lakh	₹ 75 lakh
Reserves and surplus	₹ 300 lakh	₹ 165 lakh
Total	₹ 400 lakh	₹ 240 lakh
Book Value per share	₹ 40	₹ 32

(i) Calculation of Swap Ratio

EPS	1 : 4 i.e.	4.0 × 40%	1.6
Book value	1 : 0.8 i.e.	0.8 × 25%	0.2
Market price	1 : 2 i.e.	2.0 × 35%	0.7
		Total	2.5

Swap ratio is for every one share of Healthy Ltd., to issue 2.5 shares of Efficient Ltd. Hence, total no. of shares to be issued 7.5 lakh × 2.5 = 18.75 lakh shares.

Promoter's holding = 4.75 lakh shares + (5 × 2.5 = 12.5 lakh shares) = 17.25 lakh i.e. Promoter's holding % is (17.25 lakh/28.75 lakh) × 100 = 60%.

Calculation of EPS, Market price, Market capitalization and free float market capitalization.

(ii) Total No. of shares 10 lakh + 18.75 lakh = 28.75 lakh

Total capital 100 lakh + 187.5 lakh = ₹ 287.5 lakh

EPS $\frac{\text{Total profit}}{\text{No. of shares}} = \frac{50\text{ lakh} + 150\text{ lakh}}{28.75\text{ lakh}} = \frac{200}{28.75} = ₹\ 6.956$

(iii) Expected market price EPS 6.956 × P/E 10 = ₹ 69.56

Market capitalization = ₹ 69.56 per share × 28.75 lakh shares

= ₹ 1,999.85 lakh

(iv) Free float of market capitalization = ₹ 69.56 per share × (28.75 lakh × 40%)

= ₹ 799.94 lakh

18. Abhiman Ltd. is a subsidiary of Janam Ltd. and is acquiring Swabhiman Ltd. which is also a subsidiary of Janam Ltd. The following information is given :

	Abhiman Ltd.	Swabhiman Ltd.
% Shareholding of promoter	50%	60%
Share capital	₹ 200 lacs	100 lacs
Free Reserves and surplus	₹ 900 lacs	600 lacs
Paid up value per share	₹ 100	10
Free float market capitalization	₹ 500 lacs	156 lacs
P/E Ratio (times)	10	4

Janam Ltd., is interested in doing justice to both companies. The following parameters have been assigned by the Board of Janam Ltd., for determining the swap ratio:

Book value 25%
Earning per share 50%
Market price 25%

You are required to compute
(i) The swap ratio.
(ii) The Book Value, Earning Per Share and Expected Market Price of Swabhiman Ltd., (assuming P/E Ratio of Abhiman remains the same and all assets and liabilities of Swabhiman Ltd. are taken over at book value.)
Answer:

SWAP RATIO

	Abhiman Ltd. (₹)	Swabhiman Ltd. (₹)
Share capital	200 lacs	100 lacs
Free reserves & surplus	900 lacs	600 lacs
Total	1100 lacs	700 lacs
No. of shares	2 lacs	10 lacs
Book value for share	₹ 550	₹ 70
Promoters Holding	50%	60%
Non promoters holding	50%	40%
Free float market capitalization (Public)	500 lacs	₹ 156 lacs
Total Market Cap	1000 lacs	390 lacs
No. of shares	2 lacs	10 lacs
Market Price	₹ 500	₹ 39
P/E ratio	10	4
EPS	₹ 50.00	₹ 9.75

Calculation of SWAP Ratio

Book Value	1:0.1273	0.1273 × 25%	0.031825
EPS	1:0.195	0.195 × 50%	0.097500
Market Price	1:0.078	0.078 × 25%	0.019500
Total			0.148825

(i) SWAP Ratio is 0.148825 shares of Abhiman Ltd. for every share of Swabhiman Ltd.

Total No. of shares to be issued = 10 lakh × 0.148825 = 148825 shares

(ii) Book value, EPS & Market Price.

Total No. shares = 200000 +148825=348825

Total capital = ₹200 lakh + ₹148.825 lac = ₹ 348.825 lac

Reserves = ₹ 900 lac + ₹ 551.175 lac = ₹ 1451.175 lac

$$\text{Book value Per Share} = \frac{₹\ 348.825\text{lac} + ₹\ 1451.175\ \text{lac}}{3.48825\ \text{lac}} = ₹\ 516.02$$

or ₹ 516.02 x 0.148825 = ₹ 76.80

$$\text{or} = \frac{\text{Total Capital}}{\text{No. of Shares}} = \frac{1100\text{lac} + 700\ \text{lac}}{348825} = ₹\ 516.02$$

$$\text{EPS} = \frac{\text{Total Profit}}{\text{No. of shares}} = \frac{₹100\ \text{lac} + ₹\ 97.50\ \text{lac}}{3.48825\text{lac}} = ₹\ 56.62$$

or ₹ 56.62 x 0.148825 = ₹ 8.43

Expected market price = ₹ 56.62 × PE Ratio= ₹ 56.62 × 10 = ₹ 566.20

or ₹ 566.20 x 0.148825 = ₹ 84.26

19. The following information is provided relating to the acquiring company E Ltd., and the target company H Ltd:

Particulars	E Ltd. (₹)	H Ltd. (₹)
Number of shares (Face value ₹ 10 each)	20 Lakhs	15 Lakhs
Market Capitalization	1000 Lakhs	1500 Lakhs
P/E Ratio (times)	10.00	5.00
Reserves and surplus in ₹	600.00 Lakhs	330.00 Lakhs
Promoter's Holding (No. of shares)	9.50 Lakhs	10.00 Lakhs

The Board of Directors of both the companies have decided to give a fair deal to the shareholders. Accordingly, the weights are decided as 40%, 25% and 35% respectively for earnings, book value and market price of share of each company for swap ratio.

Calculate the following:

(i) Market price per share, earnings per share and Book Value per share;

(ii) Swap ratio;

(iii) Promoter's holding percentage after acquisition;

(iv) EPS of E Ltd. after acquisitions of H Ltd;

(v) Expected market price per share and market capitalization of E Ltd.; after acquisition, assuming P/E ratio of E Ltd. remains unchanged; and

(vi) Free float market capitalization of the merged firm.

Answer:

(i)

	E Ltd.	H Ltd.
Market capitalisation	1000 lakhs	1500 lakhs
No. of shares	20 lakhs	15 lakhs
Market Price per share	₹ 50	₹ 100
P/E ratio	10	5
EPS	₹ 5	₹ 20
Profit	₹ 100 lakh	₹ 300 lakh
Share capital	₹ 200 lakh	₹ 150 lakh
Reserves and surplus	₹ 600 lakh	₹ 330 lakh
Total	₹ 800 lakh	₹ 480 lakh
Book Value per share	₹ 40	₹ 32

(ii) **Calculation of Swap Ratio**

EPS	1 : 4 i.e.	4.0 × 40%	1.6
Book value	1 : 0.8 i.e.	0.8 × 25%	0.2

Market price	1 : 2 i.e.	2.0 × 35%	0.7
		Total	2.5

Swap ratio is for every one share of H Ltd., to issue 2.5 shares of E Ltd. Hence, total no. of shares to be issued 15 lakh × 2.5 = 37.50 lakh shares

(iii) Promoter's holding = 9.50 lakh shares + (10× 2.5 = 25 lakh shares) = 34.50 lakh i.e. Promoter's holding % is (34.50 lakh/57.50 lakh) × 100 = 60%.

(iv) Calculation of EPS after merger

Total No. of shares 20 lakh + 37.50 lakh = 57.50 lakh

$$\text{EPS } \frac{\text{Total profit}}{\text{No. of shares}} = \frac{100 \text{ lakh} + 300 \text{ lakh}}{57.50 \text{ lakh}} = \frac{400}{57.50} = ₹\ 6.956$$

(v) Calculation of Market price and Market capitalization after merger

Expected market price EPS 6.956 × P/E 10 = ₹ 69.56

Market capitalization = ₹ 69.56 per share ×57.50 lakh shares

= ₹ 3,999.70 lakh or ₹ 4,000 lakh

(vi) Free float of market capitalization = ₹ 69.56 per share × (57.50 lakh × 40%) = ₹ 1599.88 lakh

20. The following information relating to the acquiring Company Abhiman Ltd. and the target Company Abhishek Ltd. are available. Both the Companies are promoted by Multinational Company, Trident Ltd. The promoter's holding is 50% and 60% respectively in Abhiman Ltd. and Abhishek Ltd.:

	Abhiman Ltd.	Abhishek Ltd.
Share Capital (₹)	200 lakh	100 lakh
Free Reserve and Surplus (₹)	800 lakh	500 lakh
Paid up Value per share (₹)	100	10
Free float Market Capitalisation (₹)	400 lakh	128 lakh
P/E Ratio (times)	10	4

Trident Ltd. is interested to do justice to the shareholders of both the Companies. For the swap ratio weights are assigned to different parameters by the Board of Directors as follows:

Book Value	25%
EPS (Earning per share)	50%
Market Price	25%

(a) What is the swap ratio based on above weights?

(b) What is the Book Value, EPS and expected Market price of Abhiman Ltd. after acquisition of Abhishek Ltd. (assuming P.E. ratio of Abhiman Ltd. remains unchanged and all assets and liabilities of Abhishek Ltd. are taken over at book value).

(c) Calculate:

(i) Promoter's revised holding in the Abhiman Ltd.

(ii) Free float market capitalization.

(iii) Also calculate No. of Shares, Earning per Share (EPS) and Book Value (B.V.), if after acquisition of Abhishek Ltd., Abhiman Ltd. decided to :

(1) Issue Bonus shares in the ratio of 1 : 2; and

(2) Split the stock (share) asRs.5 each fully paid.

[ALSO IN RTP - MAY 2020]

Answer:

(a) **Swap Ratio**

	Abhiman Ltd.	Abhishek Ltd.
Share Capital	200 Lakh	100 Lakh
Free Reserves	800 Lakh	500 Lakh
Total	1000 Lakh	600 Lakh
No. of Shares	2 Lakh	10 Lakh
Book Value per share	₹ 500	₹ 60
Promoter's holding	50%	60%
Non promoter's holding	50%	40%
Free Float Market Cap. i.e. relating to Public's holding	400 Lakh	128 Lakh
Hence Total market Cap.	800 Lakh	320 Lakh
No. of Shares	2 Lakh	10 Lakh
Market Price	₹ 400	₹ 32
P/E Ratio	10	4

EPS	40	8
Profits (₹ 2 X 40 lakh)	₹ 80 lakh	-
(₹ 8 X 10 lakh)	-	₹ 80 lakh

Calculation of Swap Ratio

Book Value	1 : 0.12 i.e.	0.12 x 25%	0.03
EPS	1 : 0.2	0.20 x 50%	0.10
Market Price	1 : 0.08	0.08 x 25%	0.02
		Total	0.15

Swap ratio is for every one share of Abhishek Ltd., to issue 0.15 shares of Abhiman Ltd. Hence total no. of shares to be issued.

10 Lakh x 0.15 = 1.50 lakh shares

(b) Book Value, EPS & Market Price

Total No of Shares	2 Lakh + 1.5 Lakh = 3.5 Lakh
Total Capital	₹ 200 Lakh + ₹ 150 Lakh = ₹ 350 Lakh
Reserves	₹ 800 Lakh + ₹ 450 Lakh = ₹ 1,250 Lakh
Book Value	₹ 350 Lakh + ₹ 1,250 Lakh / 3.5 Lakh = ₹ 457.14 per share
EPS	$\frac{\text{Total Profit}}{\text{No. of Share}} = \frac{₹\,80\,\text{Lakh} + ₹\,80\,\text{Lakh}}{3.5\,\text{Lakh}} = \frac{₹\,160\,\text{Lakh}}{3.5} = ₹\ 45.71$

Expected Market Price EPS (₹ 45.71) x P/E Ratio (10) = ₹ 457.10

(c) (i) Promoter's holding

Promoter's Revised Holding	Abhiman 50% i.e.	1.00 Lakh shares
	Abhishek 60% i.e.	0.90 Lakh shares
	Total	1.90 Lakh shares

Promoter's % = 1.90/3.50 x 100 = 54.29%

(ii) Free Float Market Capitalisation

Free Float Market Capitalisation	= (3.5 Lakh – 1.9 Lakh) x ₹ 457.10 = ₹ 731.36 Lakh

(iii) (a) & (b)

Revised Capital	₹ 350 Lakh + ₹ 175 Lakh = ₹ 525 Lakh
No. of shares before Split (F.V ₹ 100)	5.25 Lakh
No. of Shares after Split (F.V. ₹ 5)	5.25 x 20 = 105 Lakh
EPS	160 Lakh / 105 Lakh = 1.523
Book Value	Cap. ₹ 525 Lakh + ₹ 1075 Lakh No. of Shares =105 Lakh = ₹ 15.238 per share

21. T Ltd. and E Ltd. are in the same industry. The former is in negotiation for acquisition of the latter. Important information about the two companies as per their latest financial statements is given below:

₹ 10 Equity shares outstanding	T Ltd. 12 Lakhs	E Ltd. 6 Lakhs
Debt:		
10% Debentures (₹ Lakhs)	580	--
12.5% Institutional Loan (₹ Lakhs)	--	240
Earning before interest, depreciation and tax (EBIDAT) (₹ Lakhs)	400.86	115.71
Market Price/share (₹)	220.00	110.00

T Ltd. plans to offer a price for E Ltd., business as a whole which will be 7 times EBIDAT reduced by outstanding debt, to be discharged by own shares at market price.

E Ltd. is planning to seek one share in T Ltd. for every 2 shares in E Ltd. based on the market price. Tax rate for the two companies may be assumed as 30%.

Calculate and show the following under both alternatives - T Ltd.'s offer and E Ltd.'s plan:
(i) Net consideration payable.
(ii) No. of shares to be issued by T Ltd.
(iii) EPS of T Ltd. after acquisition.
(iv) Expected market price per share of T Ltd. after acquisition.
(v) State briefly the advantages to T Ltd. from the acquisition.
Note: Calculations (except EPS) may be rounded off to 2 decimals in lakhs.
[ASKED IN NOV 2018 - 12 MKS | MTP OCTOBER 2018 - 8 MKS | RTP - MAY 2018]
Answer:

As per T Ltd.'s Offer

		₹ in lakhs
(i)	**Net Consideration Payable**	
	7 times EBIDAT, i.e. 7 x ₹ 115.71 lakh	809.97
	Less: Debt	240.00
		569.97
(ii)	**No. of shares to be issued by T Ltd**	
	₹ 569.97 lakh/₹ 220 (rounded off) (Nos.)	2,59,000
(iii)	**EPS of T Ltd after acquisition**	
	Total EBIDT (₹ 400.86 lakh + ₹ 115.71 lakh)	516.57
	Less: Interest (₹ 58 lakh + ₹ 30 lakh)	88.00
		428.57
	Less: 30% Tax	128.57
	Total earnings (NPAT)	300.00
	Total no. of shares outstanding	14.59 lakh
	(12 lakh + 2.59 lakh)	
	EPS (₹ 300 lakh/ 14.59 lakh)	₹ 20.56
(iv)	**Expected Market Price:**	
	Pre-acquisition P/E multiple:	
	EBIDAT (₹ in lakhs)	400.86
	Less: Interest $(580 \times \frac{10}{100})$ (₹ in lakhs)	58.00
		342.86
	Less: 30% Tax (₹ in lakhs)	102.86

EAT (₹ in lakhs)	240.00
No. of shares (lakhs)	12.00
EPS	₹ 20.00
Hence, PE multiple $\frac{220}{20}$	11
Expected market price after acquisition (₹ 20.56 x 11)	₹ 226.16

As per E Ltd's Plan

		₹ in lakhs
(i)	**Net consideration payable**	
	6 lakhs shares x ₹ 110	660
(ii)	**No. of shares to be issued by T Ltd**	
	₹ 660 lakhs ÷ ₹ 220	3 lakh
(iii)	**EPS of T Ltd after Acquisition**	
	NPAT (as per earlier calculations)	300.00
	Total no. of shares outstanding (12 lakhs + 3 lakhs)	15 lakh
	Earning Per Share (EPS) ₹ 300 lakh/15 lakh	₹ 20.00
(iv)	**Expected Market Price** (₹ 20 x 11)	220.00

(v) **Advantages of Acquisition to T Ltd**

Since the two companies are in the same industry, the following advantages coul accrue:

- Synergy, cost reduction and operating efficiency.
- Better market share.
- Avoidance of competition

22. The following information is relating to Fortune India Ltd. having two division, viz. Pharma Division and Fast Moving Consumer Goods Division (FMCG Division). Paid up share capital of Fortune India Ltd. is consisting of 3,000 Lakhs equity shares of Re. 1 each. Fortune India Ltd. decided to de-merge Pharma Division as Fortune Pharma Ltd. w.e.f. 1.4.2009. Details of Fortune India Ltd. as on 31.3.2009 and of Fortune Pharma Ltd. as on 1.4.2009 are given below:

Particulars	Fortune Pharma Ltd. ₹	Fortune India Ltd. ₹
Outside Liabilities		
Secured Loans	400 lakh	3,000 lakh
Unsecured Loans	2,400 lakh	800 lakh
Current Liabilities & Provisions	1,300 lakh	21,200 lakh
Assets		
Fixed Assets	7,740 lakh	20,400 lakh
Investments	7,600 lakh	12,300 lakh
Current Assets	8,800 lakh	30,200 lakh
Loans & Advances	900 lakh	7,300 lakh
Deferred tax/Misc. Expenses	60 lakh	(200) lakh

Board of Directors of the Company have decided to issue necessary equity shares of Fortune Pharma Ltd. of Re. 1 each, without any consideration to the shareholders of Fortune India Ltd. For that purpose following points are to be considered:

(a) Transfer of Liabilities & Assets at Book value.

(b) Estimated Profit for the year 2009-10 isRs.11,400 Lakh for Fortune India Ltd. &Rs.1,470 lakhs for Fortune Pharma Ltd.

(c) Estimated Market Price of Fortune Pharma Ltd. isRs.24.50 per share.

(d) Average P/E Ratio of FMCG sector is 42 & Pharma sector is 25, which is to be expected for both the companies.

Calculate:

1. The Ratio in which shares of Fortune Pharma are to be issued to the shareholders of Fortune India Ltd.

2. Expected Market price of Fortune India (FMCG) Ltd.

3. Book Value per share of both the Companies immediately after Demerger.

Answer:

Share holders' funds (₹ Lakhs)

Particulars	*Fortune India Ltd.*	*Fortune Pharma Ltd.*	*Fortune India (FMCG) Ltd.*
Assets	70,000	25,100	44,900
Outside liabilities	25,000	4,100	20,900
Net worth	45,000	21,000	24,000

1. Calculation of Shares of Fortune Pharma Ltd. to be issued to shareholders of Fortune India Ltd.

	Fortune Pharma Ltd.
Estimated Profit (₹ in lakhs)	1,470
Estimated market price (₹)	24.5
Estimated P/E	25
Estimated EPS (₹)	0.98
No. of shares lakhs	1,500

Hence, Ratio is 1 share of Fortune Pharma Ltd. for 2 shares of Fortune India Ltd.

OR for 0.50 share of Fortune Pharma Ltd. for 1 share of Fortune India Ltd.

2. Expected market price of Fortune India (FMCG) Ltd.

	Fortune India (FMCG) Ltd.
Estimated Profit (₹ in lakhs)	11,400
No. of equity shares (₹ in lakhs)	3,000
Estimated EPS (₹)	3.8
Estimated P/E	42
Estimated market price (₹)	159.60

3. Book value per share

	Fortune Pharma Ltd.	*Fortune India (FMCG) Ltd.*
Net worth (₹in lakhs)	21,000	24,000
No. of shares (₹ in lakhs)	1,500	3,000
Book value of shares	₹ 14	₹ 8

23. H Ltd. agrees to buy over the business of B Ltd. effective 1st April, 2012.The summarized Balance Sheets of H Ltd. and B Ltd. as on 31st March 2012 are as follows:

Balance sheet as at 31st March, 2012 (In Crores of Rupees)

Liabilities:	**H. Ltd**	**B. Ltd.**
Paid up Share Capital		
-Equity Shares of ₹100 each	350.00	
-Equity Shares of ₹10 each		6.50
Reserve & Surplus	950.00	25.00
Total	**1,300.00**	**31.50**
Assets:		
Net Fixed Assets	220.00	0.50
Net Current Assets	1,020.00	29.00
Deferred Tax Assets	60.00	2.00
Total	**1,300.00**	**31.50**

H Ltd. proposes to buy out B Ltd. and the following information is provided to you as part of the scheme of buying:

(a) The weighted average post tax maintainable profits of H Ltd. and B Ltd. for the last 4 years areRs.300 crores andRs.10 crores respectively.

(b) Both the companies envisage a capitalization rate of 8%.
(c) H Ltd. has a contingent liability ofRs.300 crores as on 31st March, 2012.
(d) H Ltd. to issue shares ofRs.100 each to the shareholders of B Ltd. in terms of the exchange ratio as arrived on a Fair Value basis. (Please consider weights of 1 and 3 for the value of shares arrived on Net Asset basis and Earnings capitalization method respectively for both H Ltd. and B Ltd.)
You are required to arrive at the value of the shares of both H Ltd. and B Ltd. under:
(i) Net Asset Value Method
(ii) Earnings Capitalisation Method
(iii) Exchange ratio of shares of H Ltd. to be issued to the shareholders of B Ltd. on a Fair value basis (taking into consideration the assumption mentioned in point 4 above.)

Answer:

(i) **Net asset value**

H Ltd.	$\frac{₹\ 1300\ \text{Crores} - ₹\ 300\ \text{Crores}}{3.50\ \text{Crores}} = ₹\ 285.71$
B Ltd.	$\frac{₹\ 31.50\ \text{Crores}}{0.65\ \text{Crores}} = ₹\ 48.46$

(ii) **Earning capitalization value**

H Ltd.	$\frac{₹\ 300\ \text{Crores} / 0.08}{3.50\ \text{Crores}} = ₹\ 1071.43^*$
B Ltd.	$\frac{₹\ 10\ \text{Crores} / 0.08}{0.65\ \text{Crores}} = ₹\ 192.31$

* Alternatively, Contingent Liability can also be deducted from this Valuation.

(iii) **Fair value**

H Ltd.	$\frac{₹\ 285.71 \times 1 + ₹\ 1071.43 \times 3}{4} = ₹\ 875$
B Ltd.	$\frac{₹\ 48.46 \times 1 + ₹\ 192.31 \times 3}{4} = ₹\ 156.3475$

Exchange ratio ₹156.3475/ ₹875 = 0.1787
H Ltd should issue its 0.1787 share for each share of B Ltd.
Note: In above solution it has been assumed that the contingent liability will materialize at its full amount.

24. Reliable Industries Ltd. (RIL) is considering a takeover of Sunflower Industries Ltd. (SIL). The particulars of 2 companies are given below:

Particulars	Reliable Industries Ltd	Sunflower Industries Ltd.
Earnings After Tax (EAT)	₹ 20,00,000	₹ 10,00,000
Equity shares O/s	10,00,000	10,00,000
Earnings per share (EPS)	2	1
PE Ratio (Times)	10	5

Required:
(i) What is the market value of each Company before merger?
(ii) Assume that the management of RIL estimates that the shareholders of SIL will accept an offer of one share of RIL for four shares of SIL. If there are no synergic effects, what is the market value of the Post-

merger RIL? What is the new price per share? Are the shareholders of RIL better or worse off than they were before the merger?

(iii) Due to synergic effects, the management of RIL estimates that the earnings will increase by 20%. What are the new post-merger EPS and Price per share? Will the shareholders be better off or worse off than before the merger?

Answer:

(i) **Market value of Companies before Merger**

Particulars	*RIL*	*SIL*
EPS	₹ 2	Re.1
P/E Ratio	10	5
Market Price Per Share	₹ 20	₹ 5
Equity Shares	10,00,000	10,00,000
Total Market Value	2,00,00,000	50,00,000

(ii) **Post Merger Effects on RIL**

	₹
Post-merger earnings	30,00,000
Exchange Ratio (1:4)	
No. of equity shares o/s (10,00,000 + 2,50,000)	12,50,000
EPS: 30,00,000/12,50,000	2.4
PE Ratio	10
Market Value 10 x 2.4	24
Total Value (12,50,000 x 24)	3,00,00,000

Gains From Merger:	₹
Post-Merger Market Value of the Firm	3,00,00,000
Less: Pre-Merger Market Value	
RIL 2,00,00,000	
SIL 50,00,000	2,50,00,000
Total gains from Merger	50,00,000

Apportionment of Gains between the Shareholders:

Particulars	RIL (₹)	SIL (₹)
Post-Merger Market Value:		
10,00,000 x 24	2,40,00,000	--
2,50,000 x 24	-	60,00,000
Less: Pre-Merger Market Value	2,00,00,000	50,00,000
Gains from Merger:	40,00,000	10,00,000

Thus, the shareholders of both the companies (RIL + SIL) are better off than before

(iii) Post-Merger Earnings:

Increase in Earnings by 20%	
New Earnings: ₹ 30,00,000 x (1+0.20)	₹ 36,00,000
No. of equity shares outstanding:	12,50,000
EPS (₹ 36,00,000/12,50,000)	₹ 2.88
PE Ratio	10
Market Price Per Share: = ₹2.88 x 10	₹ 28.80

∴ Shareholders will be better-off than before the merger situation.

25. AFC Ltd. wishes to acquire BCD Ltd. The shares issued by the two companies are 10,00,000 and 5,00,000 respectively:

(i) Calculate the increase in the total value of BCD Ltd. resulting from the acquisition on the basis of the following conditions:

Current expected growth rate of BCD Ltd.	**7%**
Expected growth rate under control of AFC Ltd.,	**8%**
(without any additional capital investment and without any change in risk of operations)	
Current Market price per share of AFC Ltd.	**Rs.100**
Current Market price per share of BCD Ltd.	**Rs.20**
Expected Dividend per share of BCD Ltd.	**Rs.0.60**

(ii) On the basis of aforesaid conditions calculate the gain or loss to shareholders of both the companies, if AFC Ltd. were to offer one of its shares for every four shares of BCD Ltd.

(iii) Calculate the gain to the shareholders of both the Companies, if AFC Ltd. paysRs.22 for each share of BCD Ltd., assuming the P/E Ratio of AFC Ltd. does not change after the merger. EPS of AFC Ltd. isRs.8 and that of BCD isRs.2.50. It is assumed that AFC Ltd. invests its cash to earn 10%.

Answer:

(i) For BCD Ltd., before acquisition

The cost of capital of BCD Ltd. may be calculated by using the following formula:

$$\frac{\text{Dividend}}{\text{Price}} + \text{Growth\%}$$

Cost of Capital i.e., Ke = (0.60/20) + 0.07 = 0.10

After acquisition g (i.e. growth) becomes 0.08

Therefore, price per share after acquisition = 0.60/(0.10-0.08) = ₹30

The increase in value therefore is = ₹(30-20) x 5,00,000 = ₹50,00,000/-

(ii) To share holders of BCD Ltd. the immediate gain is ₹100 – ₹20x4 = ₹20 per share

The gain can be higher if price of shares of AFC Ltd. rise following merger which they should undertake.

To AFC Ltd. shareholders	(₹ (In lakhs)
Value of Company now	1,000
Value of BCD Ltd.	150
	1,150
No. of shares	11.25
∴ Value per share	1150/11.25 = ₹102.22

Gain to shareholders of BCD Ltd. = ₹102.22 – ₹(4 x 20) = ₹22.22

Gain to shareholders of AFC Ltd. = ₹102.22 – ₹100.00 = ₹2.22

(iii) Gain to shareholders of AFC Ltd:-

Earnings of BCD Ltd. (5,00,000 x 2.50)	₹12,50,000/-
Less: Loss of earning in cash (5,00,000 x ₹ 22 x 0.10)	₹11,00,000/-
Net Earning	₹ 1,50,000/-
Number of shares	10,00,000
Net increase in earning per share	0.15

P/E ratio of AFC Ltd. = 100/8 = 12.50

Therefore, Gain per share of shareholders of AFC Ltd. = 0.15x12.50 = ₹1.88

Gain to the shareholders of BCD Ltd. ₹ (22-20) = ₹2/- per share

Alternatively, it can also be computed as follows:

Post-Merger Earnings (10,00,000 x ₹ 8 + 5,00,000 x ₹ 2.5 – 11,00,000)	₹ 81,50,000
EPS after Merger $\left(\frac{81,50,000}{10,00,000}\right)$	₹ 8.15
PE Ratio	12.50
Post Merger Price of Share (₹ 8.15 x 12.50)	₹ 101.875
Less: Price before merger	₹ 100.00
	₹ 1.875
Say	₹ 1.88

26. AB Ltd., is planning to acquire and absorb the running business of XY Ltd. The valuation is to be based on the recommendation of merchant bankers and the consideration is to be discharged in the form of equity shares to be issued by AB Ltd. As on 31.3.2006, the paid up capital of AB Ltd. consists of 80 lakhs shares ofRs.10 each. The highest and the lowest market quotation during the last 6 months wereRs.570 andRs.430. For the purpose of the exchange, the price per share is to be reckoned as the average of the highest and lowest market price during the last 6 months ended on 31.3.06.

XY Ltd.'s Balance Sheet as at 31.3.2006 is summarised below:

	₹ lakhs
Sources	
Share Capital	
20 lakhs equity shares of ₹10 each fully paid	200
10 lakhs equity shares of ₹10 each, ₹5 paid	50
Loans	100
Total	350
Uses	
Fixed Assets (Net)	150
Net Current Assets	200
	350

An independent firm of merchant bankers engaged for the negotiation, have produced the following estimates of cash flows from the business of XY Ltd.:

Year ended	By way of	₹ lakhs
31.3.07	after tax earnings for equity	105
31.3.08	do	120
31.3.09	Do	125
31.3.10	Do	120
31.3.11	Do	100
	Terminal Value estimate	200

It is the recommendation of the merchant banker that the business of XY Ltd. may be valued on the basis of the average of (i) Aggregate of discounted cash flows at 8% and (ii) Net assets value. Present value factors at 8% for years

1-5: 0.93 0.86 0.79 0.74 s0.68

You are required to:

(a) Calculate the total value of the business of XY Ltd.

(b) The number of shares to be issued by AB Ltd.; and

(c) The basis of allocation of the shares among the shareholders of XY Ltd.

Answer:

Price/share of AB Ltd. for determination of number of shares to be issued

= (` 570 +Rs. 430)/2 =Rs. 500

Value of XY Ltd based on future cash flow capitalization (105x0.93)+(120x0.86)+(125x0.79)+(120x0.74)x(300x0.68)	₹ lakhs	592.40
Value of XY Ltd based on net assets	₹ lakhs	250.00
Average value (592.40+250)/2		421.20
No. of shares in AB Ltd to be issued ₹ 4,21,20,000/500	Nos.	84240
Basis of allocation of shares		
Fully paid equivalent shares in XY Ltd. (20+5) lakhs		2500000
Distribution to fully paid shareholders 84240x20/25		67392
Distribution to partly paid shareholders 84240-67392		16848

27. R Ltd. and S Ltd. are companies that operate in the same industry. The financial statements of both the companies for the current financial year are as follows:

Balance Sheet

Particulars	R. Ltd. (₹)	S. Ltd (₹)
Equity & Liabilities		
Shareholders Fund		
Equity Capital (₹ 10 each)	20,00,000	16,00,000
Retained earnings	4,00,000	-
Non-current Liabilities		
16% Long term Debt	10,00,000	6,00,000
Current Liabilities	14,00,000	8,00,000
Total	**48,00,000**	**30,00,000**
Assets		
Non-current Assets	20,00,000	10,00,000
Current Assets	28,00,000	20,00,000
Total	**48,00,000**	**30,00,000**

Income Statement

	Particulars	R. Ltd. (₹)	S. Ltd. (₹)
A.	Net Sales	69,00,000	34,00,000
B.	Cost of Goods sold	55,20,000	27,20,000
C.	**Gross Profit (A-B)**	13,80,000	6,80,00
D.	Operating Expenses	4,00,000	2,00,000
E.	Interest	1,60,000	96,000
F.	**Earnings before taxes [C-(D+E)]**	8,20,000	3,84,000
G.	Taxes @ 35%	2,87,000	1,34,400
H.	Earnings After Tax (EAT)	5,33,000	2,49,600

Additional Information:

No. of equity shares	**2,00,000**	**1,60,000**
Dividend payment Ratio (D/P)	**20%**	**30%**
Market price per share	**Rs.50**	**Rs.20**

Assume that both companies are in the process of negotiating a merger through exchange of Equity shares: You are required to:

(i) Decompose the share price of both the companies into EPS & P/E components. Also segregate their EPS figures into Return On Equity (ROE) and Book Value/Intrinsic Value per share components.

(ii) Estimate future EPS growth rates for both the companies.

(iii) Based on expected operating synergies, R Ltd. estimated that the intrinsic value of S Ltd. Equity share would beRs.25 per share on its acquisition. You are required to develop a range of justifiable Equity Share Exchange ratios that can be offered by R Ltd. to the shareholders of S Ltd. Based on your analysis on parts (i) and (ii), would you expect the negotiated terms to be closer to the upper or the lower exchange ratio limits and why?

Answer:

(i) Determination of EPS, P/E Ratio, ROE and BVPS of R Ltd. & S Ltd.

	R Ltd.	S Ltd.
EAT (₹)	5,33,000	2,49,600
N	200000	160000
EPS (EAT÷N)	2.665	1.56
Market Price Per Share	50	20
PE Ratio (MPS/EPS)	18.76	12.82
Equity Fund (Equity Value)	2400000	1600000
BVPS (Equity Value ÷ N)	12	10
ROE (EAT÷ EF) or	0.2221	0.156
ROE (EAT ÷ EF) x 100	22.21%	15.60%

(ii) Determination of Growth Rate of EPS of R Ltd.& S Ltd.

	R Ltd.	S Ltd.
Retention Ratio (1-D/P Ratio)	0.80	0.70
Growth Rate (ROE x Retention Ratio) or	0.1777	0.1092
Growth Rate (ROE x Retention Ratio) x 100	17.77%	10.92%

(iii) Justifiable equity share exchange ratio

(a) Market Price Based = MPS_S/MPS_R = ₹ 20/ ₹ 50 = 0.40:1 (lower limit)

(b) Intrinsic Value Based = ₹ 25/ ₹ 50 = 0.50:1 (max. limit)

Since R Ltd. has higher EPS, PE, ROE and higher growth expectations the negotiated term would be expected to be closer to the lower limit, based on existing share price.

28. BA Ltd. and DA Ltd. both the companies operate in the same industry. The Financial statements of both the companies for the current financial year are as follows:

Balance Sheet

Particulars	BA Ltd.(₹)	DA Ltd.(₹)
Current Assets	14,00,000	10,00,000
Fixed Assets (Net)	10,00,000	5,00,000
Total (₹)	**24,00,000**	**15,00,000**
Equity capital (₹10 each)	10,00,000	8,00,000
Retained earnings	2,00,000	--
14% long-term debt	5,00,000	3,00,00
Current liabilities	7,00,000	4,00,000
Total (₹)	**24,00,000**	**15,00,000**

Income Statement

	BA Ltd. (₹)	DA Ltd. (₹)
Net Sales	34,50,000	17,00,000
Cost of Goods sold	27,60,000	13,60,000
Gross profit	6,90,000	3,40,000
Operating expenses	2,00,000	1,00,000
Interest	70,000	42,000
Earnings before taxes	4,20,000	1,98,00
Taxes @ 50%	2,10,000	99,000
Earnings after taxes (EAT)	**2,10,000**	**99,000**

Additional Information :		
No. of Equity shares	1,00,000	80,000
Dividend payment ratio (D/P)	40%	60%
Market price per share	₹40	₹15

Assume that both companies are in the process of negotiating a merger through an exchange of equity shares. You have been asked to assist in establishing equitable exchange terms and are required to:

(i) Decompose the share price of both the companies into EPS and P/E components; and also segregate their EPS figures into Return on Equity (ROE) and book value/intrinsic value per share components.

(ii) Estimate future EPS growth rates for each company.

(iii) Based on expected operating synergies BA Ltd. estimates that the intrinsic value of DA's equity share would beRs.20 per share on its acquisition. You are required to develop a range of justifiable equity share exchange ratios that can be offered by BA Ltd. to the shareholders of DA Ltd. Based on your analysis in part (i) and (ii), would you expect the negotiated terms to be closer to the upper, or the lower exchange ratio limits and why?

(iv) Calculate the post-merger EPS based on an exchange ratio of 0.4: 1 being offered by BA Ltd. and indicate the immediate EPS accretion or dilution, if any, that will occur for each group of shareholders.

(v) Based on a 0.4: 1 exchange ratio and assuming that BA Ltd.'s pre-merger P/E ratio will continue after the merger, estimate the post-merger market price. Also show the resulting accretion or dilution in pre-merger market prices. [ALSO IN MTP - APRIL 2018]

Answer:

Market price per share (MPS) = EPS X P/E ratio or P/E ratio = MPS/EPS

(i) **Determination of EPS, P/E ratio, ROE and BVPS of BA Ltd. and DA Ltd.**

		BA Ltd.	DA Ltd.
Earnings After Tax	(EAT)	₹ 2,10,000	₹ 99,000
No. of Shares	(N)	100000	80000
EPS	(EAT/N)	₹ 2.10	₹ 1.2375
Market price per share	(MPS)	40	15
P/E Ratio	(MPS/EPS)	19.05	12.12
Equity Funds	(EF)	₹ 12,00,000	₹ 8,00,000
BVPS	(EF/N)	12	10
ROE	(EAT/EF) × 100	17.50%	12.37%

(ii) **Estimation of growth rates in EPS for BA Ltd. and DA Ltd.**

Retention Ratio	(1-D/P ratio)	0.6	0.4
Growth Rate	(ROE × Retention Ratio)	10.50%	4.95%

(iii) **Justifiable equity shares exchange ratio**

(a) Intrinsic value based = ₹20 / ₹40 = 0.5:1 (upper limit)

(b) Market price based = MPS_{DA}/MPS_{BA} = ₹15 / ₹40 =0.375:1(lower limit)

Since, BA Ltd. has a higher EPS, ROE, P/E ratio and even higher EPS growth expectations, the negotiable terms would be expected to be closer to the lower limit, based on the existing share prices.

(iv) **Calculation of Post merger EPS and its effects**

Particulars			BA Ltd.	DA Ltd.	Combined
EAT	(₹)	(i)	2,10,000	99,000	3,09,000
Share outstanding		(ii)	100000	80000	132000*
EPS	(₹)	(i) / (ii)	2.1	1.2375	2.341
EPS Accretion (Dilution)	(Re.)		0.241	(0.301***)	

(v) **Estimation of Post merger Market price and other effects**

Particulars			BA Ltd.	DA Ltd.	Combined
EPS	(₹)	(i)	2.1	1.2375	2.341
P/E Ratio		(ii)	19.05	12.12	19.05
MPS	(₹)	(i) / (ii)	40	15	44.6
MPS Accretion	(₹)		4.6	2.84***	

* Shares outstanding (combined) = 100000 shares + (.40 × 80000)= 132000 shares

** EPS claim per old share	= ₹2.34 × 0.4	₹ 0.936
EPS dilution	= ₹1.2375 – ₹ 0.936	₹ 0.3015
***S claim per old share	(₹ 44.60 × 0.4)	₹ 17.84
Less: MPS per old share		₹ 15.00
		₹ 2.84

29. During the audit of the Weak Bank (W), RBI has suggested that the Bank should either merge with another bank or may close down. Strong Bank (S) has submitted a proposal of merger of Weak Bank with itself. The relevant information and Balance Sheets of both the companies are as under:

Particulars	Weak Bank (W)	Strong Bank (S)	Assigned Weights (%)
Gross NPA (%)	40	5	30
Capital Adequacy Ratio (CAR)	5	16	28
Total Capital/ Risk Weight Asset			
Market price per Share (MPS)	12	96	32
Book value			10
Trading on Stock Exchange	Irregular	Frequent	

Balance Sheet **(₹ in Lakhs)**

Particulars	Weak Bank (W)	Strong Bank (S)
Paid up Share Capital (₹ 10 per share)	150	500
Reserves & Surplus	80	5,500
Deposits	4,000	44,000
Other Liabilities	890	2,500
Total Liabilities	**5,120**	**52,500**
Cash in Hand & with RBI	400	2,500
Balance with Other Banks	-	2,000
Investments	1,100	19,000
Advances	3,500	27,000
Other Assets	70	2,000
Preliminary Expenses	50	-
Total Assets	**5,120**	**52,500**

You are required to
(a) Calculate Swap ratio based on the above weights:
(b) Ascertain the number of Shares to be issued to Weak Bank;
(c) Prepare Balance Sheet after merger; and
(d) Calculate CAR and Gross NPA of Strong Bank after merger.
[MTP - OCTOBER 2019 - 8 MARKS]
Answer:

(a) Swap Ratio

Gross NPA	5:40	5/40 x 30%	0.0375
CAR	5:16	5/16 x 28%	0.0875
Market Price	12:96	12/96 x 32%	0.0400
Book Value Per Share	12:120	12/120x 10%	0.0100
			0.1750

Thus, for every share of Weak Bank, 0.1750 share of Strong Bank shall be issued.

Calculation of Book Value Per Share

Particulars	Weak Bank (W)	Strong Bank (S)
Share Capital (₹ Lakhs)	150	500
Reserves & Surplus (₹ Lakhs)	80	5,500
	230	6,000
Less: Preliminary Expenses (₹ Lakhs)	50	--
Net Worth or Book Value (₹ Lakhs)	180	6,000
No. of Outstanding Shares (Lakhs)	15	50
Book Value Per Share (₹)	12	120

(b) No. of equity shares to be issued:

$$\frac{150}{10} \times 0.1750 = 2.625 \text{ lakh shares}$$

(c) **Balance Sheet after Merger**

Calculation of Capital Reserve

Book Value of Shares	₹ 180.00 lac
Less: Value of Shares issued	₹ 26.25 lac
Capital Reserve	₹ 153.75 lac

Balance Sheet

	₹ lac		₹ lac
Paid up Share Capital	526.25	Cash in Hand & RBI	2900.00
Reserves & Surplus	5500.00	Balance with other banks	2000.00
Capital Reserve	153.75	Investment	20100.00
Deposits	48000.00	Advances	30500.00
Other Liabilities	3390.00	Other Assets	2070.00
	57570.00		**57570.00**

(d) **Calculation CAR & Gross NPA % of Bank 'S' after merger**

$$\text{CAR / CRWAR} = \frac{\text{Total Capital}}{\text{Risky Weighted Assets}}$$

	Weak Bank	Strong Bank	Merged
	5%	16%	
Total Capital	₹ 180 lac	₹ 6000 lac	₹ 6180 lac
Risky Weighted Assets	₹ 3600 lac	₹ 37500 lac	₹ 41100 lac

$$\text{CAR} = \frac{6180}{41100} \times 100 = 15.04\%$$

$$\text{GNPA Ratio} = \frac{\text{Gross NPA}}{\text{Gross Advances}} \times 100$$

	Weak Bank	Strong Bank	Merged
GNPA (Given)	0.40	0.05	
	$0.40 = \frac{GNPA_R}{₹\ 3500\ lac}$	$0.05 = \frac{GNPA_S}{₹\ 27000\ lac}$	
Gross NPA	₹ 1400 lac	₹ 1350 lac	₹ 2750 lac

30. M/s Tiger Ltd. wants to acquire M/s. Leopard Ltd. The balance sheet of Leopard Ltd. as on 31st March, 2012 is as follows:

Liabilities	₹	Assets	₹
Equity Capital (70,000 shares)		Cash	50,000
Retained earnings	3,00,000	Debtors	70,000
12% Debentures	3,00,000	Inventories	2,00,000
Creditors and other liabilities	3,20,000	Plants & Eqpt.	13,00,000
	16,20,000		16,20,000

Additional Information:

(i) Shareholders of Leopard Ltd. will get one share in Tiger Ltd. for every two shares. External liabilities are expected to be settled atRs.5,00,000. Shares of Tiger Ltd. would be issued at its current price ofRs.15 per share. Debenture holders will get 13% convertible debentures in the purchasing company for the same amount. Debtors and inventories are expected to realizeRs.2,00,000.

(ii) Tiger Ltd. has decided to operate the business of Leopard Ltd. as a separate division. The division is likely to give cash flows (after tax) to the extent ofRs.5,00,000 per year for 6 years. Tiger Ltd. has planned that, after 6 years, this division would be demerged and disposed of forRs.2,00,000.

(iii) The company's cost of capital is 16%.

Make a report to the Board of the company advising them about the financial feasibility of this acquisition.

Net present values for 16% forRs.1 are as follows:

Years	1	2	3	4	5	6
PV	0.862	0.743	0.641	0.552	0.476	0.410

Answer:

Calculation of Purchase Consideration

	₹
Issue of Share 35000 x ₹15	5,25,000
External Liabilities settled	5,00,000
13% Debentures	3,00,000
	13,25,000
Less: Realization of Debtors and Inventories	2,00,000
Cash	50,000
	10,75,000

Net Present Value = PV of Cash Inflow + PV of Demerger of Leopard Ltd. – Cash Outflow

= ₹ 5,00,000 PVAF(16%,6) + ₹ 2,00,000 PVF(16%, 6) – ₹ 10,75,000

= ₹ 5,00,000 x 3.684 + ₹ 2,00,000 x 0.410 – ₹ 10,75,000

= ₹ 18,42,000 + ₹ 82,000 – ₹ 10,75,000

= ₹ 8,49,000

Since NPV of the decision is positive it is advantageous to acquire Leopard Ltd.

31. The equity shares of XYZ Ltd. are currently being traded at Rs.24 per share in the market. XYZ Ltd. has total 10,00,000 equity shares outstanding in number; and promoters' equity holding in the company is 40%. PQR Ltd. wishes to acquire XYZ Ltd. because of likely synergies. The estimated present value of these synergies is Rs.80,00,000.

Further PQR feels that management of XYZ Ltd. has been over paid. With better motivation, lower salaries and fewer perks for the top management, will lead to savings of Rs.4,00,000 p.a. Top management with their families are promoters of XYZ Ltd. Present value of these savings would add Rs.30,00,000 in value to the acquisition.

Following additional information is available regarding PQR Ltd.:

Earnings per share :	**Rs.4**
Total number of equity shares outstanding :	**15,00,000**
Market price of equity share :	**Rs.40**

Required:

(i) What is the maximum price per equity share which PQR Ltd. can offer to pay for XYZ Ltd.?

(ii) What is the minimum price per equity share at which the management of XYZ Ltd. will be willing to offer their controlling interest?

Answer:

(i) Calculation of maximum price per share at which PQR Ltd. can offer to pay for XYZ Ltd.'s share

Market Value (10,00,000 x ₹ 24)	₹ 2,40,00,000
Synergy Gain	₹ 80,00,000
Saving of Overpayment	₹ 30,00,000
	₹ 3,50,00,000
Maximum Price (₹ 3,50,00,000/10,00,000)	₹ 35

Alternatively, it can also be computed as follows:

Let ER be the swap ratio then,

$$40=\frac{24\times10,00,000+40\times15,00,000+80,00,000+30,00,000}{15,00,000+10,00,000\times ER}$$

ER = 0.875

$$MP = PE \times EPS \times ER = \frac{40}{4} \times ₹\ 4 \times 0.875 = ₹\ 35$$

(ii) Calculation of minimum price per share at which the management of XYZ Ltd.'s will be willing to offer their controlling interest

Value of XYZ Ltd.'s Management Holding (40% of 10,00,000 x ₹ 24)	₹ 96,00,000
Add: PV of loss of remuneration to top management	₹ 30,00,000
	₹ 1,26,00,000
No. of Shares	4,00,000
Minimum Price (₹ 1,26,00,000/4,00,000)	₹ 31.50

PAST EXAMINATION, RTP, MTP QUESTIONS

1. Tatu Ltd. wants to takeover Mantu Ltd. and has offered a swap ratio of 1:2 (0.5 shares for everyone share of Mantu Ltd.). Following information is provided

	Tatu Ltd.	Mantu Ltd.
Profit after tax	₹24,00,000	₹4,80,000
Equity shares outstanding (Nos.)	8,00,000	2,40,000
EPS	₹3	₹2
PE Ratio	10 times	7 times
Market price per share	₹30	₹14

You are required to calculate:
(i) The number of equity shares to be issued by Tatu Ltd. for acquisition of Mantu Ltd.
(ii) What is the EPS of Tatu Ltd. after the acquisition?
(iii) Determine the equivalent earnings per share of Mantu Ltd.
(iv) What is the expected market price per share of Tatu Ltd. after the acquisition, assuming its PE multiple remains unchanged?
(v) Determine the market value of the merged firm.
[MAY 2018 - 8 MARKS]

Answer:

(i) The number of shares to be issued by Tatu Ltd.:
The Exchange ratio is 0.5
So, new Shares = 2,40,000 x 0.5 = 1,20,000 shares.

(ii) EPS of Tatu Ltd. after acquisition:

Total Earnings (Rs. 24,00,000 + Rs. 4,80,000)	Rs. 28,80,000
No. of Shares (8,00,000 + 1,20,000)	9,20,000
EPS (Rs. 28,80,000)/ 9,20,000)	Rs. 3.13

(iii) Equivalent EPS of Mantu Ltd.:

No. of new Shares	0.5
EPS	Rs. 3.13
Equivalent EPS (Rs. 3.13 x 0.5)	Rs. 1.57

(iv) New Market Price of Tatu Ltd. (P/E remaining unchanged)

Present P/E Ratio of A Ltd.	10 times
Expected EPS after merger	Rs. 3.13
Expected Market Price (Rs. 3.13 x 10)	Rs. 31.30

(v) Market Value of merged firm:

Total number of Shares	9,20,000
Expected Market Price	Rs. 31.30
Total value (9,20,000 x 31.30)	Rs. 2,87,96,000

2. The shares of Day Ltd. and Night Ltd. trade at 20 and 15 times their respective P/E ratios.

Day Ltd. considers taking over Night Ltd. By paying Rs. 55 crores considering that the market price of Night Ltd. reflects its true value. It is considering both the following options:
I. Takeover is funded entirely in cash.
II. Takeover is funded entirely in stock.
You are required to calculate the cost of the takeover and advise Day Ltd. on the best alternative.
[MAY 2019 - 8 MARKS]
Answer:

Working Notes:

	Day Ltd.	Night Ltd.
Net Earnings	₹ 5 crores	₹ 3.5 crores
No. of Equity Shares	10,00,000	7,00,000
EPS	50	50
P/E	20 times	15 times
MPS	₹ 1000	₹ 750
Market Value	1,00,00,00,000	52,50,00,000

(i) If takeover is funded by Cash
Since Market Price of Night Ltd. reflects its full value, cost of takeover to Day Ltd is 55 crore – 52.50 crore = Rs. 2.5 crore.

(ii) If the takeover is funded by stock
Number of shares to be issued to Night Ltd.
= Rs. 55 Crore/ Rs. 1000 = 550000 Lakhs

Market Value of Merged Firm
= Rs. 1,00,00,00,000 + Rs. 52,50,00,000
= Rs. 1,52,50,00,000 i.e. Rs. 152.50 Crore
Proportion that Night Ltd.'s shareholders get in Day Ltd.'s Capital Structure will be:
= 5.5 Lakhs / (5.5 Lakhs + 10 Lakhs) = 0.3548
True Cost of Merger = Rs. 152.50 Crore x 0.3548 – Rs. 55 Crore
= - Rs. 0.893 Crore
Since true cost is negative in case of funding from stock, Day Ltd. would better off by funding the takeover by stock.

3. Reliable Industries Ltd. (RIL) is considering a takeover of Sunflower Industries Ltd. (SIL). The particulars of 2 companies are given below:

Particulars	Reliable Industries Ltd	Sunflower Industries Ltd.
Earnings After Tax (EAT)	₹ 20,00,000	₹ 10,00,000
Equity shares O/s	10,00,000	10,00,000
Earnings per share (EPS)	2	1
PE Ratio (Times)	10	5

(i) Calculate the market value of each Company before merger. (3 Marks)

(ii) Calculate the market value of the Post-merger RIL assuming that the management of the shareholders of SIL will accept an offer of one share of RIL for four shares of SIL and there are no synergic effects. Also, calculate the new price per share. (4 Marks)
(iii) Evaluate whether the shareholders of RIL better or worse off than they were before the merger. (1 Mark)
(iv) Calculate the new post-merger EPS and Price per share if the management of RIL estimates that the earnings will increase by 20% due to synergic effects. (3 Marks)
(v) Evaluate whether the shareholders are better off or worse off than before the merger. (1 Mark)
[MTP - MARCH 2018 | RTP - MAY 2019]
Answer:

(i) Market value of Companies before Merger

Particulars	RIL	SIL
EPS	₹ 2	Re.1
P/E Ratio	10	5
Market Price Per Share	₹ 20	₹ 5
Equity Shares	10,00,000	10,00,000
Total Market Value	2,00,00,000	50,00,000

(ii) Post Merger Effects on RIL

	₹
Post merger earnings	30,00,000
Exchange Ratio	1:4
No. of equity shares o/s (10,00,000 + 2,50,000)	12,50,000
EPS: 30,00,000/12,50,000	2.4
PE Ratio	10
Market Value 10 x 2.4	24
Total Value (12,50,000 x 24)	3,00,00,000
Gains From Merger:	₹
Post-Merger Market Value of the Firm	3,00,00,000
Less: Pre-Merger Market Value	
RIL 2,00,00,000	
SIL 50,00,000	2,50,00,000
Total gains from Merger	50,00,000

Apportionment of Gains between the Shareholders:

Particulars	RIL (₹)	SIL (₹)
Post Merger Market Value:		
10,00,000 x 24	2,40,00,000	--
2,50,000 x 24	-	60,00,000
Less: Pre-Merger Market Value	2,00,00,000	50,00,000
Gains from Merger:	40,00,000	10,00,000

Thus, the shareholders of both the companies (RIL + SIL) are better off than before

(iii) Post-Merger Earnings:

Increase in Earnings by 20%

New Earnings: ₹ 30,00,000 x (1+0.20)	₹ 36,00,000
No. of equity shares outstanding:	12,50,000
EPS (₹ 36,00,000/12,50,000)	₹ 2.88
PE Ratio	10
Market Price Per Share: = ₹2.88 x 10	₹ 28.80

∴ Shareholders will be better-off than before the merger situation.

4. The following is the Balance-sheet of Grape Fruit Company Ltd as at March 31st, 2011.

Liabilities	(Rs. in lakhs)	Assets	(Rs. in lakhs)
Equity shares of Rs. 100 each	600	Land and Building	200
14% preference shares of Rs. 100/- each	200	Plant and Machinery	300
13% Debentures	200	Furniture and Fixtures	50
Debenture interest accrued and payable	26	Inventory	150
Loan from bank	74	Sundry debtors	70
Trade creditors	340	Cash at bank	130
		Preliminary expenses	10
		Cost of issue of debentures	5
		Profit and Loss account	525
	1440		1440

The Company did not perform well and has suffered sizable losses during the last few years. However, it is felt that the company could be nursed back to health by proper financial restructuring. Consequently the following scheme of reconstruction has been drawn up :

(1) Equity shares are to be reduced to Rs. 25/- per share, fully paid up;

(2) Preference shares are to be reduced (with coupon rate of 10%) to equal number of shares of Rs. 50 each, fully paid up.

(3) Debenture holders have agreed to forgo the accrued interest due to them. In the future, the rate of interest on debentures is to be reduced to 9 percent.

(4) Trade creditors will forego 25 percent of the amount due to them.
(5) The company issues 6 lakh of equity shares at Rs. 25 each and the entire sum was to be paid on application. The entire amount was fully subscribed by promoters.
(6) Land and Building was to be revalued at Rs. 450 lakhs, Plant and Machinery was to be written down by Rs. 120 lakhs and a provision of Rs.15 lakhs had to be made for bad and doubtful debts.
Required:
(i) Show the impact of financial restructuring on the company's activities.
(ii) Prepare the fresh balance sheet after the reconstructions is completed on the basis of the above proposals.
[MTP - AUGUST 2018 - 8 MARKS/ RTP- NOV 2020]
Answer:

Impact of Financial Restructuring

(i) Benefits to Grape Fruit Ltd.

(a) Reduction of liabilities payable

	Rs. in lakhs
Reduction in equity share capital (6 lakh shares x Rs.75 per share)	450
Reduction in preference share capital (2 lakh shares x Rs.50 per share)	100
Waiver of outstanding debenture Interest	26
Waiver from trade creditors (Rs.340 lakhs x 0.25)	85
	661
(b) *Revaluation of Assets*	
Appreciation of Land and Building (Rs.450 lakhs - Rs.200 lakhs)	250
Total (A)	911

Amount of Rs.911 lakhs utilized to write off losses, fictious assets and over- valued assets.

Writing off profit and loss account	525
Cost of issue of debentures	5
Preliminary expenses	10

Provision for bad and doubtful debts	15
Revaluation of Plant and Machinery (Rs.300 lakhs – Rs.180 lakhs)	120
Total (B)	675
Capital Reserve (A) – (B)	236

(ii) Balance sheet of Grape Fruit Ltd as at 31st March 2011 (after re-construction)

(Rs. in lakhs)

Liabilities	Amount	Assets		Amount
12 lakhs equity shares of Rs. 25/- each	300	Land & Building		450
10% Preference shares of Rs. 50/- each	100	Plant & Machinery		180
Capital Reserve	236	Furnitures & Fixtures		50
9% debentures	200	Inventory		150
Loan from Bank	74	Sundry debtors	70	
Trade Creditors	255	Prov. for Doubtful Debts	-15	55
		Cash-at-Bank (Balancing figure)*		280
	1165			1165

*Opening Balance of Rs.130/- lakhs + Sale proceeds from issue of new equity shares Rs.150/- lakhs.

5. The Nishan Ltd. has 35,000 shares of equity stock outstanding with a book value of Rs.20 per share. It owes debt Rs. 15,00,000 at an interest rate of 12%. Selected financial results are as follows.

Income and Cash Flow	
EBIT	Rs. 80,000
Interest	1,80,000
EBT	(Rs. 1,00,000)
Tax	0
EAT	(Rs. 1,00,000)
Depreciation	Rs. 50,000
Principal repayment	(Rs. 75,000)
Cash Flow	(Rs. 1,25,000)

Capital	
Debt	Rs. 1,500,000
Equity	7,00,000
	Rs. 2,200,000

Evaluate and Restructure the financial line items shown assuming a composition in which creditors agree to convert two thirds of their debt into equity at book value. Assume Nishan will pay tax at a rate of 15% on income after the restructuring, and that principal repayments are reduced proportionately with debt. Demonstrate as to who will control the company and by how big a margin after the restructuring? [MTP - MARCH 2019 - 8 MARKS]

Answer:

Creditors would convert Rs. 10,00,000 in debt to equity by accepting
Rs. 1,000,000/Rs. 20= 50,000 shares of stock.
The remaining Rs. 500,000 of debt would generate interest of
Rs. 500,000 x .12 = Rs. 60,000

Repayment of principal would be reduced by two thirds to Rs. 25,000 per year.
The result is as follows

Income and Cash Flow		Capital	
EBIT	Rs. 80,000	Debt	Rs. 500,000
Interest	60,000	Equity	Rs. 1,700,000
EBT	Rs. 20,000		Rs. 2,200,000
Tax	3,000		
EAT	Rs. 17,000		
Depreciation	50,000		
Principal repayment	(25,000)		
Cash Flow	Rs. 42,000		

After the restructuring there will be a total of (35,000+50,000) 85,000 shares of equity stock outstanding. The original shareholders will still own 35,000 shares (approximately 41%), while the creditors will own 50,000 shares (59%). Hence the creditors will control the company by a substantial majority.

6. What is Reverse Stock Split up and why companies resort it.
[MTP - APRIL 2019 - 5 MARKS]
Answer:

A '**Reverse Stock Split**' is a process whereby a company decreases the number of shares outstanding by combining current shares into fewer or lesser number of shares. For example, in a 5 : 1 reverse split, a company would take back 5 shares and will replace them with one share.
Although, reverse stock split does not result in change in Market value or Market Capitalization of the company but it results in increase in price per share.
Considering above mentioned ratio, if company has 100 million shares outstanding having Market Capitalisation of Rs. 500 crore before split up, the number of shares would be equal to 20 million after the reverse split up and market price per share shall increase from Rs. 50 to Rs. 250.

Reasons for Reverse Split Up

Although Reverse Split up is not so popular especially in India but company carries out reverse split up due to following reasons:

(i) Avoiding delisting from stock exchange: Sometimes as per the stock exchange regulations if the price of shares of a company goes below a certain limit it can be delisted. To avoid such delisting company may resort to reverse stock split up.

(ii) Avoiding removal from constituents of Index: If company's share is one of the constituents of the market index then to avoid their removal of scrip from this list due to persistent fall in the prices of share, the company may take reverse split up route.

(iii) To avoid the tag of "Penny Stock": If the price of shares of a company goes below a limit it may be called "Penny Stock". In order to improve the image of the company and avoiding this stage, the company may go for Reverse Stock Split.

(iv) To attract Institutional Investors and Mutual Funds: It might be possible that institutional investors may be shying away from acquiring low value shares and hence to attract these investors the company may adopt the route of Reverse Stock Split up to increase the price per share.

7.

(a) MK Ltd. is considering acquiring NN Ltd. The following information is available:

Company	Earning after Tax (₹)	No. of Equity Shares	Market Value Per Share (₹)
MK Ltd.	60,00,000	12,00,000	200.00
NN Ltd.	18,00,000	3,00,000	160.00

Exchange of equity shares for acquisition is based on current market value as above. There is no synergy advantage available.

(i) Find the earning per share for company MK Ltd. after merger, and

(ii) Find the exchange ratio so that shareholders of NN Ltd. would not be at a loss.

(MTP-OCT 2020)

Answer:

(a) (i) Earning per share of company MK Ltd after merger:-

Exchange ratio 160 : 200 = 4 : 5.

that is 4 shares of MK Ltd. for every 5 shares of NN Ltd.

∴ Total number of shares to be issued = 4/5 × 3,00,000 = 2,40,000 Shares.

∴ Total number of shares of MK Ltd. and NN Ltd.=12,00,000 (MK Ltd.)+2,40,000 (NN Ltd.)

= 14,40,000 Shares

Total profit after tax = ₹ 60,00,000 MK Ltd.

= ₹ 18,00,000 NN Ltd.

= ₹ 78,00,000

∴ EPS. (Earning Per Share) of MK Ltd. after merger

₹ 78,00,000/14,40,000 = ₹ 5.42 per share

(ii) To find the exchange ratio so that shareholders of NN Ltd. would not be at a Loss:

Present earning per share for company MK Ltd.

= ₹ 60,00,000/12,00,000 = ₹ 5.00

Present earning per share for company NN Ltd.

= ₹ 18,00,000/3,00,000 = ₹ 6.00

∴ Exchange ratio should be 6 shares of MK Ltd. for every 5 shares of NN Ltd.

∴ Shares to be issued to NN Ltd. = 3,00,000 × 6/5 = 3,60,000 shares

Now, total No. of shares of MK Ltd. and NN Ltd. =12,00,000 (MK Ltd.) +3,60,000 (NN Ltd.)

= 15,60,000 shares

∴ EPS after merger = ₹ 78,00,000/15,60,000 = ₹ 5.00 per share

Total earnings available to shareholders of NN Ltd. after merger = 3,60,000 shares × ₹ 5.00 = ₹ 18,00,000.

This is equal to earnings prior merger for NN Ltd.

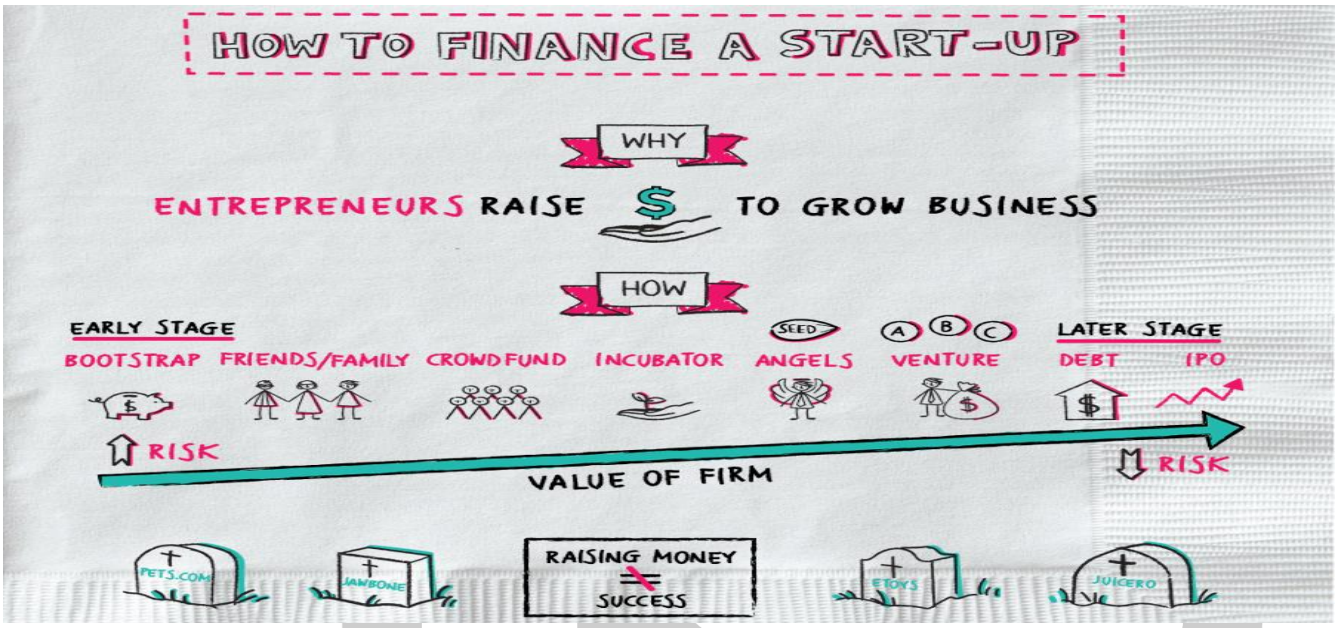
∴ Exchange ratio on the basis of earnings per share is recommended.

CHAPTER-14 STARTUP FINANCE

QUESTIONS FROM STUDY MATERIAL

1. Explain some of the innovative sources for funding a start-up.

Answer:



Every startup needs access to capital, whether for funding product development, acquiring machinery and inventory, or paying salaries to its employee. Most entrepreneurs think first of bank loans as the primary source of money, only to find out that banks are really the least likely benefactors for startups. So, innovative measures include maximizing non-bank financing. Here are some of the sources for funding a startup:

(i) Personal financing. It may not seem to be innovative but you may be surprised to note that most budding entrepreneurs never thought of saving any money to start a business. This is important because most of the investors will not put money into a deal if they see that you have not contributed any money from your personal sources.

(ii) Personal credit lines. One qualifies for personal credit line based on one's personal credit efforts. Credit cards are a good example of this. However, banks are very cautious while granting personal credit lines. They provide this facility only when the business has enough cash flow to repay the line of credit.

(iii) Family and friends. These are the people who generally believe in you, without even thinking that your idea works or not. However, the loan obligations to friends and relatives should always be in writing as a promissory note or otherwise.

(iv) Peer-to-peer lending. In this process group of people come together and lend money to each other. Peer to peer to lending has been there for many years. Many small and ethnic business groups having similar faith or interest generally support each other in their start up endeavors.

(v) Crowdfunding. Crowdfunding is the use of small amounts of capital from a large number of individuals to finance a new business initiative. Crowdfunding makes use of the easy accessibility of vast networks of people through social media and crowdfunding websites to bring investors and entrepreneurs together.

(vi) Microloans. Microloans are small loans that are given by individuals at a lower interest to a new business ventures. These loans can be issued by a single individual or aggregated across a number of individuals who each contribute a portion of the total amount.

(vii) Vendor financing. Vendor financing is the form of financing in which a company lends money to one of its customers so that he can buy products from the company itself. Vendor financing also takes place when many manufacturers and distributors are convinced to defer payment until the goods are sold. This means extending the payment terms to a longer period for e.g. 30 days payment period can be extended to 45 days or 60 days. However, this depends on one's credit worthiness and payment of more money.

(viii) Purchase order financing. The most common scaling problem faced by startups is the inability to find a large new order. The reason is that they don't have the necessary cash to produce and deliver the product. Purchase order financing companies often advance the required funds directly to the supplier. This allows the transaction to complete and profit to flow up to the new business.

(ix) Factoring accounts receivables. In this method, a facility is given to the seller who has sold the good on credit to fund his receivables till the amount is fully received. So, when the goods are sold on credit, and the credit period (i.e. the date upto which payment shall be made) is for example 6 months, factor will pay most of the sold amount up front and rest of the amount later. Therefore, in this way, a startup can meet his day to day expenses.

2. What do you mean by Pitch Presentation in context of Start-up Business?
[ALSO IN MTP - OCTOBER 2018 - 6 MARKS]

Answer:

Pitch presentation is a short and brief presentation (not more than 20 minutes) to investors explaining about the prospects of the company and why they should invest into the startup business. So, pitch deck resentation is a brief presentation basically using PowerPoint to provide a quick overview of business plan and

convincing the investors to put some money into the business. Pitch presentation can be made either during face to face meetings or online meetings with potential investors, customers, partners, and co-founders. Here, some of the methods have been highlighted below as how to approach a pitch presentation:

(i) Introduction: To start with, first step is to give a brief account of yourself i.e. who are you? What are you doing? But care should be taken to make it short and sweet. Also, use this opportunity to get your investors interested in your company. One can also talk up the most interesting facts about one's business, as well as any huge milestones one may have achieved.

(ii) Team: The next step is to introduce the audience the people behind the scenes. The reason is that the investors will want to know the people who are going to make the product or service successful. Moreover, the investors are not only putting money towards the idea but they are also investing in the team. Also, an attempt should be made to include the background of the promoter, and how it relates to the new company. Moreover, if possible, it can also be highlighted that the team has worked together in the past and achieved significant results.

(iii) Problem: Further, the promoter should be able to explain the problem he is going to solve and solutions emerging from it. Further the investors should be convinced that the newly introduced product or service will solve the problem convincingly.
For instance, when Facebook was launched in 2004, it added some new features which give it a more professional and lively look in comparison to Orkut which was there for some time. It enabled Facebook to become an instant hit among the people. Further, customers have no privacy while using Orkut. However, in Facebook, you can view a person's profile only if he adds you to his list. These simple yet effective advantages that Facebook has over Orkut make it an extremely popular social networking site.

(iv) Solution: It is very important to describe in the pitch presentation as to how the company is planning to solve the problem. For instance, when Flipkart first started its business in 2007, it brought the concept of e-commerce in India but when they started, payment through credit card was rare. So, they introduced the system of payment on the basis of cash on delivery which was later followed by other e-commerce companies in India. The second problem was the entire supply chain system. Delivering goods on time is one of the most important factors that determine the success of an ecommerce company. Flipkart addressed this issue by launching their own supply chain management system to deliver orders in a timely manner. These innovative techniques used by Flipkart enabled them to raise large amount of capital from the investors.

(v) Marketing/Sales: This is a very important part where investors will be deeply interested. The market size of the product must be communicated to the investors. This can include profiles of target customers, but one should be prepared to answer questions about how the promoter is planning to attract the customers. If a business is already selling goods, the promoter can also brief the investors about the growth and forecast future revenue.

(vi) Projections or Milestones: It is true that it is difficult to make financial projections for a startup concern. If an organization doesn't have a long financial history, an educated guess can be made. Projected financial statements can be prepared which gives an organization a brief idea about where is the business heading? It tells us that whether the business will be making profit or loss?

Financial projections include three basic documents that make up a business's financial statements.

- Income statement**:** This projects how much money the business will generate by projecting income and expenses, such as sales, cost of goods sold, expenses and capital. For your first year in business, you'll want to create a monthly income statement. For the second year, quarterly statements will suffice. For the following years, you'll just need an annual income statement.
- Cash flow statement**:** A projected cash flow statement will depict how much cash will be coming into the business and out of that cash how much cash will be utilized into the business. At the end of each period (e.g. monthly, quarterly, annually), one can tally it all up to show either a profit or loss.
- Balance sheet**:** The balance sheet shows the business's overall finances including assets, liabilities and equity. Typically, one will create an annual balance sheet for one's financial projections.

(vii) Competition: Every business organization has competition even if the product or service offered is new and unique. It is necessary to highlight in the pitch presentation as to how the products or services are different from their competitors. If any of the competitors have been acquired, their complete details like name of the organization, acquisition prices etc. should also be highlighted.

(viii) Business Model: The term business model is a wide term denoting core aspects of a business including purpose, business process, target customers, offerings, strategies, infrastructure, organizational structures, sourcing, trading practices, and operational processes and policies including culture.
Further, as per Investopedia, a business model is the way in which a company generates revenue and makes a profit from company operations. Analysts use the term gross profit as a way to compare the efficiency and effectiveness of a firm's business model. Gross profit is calculated by subtracting the cost of goods sold from revenues. A business model can be illustrated with the help of an example. There are two companies – company A and company B. Both the companies are engaged in the business of renting movies. Prior to the advent of internet both the companies rent movies physically. Both the companies madeRs. 5 crore as revenues. Cost of goods sold wasRs. 4 crore. So, the companies madeRs. 1 crore as gross profit. After the introduction of internet, company A started to offer movies online instead of renting or selling it physically. This change affected the business model of company A positively. Revenue is stillRs. 5 crore but the significant part is that cost of goods sold is nowRs. 2 crore only. This is because online sales lead to significant reduction of storage and distribution costs. So, the gross profit increases from 20% to 60%.
Therefore, Company A isn't making more in sales, but it figured out a way to revolutionize its business model, which greatly reduces costs. Managers at company A have an additional 40% more in margin to play with than managers at company A. Managers at company A have little room for error and they have to tread carefully. Hence, every investor wants to get his money back, so it's important to tell them in a pitch presentation as to how they should plan on generating revenue. It is better to show the investors a list of the various revenue streams for a business model and the timeline for each of them. Further, how to price the product and what does the competitor charge for the same or similar product shall also be highlighted. It is also beneficial to discuss the lifetime value of the customer and what should be the strategy to keep him glued to their product.

(ix) Financing: If a startup business firm has raised money, it is preferable to talk about how much money has already been raised, who invested money into the business and what they did about it. If no money has been raised till date, an explanation can be made regarding how much work has been accomplished with the help of minimum funding that the company is managed to raise.
It is true that investors like to see entrepreneurs who have invested their own money. If a promoter is pitching to raise capital he should list how much he is looking to raise and how he intend to use the funds.

PAST EXAMINATION, RTP & MTP QUESTIONS

1. Explain the advantages of bringing venture capital in the company.
[MAY 2018 - 4 MARKS]
Answer:

Advantages of bringing VC in the company:
: It injects long- term equity finance which provides a solid capital base for future growth.
: The venture capitalist is a business partner, sharing both the risks and rewards. Venture capitalists are rewarded with business success and capital gain.
: The venture capitalist is able to provide practical advice and assistance to the company based on past experience with other companies which were in similar situations.
: The venture capitalist also has a network of contacts in many areas that can add value to the company.
: The venture capitalist may be capable of providing additional rounds of funding should it be required to finance growth.
: Venture capitalists are experienced in the process of preparing a company for an initial public offering (IPO) of its shares onto the stock exchanges or overseas stock exchange such as NASDAQ.
:They can also facilitate a trade sale.

2. Explain Angel Investors.
OR
Briefly explain how Angel Investors finance the Startups.
[NOV 2018 - 4 MARKS | MTP - OCTOBER 2019 - 4 MARKS]
Answer:
Angel investors invest in small startups or entrepreneurs. Often, angel investors are entrepreneur's family and friends. The capital angel investors provide may be a one-time investment to help the business propel or an ongoing injection of money to support and carry the company through its difficult early stages.
Angel investors provide more favorable terms compared to other lenders, since they usually invest in the entrepreneur starting the business rather than the viability of the business. Angel investors are focused on helping startups take their first steps, rather than the possible profit they may get from the business. Essentially, angel investors are the opposite of venture capitalists.
Angel investors are also called informal investors, angel funders, private investors, seed investors or business angels. These are affluent individuals who inject capital for startups in exchange for ownership equity or convertible debt. Some angel investors invest through crowdfunding platforms online or build angel investor networks to pool in capital.

Angel investors typically use their own money, unlike venture capitalists who take care of pooled money from many other investors and place them in a strategically managed fund. Though angel investors usually represent individuals, the entity that actually provides the fund may be a limited liability company, a business, a trust or an investment fund, among many other kinds of vehicles.
Angel investors who seed startups that fail during their early stages lose their investments completely. This is why professional angel investors look for opportunities for a defined exit strategy, acquisitions or initial public offerings (IPOs).

3. Compare and contrast startups and entrepreneurship. Describe the priorities and challenges which startups in India are facing.
[MTP - MARCH 2018 & APRIL 2018 - 8 MARKS]
Answer:

Differences between a startup and entrepreneurship

Startups are different from entrepreneurship. The major differences between them have been discussed in the following paragraphs:

(i) Start up is a part of entrepreneurship. Entrepreneurship is a broader concept and it includes a startup firm.

(ii) The main aim of startup is to build a concern, conceptualize the idea which it has developed into a reality and build a product or service. On the other hand, the major objective of an already established entrepreneurship concern is to attain opportunities with regard to the resources they currently control.

(iii) A startup generally does not have a major financial motive whereas an established entrepreneurship concern mainly operates on financial motive.

Priorities and challenges which startups in India are facing

The priority is on bringing more and more smaller firms into existence. So, the focus is on need based, instead of opportunity based entrepreneurship. Moreover, the trend is to encourage self -employment rather than large, scalable concerns.

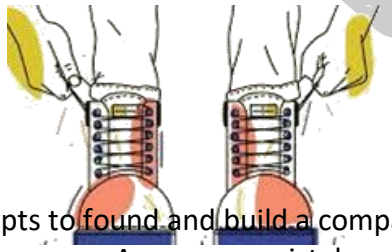
The main challenge with the startup firms is getting the right talent. And, paucity of skilled workforce can hinder the chances of a startup organization's growth and development. Further, startups had to comply with numerous regulations which escalates it's cost. It leads to further delaying the chances of a breakeven or even earning some amount of profit.

4. Explain various stages of Venture Capital Funding.
[MTP - AUGUST 2018 - 4 MARKS]
Answer:

Stages of Venture Capital Funding

1. *Seed Money:* Low level financing needed to prove a new idea.
2. Start-up: Early stage firms that need funding for expenses associated with marketing and product development.
3. First-Round: Early sales and manufacturing funds.
4. Second-Round: Working capital for early stage companies that are selling product, but not yet turning in a profit.
5. Third Round: Also called Mezzanine financing, this is expansion money for a newly profitable company.
6. Fourth-Round: Also called bridge financing, it is intended to finance the "going public" process

5. Discuss Bootstrapping as a mode of financing for startups.
[MTP - APRIL 2019 - 5 MARKS/ RTP- NOV 2020]
Answer:



Bootstrapping as a mode of financing for start ups

An individual is said to be boot strapping when he or she attempts to found and build a company from personal finances or from the operating revenues of the new company. A common mistake made by most founders is that they make unnecessary expenses towards marketing, offices and equipment they cannot really afford. So, it is true that more money at the inception of a business leads to complacency and wasteful

expenditure. On the other hand, investment by startups from their own savings leads to cautious approach. It curbs wasteful expenditures and enable the promoter to be on their toes all the time.
Here are some of the methods in which a startup firm can bootstrap:

(a) Trade Credit: When a person is starting his business, suppliers are reluctant to give trade credit.
They will insist on payment of their goods supplied either by cash or by credit card. However, a way out in this situation is to prepare a well-crafted financial plan. The next step is to pay a visit to the supplier's office. If the business organization is small, the owner can be directly contacted. On the other hand, if it is a big firm, the Chief Financial Officer can be contacted and convinced about the financial plan.
Communication skills are important here. The financial plan has to be shown. The owner or the financial officer has to be explained about the business and the need to get the first order on credit in order to launch the venture. The owner or financial officer may give half the order on credit and balance on delivery. The trick here is to get the goods shipped and sell them before payingto them. One can also borrow to pay for the good sold. But there is interest cost also. So trade credit is one of the most important ways to reduce the amount of working capital one needs. This is especially true in retail operations.
When you visit your supplier to set up your order during your startup period, ask to speak directly to the owner of the business if it's a small company. If it's a larger business, ask to speak to the chief financial officer or any other person who approves credit. Introduce yourself. Show the officer the financial plan that you have prepared. Tell the owner or financial officer about your business, and explain that you need to get your first orders on credit in order to launch your venture.
The owner or financial officer may give half the order on credit, with the balance due upon delivery. Of course, the trick here is to get the goods shipped, and sell them before one has to pay for them. One could borrow money to pay for the inventory, but you have to pay interest on that money. So trade credit is one of the most important ways to reduce the amount of working capital one needs. This is especially true in retail operations.

(b) Factoring: This is a financing method where accounts receivable of a business organization is sold to a commercial finance company to raise capital. The factor then got hold of the accounts receivable of a business organization and assumes the task of collecting the receivables as well as doing what would've been the paperwork. Factoring can be performed on a non-notification basis. It means customers may not be told that their accounts have been sold. However, there are merits and demerits to factoring. The process of factoring may actually reduce costs for a business organization. It can actually reduce costs associated with maintaining accounts receivable such as bookkeeping, collections and credit verifications. If comparison can be made between these costs and fee payable to the factor, in many cases it has been observed that it even proved fruitful to utilize this financing method. In addition to reducing internal costs of a business, factoring also frees up money that would otherwise be tied to receivables. This is especially true for businesses that sell to other businesses or to government; there are often long delays in payment that this would offset. This money can be used to generate profit through other avenues of the company. Factoring can be a very useful tool for raising money and keeping cash flowing.

(c) Leasing: Another popular method of bootstrapping is to take the equipment on lease rather than purchasing it. It will reduce the capital cost and also help lessee (person who take the asset on lease) to claim tax exemption. So, it is better to a take a photocopy machine, an automobile or a van on lease to avoid paying out lump sum money which is not at all feasible for a startup organization.

Further, if you are able to shop around and get the best kind of leasing arrangement when you're starting up a new business, it's much better to lease. It's better, for example, to lease a photocopier, rather than pay $3,000 for it; or lease your automobile or van to avoid paying out $8,000 or more.
There are advantages for both the startup businessman using the property or equipment (i.e. the lessee) and the owner of that property or equipment (i.e. the lessor.) The lessor enjoys tax benefits in the form of depreciation on the fixed asset leased and may gain from capital appreciation on the property, as well as making a profit from the lease. The lessee benefits by making smaller payments retain the ability to walk away from the equipment at the end of the lease term. The lessee may also claim tax benefit in the form of lease rentals paid by him.

6. Compare and contrast start-ups and entrepreneurship. Describe the priorities and challenges which start-ups in India are facing.
[MTP - OCTOBER 2019 - 6 MARKS]
Answer:

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Priorities and challenges which start-ups in India are facing

The priority is on bringing more and more smaller firms into existence. So, the focus is on need based, instead of opportunity based entrepreneurship. Moreover, the trend is to encourage selfemployment rather than large, scalable concerns. The main challenge with the startup firms is getting the right talent. And, paucity of skilled workforce can hinder the chances of a startup organization's growth and development. Further, startups had to comply with numerous regulations which escalates it's cost. It leads to further delaying the chances of a breakeven or even earning some amount of profit.

7. Examine briefly the various innovative methods of funding the Startups. (MTP-OCT 2020-4 Marks)
Answer:

Here are some of the innovative sources for funding a Startup:
(i) Personal financing. It may not seem to be innovative but you may be surprised to note that most budding entrepreneurs never thought of saving any money to start a business. This is important because most of the investors will not put money into a deal if they see that you have not contributed any money from your personal sources.
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