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COMPILER 4.0 SUPPLEMENT

CA FINAL AFM

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INDEX

Note – No. of Questions Include Theory + Practical Questions that has been added to Compiler 5.0 which is not there in Compiler 4.0

CHAPTER 1
FINANCIAL POLICY & CORPORATE STRATEGY

Question 1

i. What is sustainable growth rate?

ii. Mr. X has submitted the following data:

Particulars	(₹) in Lakhs
Total Assets	250
Total Liabilities	220
Net Income	12
Dividend Paid	4.5
Sales	100

Mr. X wants to know to what extent sales can be increased without going for additional borrowings by using Sustainable Growth Rate (SGR) concept?

Answer:

(i) 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.

(ii)

Sl.No	Particulars	Amount in ₹Lakhs
(a)	Total Assets	250.00
(b)	Total Liabilities	220.00
(c)	Net Income	12.00
(d)	Dividend Paid	4.50
(e)	Sales	100.00
(f)	Equity (a) – (b)	30.00
(g)	Return on Equity (ROE) (c) /(f)	40.00%
(h)	Dividend pay-out Ratio (d) /(c)	37.50%
(i)	SGR [g × (1-h)]	25.00%*
(j)	Additional Sales can be achieved without further borrowings (e) × (i)	25.00
(k)	Maximum sales can be achieved without further borrowings (e) + (j)	125.00

* Alternatively, it can also be computed as follows

Question 2

Discuss the Roll of CFO

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Answer:

Traditionally, the main role of CFO was concentrated to wealth maximisation for shareholders by taking care of financial health of an organization and overseeing and implementing adequate financial controls. However, in recent time because of globalization, growth in information and communications, pandemic situation etc. their range of responsibilities has been drastically expanded, driven by complexity and changing expectations.

Now a days in addition to fulfilling traditional role relating to governance, compliances and controls, and business ethics as a part of the leadership of role CFOs are also expected to contribute their support in strategic and operational decision making.

In post-pandemic time their role has been advanced in the following areas in addition to traditional role:

1) **Risk Management:** Now a days the CFOs are expected to look after the overall functioning of the framework of Risk Management system of an organisation.
2) **Supply Chain:** Post pandemic supply chain management system has been posing the challenge for the company to maintain the sustainable growth. Since CFOs are care takers of finance of the company, considering the financial viability of the Supply Chain Management their role has now become more critical.
3) **Mergers, acquisitions, and Corporate Restructuring:** Since in recent period to maintain the growth and capture the market share there has been a spate of Mergers and Acquisitions and hence the role of CFOs has become more crucial because these are strategic decision and any error in them can lead to collapse of the whole business.
4) **Environmental, Social and Governance (ESG) Financing:** With the evolving of the concept of ESG their role has been shifted from traditional financing to sustainability financing. Thus, from above discussion it can be concluded that in today's time CFOs are taking a leadership role in Value Creation for the organisation and that too on sustainable basis for a longer period.

Question 3

What are the fundamental elements of a strategic financial framework, and how do they contribute to maximizing shareholder wealth?

Answer:

1) **Clear and Realistic Strategy:**
   - **Definition:** A strategy provides a long-term vision for the organization, outlining its direction and scope.
   - **Contribution to Wealth Maximization:**

- Helps achieve a competitive advantage by aligning resources to meet stakeholder expectations.
- Guides investment decisions toward opportunities that maximize returns while managing risks.

2) Financial Resources, Controls, and Systems:

- **Definition:** This involves ensuring the availability of financial resources, implementing controls, and utilizing systems for financial management.
- **Contribution to Wealth Maximization:**
  - Ensures adequate funding and liquidity for operational and strategic needs.
  - Facilitates accurate financial reporting and analysis, supporting informed decision-making.

3) Right Management Team and Processes:

- **Definition:** The management team is responsible for executing strategies and managing processes effectively.
- **Contribution to Wealth Maximization:**
  - Drives implementation of strategic goals, ensuring alignment with financial objectives.
  - Enhances the organization's ability to adapt to changing environments and seize opportunities.

Question 4

Explain the concept of Sustainable Growth Rate and also state assumptions of Sustainable growth model.

MTP Mar 24 (4 Marks)

Answer:

✓ 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 equity ratio; and the retention rate, which is defined as the fraction of earnings retained in the business.

SGR = ROE × (1- Dividend payment ratio)

Sustainable growth models **assumes** 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.

Question 5

Explain how the sustainable growth model assists in managing the risks associated with additional financing. What options do mature firms have when their actual growth rates are less than their sustainable growth rates?

Answer:

The sustainable growth model is particularly helpful in situations where a borrower requests additional financing. The need for additional loans creates a potentially risky situation of too much debt and too little equity. Either additional equity must be raised, or the borrower will have to reduce the rate of expansion to a level that can be sustained without an increase in financial leverage.

Mature firms often have actual growth rates that are less than the sustainable growth rate. In these cases, management's principal objective is finding productive uses for the cash flows that exist in excess of their needs. Options available to businesses in such cases include:

1) Returning the money to shareholders through increased dividends or common stock repurchases.
2) Reducing the firm's debt load.
3) Increasing possession of lower-earning liquid assets.

These actions serve to decrease the sustainable growth rate. Alternatively, these firms can attempt to enhance their actual growth rates through the acquisition of rapidly growing companies.

Growth can come from two sources: increased volume and inflation. The inflationary increase in assets must be financed as though it were real growth. Inflation increases the amount of external financing required and increases the debt-to-equity ratio when this ratio is measured on a historical cost basis. Thus, if creditors require that a firm's historical cost debt-to-equity ratio stay constant, inflation lowers the firm's sustainable growth rate.

$SGR = \frac{g(1-h)}{1-[g(1-h)]}$ = 33.33% and then Additional Sales shall be ₹33.33 Lakhs and Maximum Sales can be achieved without further borrowings shall be ₹133.33 Lakhs

CHAPTER 2
RISK MANAGEMENT

Question 1

Mr. Bull is a rational risk taker. He takes his position in a single stock for 4 days in a week. He does not take a position on Friday to avoid weekend effect and takes position only for four days in a week i.e. Monday to Thursday. He transfers the amount on Monday morning and withdraws the balance on Friday morning. He desires to make a maximum investment where Value At Risk (VAR) should not exceed the balance lying in his bank account. The position by his manager, as per standing instructions, is taken on the free balance lying in the bank account in the morning on each Monday.

On Monday morning (before opening of the capital market) he has transferred an amount of ₹11 Crore to his bank account. A fixed deposit also matured on this Monday. The maturity amount of ₹63,42,560 was also credited to his account by the bank in the morning of the Monday. However, Mr. Bull received the intimation of the same in the evening. The bank needs a minimum balance of ₹1,000 all the time. The value of Z score, at the required confidence level of 99 percent is 2.33.

The other information with respect to stocks X and Y, which are under consideration for this week, is as under:

X		Y	
Return	Probability	Return	Probability
6	0.10	4	0.10
7	0.25	6	0.20
8	0.30	8	0.40
9	0.25	10	0.20
10	0.10	12	0.10

You are required to recommend a single stock, where maximum investment can be made.

May 23 (8 Marks)

Answer:

(a) Working Notes:

(1) Security X

Return (1)	Prob. (2)	(1) × (2)	Dev.	Dev.2	Dev.2 × Prob.
6	0.10	0.60	-2	4	0.40
7	0.25	1.75	1	1	0.25
8	0.30	2.40	0	0	0
9	0.25	2.25	1	1	0.25
10	0.10	1.00	2	4	0.40
		8.00			1.30

Expected Return (Rx) = 8.00%

Variance (σ_X^2) = 1.30

$$\text{Standard Deviation } (\sigma_X) = \sqrt{1.30} = \mathbf{1.14}$$

(2) Security Y

Return (1)	Prob. (2)	(1) × (2)	Dev.	Dev.^{2}	Dev.^{2} × Prob.
4	0.10	0.40	-4	16	1.60
6	0.20	1.20	-2	4	0.80
8	0.40	3.20	0	0	0
10	0.20	2.00	2	4	0.80
12	0.10	1.20	4	16	1.60
		8.00			**4.80**

Expected Return (R_Y) = 8.00%

Variance (σ_Y^2) = 4.80

$$\text{Standard Deviation } (\sigma_Y) = \sqrt{4.80} = 2.19$$

	No. of days	X	Y
Amount Transferred		₹110000000	₹110000000
Maturity Proceeds of Fixed Deposit		₹6342560	₹6342560
Amount available in bank account		₹116342560	₹116342560
Minimum balance to be kept		₹1000	₹1000
Available amount which can be used for potential investment for 4 days		₹116341560	₹116341560
Maximum loss for 4 days at 99% Level	4	₹116341560	₹116341560
Maximum loss for 1 day at 99% level			
=			
Maximum loss for 4 days/ $\sqrt{\text{No. of days}}$ = 116341560/ $\sqrt{4}$	1	₹58170780	₹58170780
Z Score at 99% level		2.33	2.33
Volatility in terms of ₹		₹24966000	₹24966000
(Maximum Loss/Z Score at 99% Level)			
Standard Deviation		0.0114	0.0219
Maximum Investment (Volatility in terms of ₹ / SD)		**₹2190000000**	**₹1140000000**

Recommendation: Position should be taken in X.

CHAPTER 3
ADVANCED CAPITAL BUDGETING

Question 1

Jumble Consultancy Group has determined relative utilities of cash flows of two forthcoming projects of its client company as follows:

Cash Flow in ₹	-15000	-10000	-4000	0	15000	10000	5000	1000
Utilities	-100	-60	-3	0	40	30	20	10

The distribution of cash flows of project A and Project B are as follows:

Project A					
Cash Flow (₹)	-15000	- 10000	15000	10000	5000
Probability	0.10	0.20	0.40	0.20	0.10
Project B					
Cash Flow (₹)	- 10000	-4000	15000	5000	10000
Probability	0.10	0.15	0.40	0.25	0.10

Which project should be selected and why? StudyMat, May 2011

Answer:

Evaluation of project utilizes of Project A and Project B

Project A			
Cash flow (in ₹)	**Probability**	**Utility**	**Utility value**
-15,000	0.10	-100	-10
-10,000	0.20	-60	-12
15,000	0.40	40	16
10,000	0.20	30	6
5,000	0.10	20	2
			2

Project B			
Cash flow (in ₹)	**Probability**	**Utility**	**Utility value**
-10,000	0.10	-60	-6
-4,000	0.15	-3	-0.45
15,000	0.40	40	16
5,000	0.25	20	5
10,000	0.10	30	3
			17.55

Project B should be selected as its expected utility is more.

Question 2

Cyber Company is considering two mutually exclusive projects. Investment outlay of both the projects is ₹5,00,000 and each is expected to have a life of 5 years. Under three possible situations their annual cash flows and probabilities are as under:

		Cash Flow (₹)	
Situation	Probabilities	Project A	Project B
Good	0.3	6,00,000	5,00,000
Normal	0.4	4,00,000	4,00,000
Worse	0.3	2,00,000	3,00,000

The cost of capital is 7 per cent, which project should be accepted? Explain with workings.

StudyMat

Answer:

Project A

Expected Net Cash flow (ENCF)

0.3 (6,00,000) + 0.4 (4,00,000) + 0.3 (2,00,000) = 4,00,000

$\sigma^2 = 0.3\ (6,00,000 - 4,00,000)^2 + 0.4\ (4,00,000 - 4,00,000)^2 + 0.3\ (2,00,000 - 4,00,000)^2$

$\sigma = \sqrt{24,00,00,00,000}$

σ = 1,54,919.33

Present Value of Expected Cash Inflows = 4,00,000 × 4.100 = 16,40,000

NPV = 16,40,000 - 5,00,000 = 11,40,000

Project B

ENCF = 0.3 (5,00,000) + 0.4 (4,00,000) + 0.3 (3,00,000) = 4,00,000

$\sigma^2 = 0.3\ (5,00,000 - 4,00,000)^2 + 0.4\ (4,00,000 - 4,00,000)^2 + 0.3\ (3,00,000 - 4,00,000)^2$

$\sigma = \sqrt{6,00,00,00,000}$

σ = 77,459.66

Present Value of Expected Cash Inflows = 4,00,000 × 4.100 = 16,40,000

NPV = 16,40,000 - 5,00,000 = 11,40,000

Recommendation: NPV in both projects being the same, the project should be decided on the basis of standard deviation and hence project 'B' should be accepted having lower standard deviation, means less risky.

Question 3

A company is considering Projects X and Y with following information:

Project	Expected NPV (₹)	Standard deviation

X	1,22,000	90,000
Y	2,25,000	1,20,000

i. Which project will you recommend based on the above data?

ii. Explain whether your opinion will change, if you use coefficient of variation as a measure of risk.

iii. Which measure is more appropriate in this situation and why?

StudyMat

Answer:

(i) On the basis of standard deviation project X be chosen because it is less risky than Project Y having higher standard deviation.

(ii)

$$CV_x = \frac{SD}{ENPV} = \frac{90,000}{1,22,000} = \mathbf{0.738}$$

$$CV_y = \frac{1,20,000}{2,25,000} = \mathbf{0.533}$$

On the basis of Co-efficient of Variation (C.V.) Project X appears to be riskier and hence Y should be accepted.

(iii) However, the NPV method in such conflicting situation is best because the NPV method is in compatibility of the objective of wealth maximisation in terms of time value.

Question 4

KLM Ltd., is considering taking up one of the two projects-Project-K and Project-S both the projects having same life require equal investment of ₹80 lakhs each. Both are estimated to have almost the same yield. As the company is new to this type of business, the cash flow arising from the projects cannot be estimated with certainty. An attempt was therefore, made to use probability to analyse the pattern of cash flow from other projects during the first year of operations. This pattern is likely to continue during the life of these projects. The results of the analysis are as follows:

Project K		Project S	
Cash Flow (in ₹)	Probability	Cash Flow (in ₹)	Probability
11	0.10	09	0.10
13	0.20	13	0.25
15	0.40	17	0.30
17	0.20	21	0.25
19	0.10	25	0.10

Required:

i. Calculate variance, standard deviation and co-efficient of variance for both the projects.

ii. Which of the two projects is riskier?

StudyMat

Answer:

Calculation of Variance and Standard Deviation

Project K

Expected Net Cash Flow

= (0.10 × 11) + (0.20 × 13) + (0.40 × 15) + (0.20 × 17) + (0.10 × 19)

= 1.1 + 2.6 + 6 + 3.4 + 1.9 = 15

σ^2 = 0.10 (11 - 15)^2 + 0.20(13 – 15)^2 + 0.40 (15 - 15)^2 + 0.20 (17 – 15)^2 + 0.10 (19 - 15)^2

= 1.6 + 0.8 + 0 + 0.8 + 1.6 = 4.8

$\boldsymbol{\sigma = \sqrt{4.8} = 2.19}$

Project S

Expected Net Cash Flow

= (0.10 × 9) + (0.25 × 13) + (0.30 × 17) + (0.25 × 21) + (0.10 × 25)

= 0.9 + 3.25 + 5.1 + 5.25 + 2.5 = 17

σ^2 = 0.1 (9 - 17)^2 + 0.25 (13 - 17)^2 + 0.30 (17 - 17)^2 + 0.25 (21 – 17)^2 + 0.10 (25 – 17)^2

= 6.4 + 4 + 0 + 4 + 6.4 = 20.8

$\boldsymbol{\sigma = \sqrt{20.8} = 4.56}$

Calculation of Coefficient of Variation

$$\text{Coefficient of Variation} = \frac{\text{Standard Deviation}}{\text{Mean}}$$

$$\text{Project K} = \frac{2.19}{15} = \mathbf{0.146}$$

$$\text{Project S} = \frac{4.56}{17} = \mathbf{0.268}$$

Project S is riskier as it has higher Coefficient of Variation.

Question 5

Shivam Ltd. is considering two mutually exclusive projects A and B. Project A costs ₹36,000 and project B ₹30,000. You have been given below the net present value probability distribution for each project.

Project A		Project B	
NPV estimates (₹)	Probability	NPV estimates (₹)	Probability
15,000	0.2	15,000	0.1
12,000	0.3	12,000	0.4
6,000	0.3	6,000	0.4
3,000	0.2	3,000	0.1

i. Compute the expected net present values of projects A and B.

ii. Compute the risk attached to each project i.e. standard deviation of each probability distribution.

iii. Compute the profitability index of each project.

iv. Which project do you recommend? State with reasons.

StudyMat

Answer:

(i) Statement showing computation of expected net present value of Projects A and B:

Project A			Project B		
NPV Estimate (₹)	Probability	Expected Value	NPV Estimate	Probability	Expected Value
15,000	0.2	3,000	15,000	0.1	1,500
12,000	0.3	3,600	12,000	0.4	4,800
6,000	0.3	1,800	6,000	0.4	2,400
3,000	0.2	600	3,000	0.1	300
	1.0	**EV = 9,000**		**1.0**	**EV = 9,000**

(ii) Computation of Standard deviation of each project

Project A

P	X	(X - EV)	P (X - EV)^2
0.2	15,000	6,000	72,00,000
0.3	12,000	3,000	27,00,000
0.3	6,000	- 3,000	27,00,000
0.2	3,000	- 6,000	72,00,000
			Variance = 1,98,00,000

Standard Deviation of Project A $= \sqrt{1,98,00,000} = ₹\mathbf{4,450}$

Project B

P	X	(X - EV)	P (X - EV)^2
0.1	15,000	6,000	36,00,000
0.4	12,000	3,000	36,00,000
0.4	6,000	- 3,000	36,00,000
0.1	3,000	- 6,000	36,00,000
			Variance = 1,44,00,000

Standard Deviation of Project B $= \sqrt{1,44,00,000} = ₹\mathbf{3,795}$

(iii) Computation of profitability of each project

Profitability index = Discount cash inflow / Initial outlay

In case of Project A : PI $= \frac{9,000 + 36,000}{36,000} = \frac{45,000}{36,000} = \mathbf{1.25}$

$$\text{In case of Project B : PI} = \frac{9,000 + 30,000}{30,000} = \frac{39,000}{30,000} = \mathbf{1.30}$$

(iv) Measurement of risk is made by the possible variation of outcomes around the expected value and the decision will be taken in view of the variation in the expected value where two projects have the same expected value, the decision will be the project which has smaller variation in expected value. In the selection of one of the two projects A and B, Project B is preferable because the possible profit which may occur is subject to less variation (or dispersion). Much higher risk is lying with project A.

Question 6

XY Ltd. has under its consideration a project with an initial investment of ₹1,00,000. Three probable cash inflow scenarios with their probabilities of occurrence have been estimated as below:

Annual cash inflow (₹)	20,000	30,000	40,000
Probability	0.1	0.7	0.2

The project life is 5 years and the desired rate of return is 20%. The estimated terminal values for the project assets under the three probability alternatives, respectively, are ₹0, 20,000 and 30,000.

You are required to:

i. Find the probable NPV;

ii. Find the worst-case NPV and the best-case NPV; and

iii. State the probability occurrence of the worst case, if the cash flows are perfectly positively correlated over time.

StudyMat

Answer:

The expected cash flows of the project are as follows:

Year	Pr = 0.1 ₹	Pr = 0.7 ₹	Pr = 0.2 ₹	Total ₹
0	-10,000	-70,000	-20,000	-1,00,000
1	2,000	21,000	8,000	31,000
2	2,000	21,000	8,000	31,000
3	2,000	21,000	8,000	31,000
4	2,000	21,000	8,000	31,000
5	2,000	21,000	8,000	31,000
5	0	14,000	6,000	20,000

(i) NPV based on expected cash flows would be as follows:

$$= -₹1,00,000 + \frac{₹31,000}{(1+0.20)^1} + \frac{₹31,000}{(1+0.20)^2} + \frac{₹31,000}{(1+0.20)^3} + \frac{₹31,000}{(1+0.20)^4} + \frac{₹31,000}{(1+0.20)^5} + \frac{₹20,000}{(1+0.20)^5}$$

= - ₹1,00,000 + ₹25,833.33 + ₹21,527.78 + ₹17,939.81 + ₹14,949.85+ ₹12,458.20 + ₹8,037.55

NPV = ₹746.52

(ii) For the worst case, the cash flows from the cash flow column farthest on the left are used to calculate NPV

$$= -₹1,00,000 + \frac{₹20,000}{(1+0.20)^1} + \frac{₹20,000}{(1+0.20)^2} + \frac{₹20,000}{(1+0.20)^3} + \frac{₹20,000}{(1+0.20)^4} + \frac{₹20,000}{(1+0.20)^5}$$

= - ₹100,000 + ₹16,666.67 + ₹13,888.89 + ₹11,574.07 + ₹9,645.06 + ₹8037.76

NPV = - ₹40,187.76

For the best case, the cash flows from the cash flow column farthest on the right are used to calculated NPV

$$= -₹1,00,000 + \frac{₹40,000}{(1+0.20)^1} + \frac{₹40,000}{(1+0.20)^2} + \frac{₹40,000}{(1+0.20)^3} + \frac{₹40,000}{(1+0.20)^4} + \frac{₹40,000}{(1+0.20)^5} + \frac{₹30,000}{(1+0.20)^5}$$

= - ₹1,00,000 + ₹33,333.33+ ₹27,777.78 + ₹23,148.15 + ₹19,290.12 + ₹16,075.10 + ₹12,056.33

NPV = ₹31,680.81

(iii) If the cash flows are perfectly dependent, then the low cash flow in the first year will mean a low cash flow in every year. Thus, the possibility of the worst case occurring is the probability of getting ₹20,000 net cash flow in year 1 is 10%.

Question 7

Following are the estimates of the net cash flows and probability of a new project of M/s X Ltd.:

	Year	P = 0.3	P = 0.5	P = 0.2
Initial investment	0	4,00,000	4,00,000	4,00,000
Estimated net after tax cash inflows per year	1 to 5	1,00,000	1,10,000	1,20,000
Estimated salvage value (after tax)	5	20,000	50,000	60,000

Required rate of return from the project is 10%. Find:

i. The expected NPV of the project.
ii. The best case and the worst case NPVs.
iii. The probability of occurrence of the worst case if the cash flows are perfectly dependent overtime and independent overtime.
iv. Standard deviation and coefficient of variation assuming that there are only three streams of cash flow, which are represented by each column of the table with the given probabilities.

v. Coefficient of variation of X Ltd. on its average project which is in the range of 0.95 to 1.0. If the coefficient of variation of the project is found to be less risky than average, 100 basis points are deducted from the Company's cost of Capital

Should the project be accepted by X Ltd?

StudyMat

Answer:

(i) Expected cash flows:-

Year			Net cash flows	P.V.	PV. @ 10%
0	(4,00,000 × 1)	=	(-)4,00,000	1.000	(-)4,00,000
1 to 4	(1,00,000 × 0.3+1,10,000 × 0.5 + 1,20,000 × 0.2)	=	1,09,000	3.170	3,45,530
5	[1,09,000 + (20,000 × 0.3 + 50,000 × 0.5 + 60,000 × 0.2)]	=	1,52,000	0.621	94,392
			NPV		**39,922**

(ii) ENPV of the worst case

1,00,000 × 3.790 = ₹3,79,000 (Students may have 3.791 also the values will change accordingly)

20,000 × 0.621 = ₹12,420/-

ENPV = (-) 4,00,000 + 3,79,000 + 12,420 **= (-) ₹8,580/-**

ENPV of the best case = (-) 4,00,000 + 1,20,000 × 3.790 + 60,000 × 0.621 **= ₹92,060/-**

(iii)

(a) Required probability = 0.3

(b) Required probability = $(0.3)^5$ = 0.00243

(iv) The base case NPV = (-) 4,00,000 + (1,10,000 × 3.79) + (50,000 × 0.621) = ₹47,950/

ENPV = 0.30 × (-) 8580 + 0.5 × 47950 + 92060 × 0.20 **= ₹39,813/-**

Therefore,

$\sigma_{ENPV} = \sqrt{0.3(-8580 + 39{,}813)^2 + 0.5(47950 - 39813)^2 + 0.2(92{,}060 - 39{,}813)^2} = ₹35{,}800/-$

Therefore, CV = 35,800/39,813 = **0.90**

(v) Risk adjusted out of cost of capital of X Ltd. = 10% - 1% = 9%.

Year	Expected net cash flow	PV @ 9%	Present Value
0	(-) 4,00,000	1.000	(-) 4,00,000
1 to 4	1,09,000	3.240	3,53,160
5	1,52,000	0.650	98,800
		ENPV	**51,960**

Therefore, the project should be accepted.

Question 8

Skylark Airways is planning to acquire a light commercial aircraft for flying class clients at an investment of ₹50,00,000. The expected cash flow after tax for the next three years is as follows:

(₹)

Year 1		Year 2		Year 3	
CFAT	Probability	CFAT	Probability	CFAT	Probability
14,00,000	0.1	15,00,000	0.1	18,00,000	0.2
18,00,000	0.2	20,00,000	0.3	25,00,000	0.5
25,00,000	0.4	32,00,000	0.4	35,00,000	0.2
40,00,000	0.3	45,00,000	0.2	48,00,000	0.1

The Company wishes to take into consideration all possible risk factors relating to airline operations. The company wants to know:

I. The expected NPV of this venture assuming independent probability distribution with 6 per cent risk free rate of interest.

II. The possible deviation in the expected value.

III. How would standard deviation of the present value distribution help in Capital Budgeting decisions?

May 2013 (8 Marks), StudyMat

Answer:

(i) Expected NPV

(₹ in lakhs)

Year I			Year II			Year III		
CFAT	P	CF×P	CFAT	P	CF×P	CFAT	P	CF×P
14	0.1	1.4	15	0.1	1.5	18	0.2	3.6
18	0.2	3.6	20	0.3	6.0	25	0.5	12.5
25	0.4	10.0	32	0.4	12.8	35	0.2	7.0
40	0.3	12.0	45	0.2	9	48	0.1	4.8
	$\bar{x}$ or $\overline{CF}$	**27.0**		$\bar{x}$ or $\overline{CF}$	**29.3**		$\bar{x}$ or $\overline{CF}$	**27.9**

NPV	PV factor @ 6%	Total PV
27	0.943	25.461
29.3	0.890	26.077
27.9	0.840	23.436
	PV of cash inflow	74.974
	Less: Cash outflow	50.000
	NPV	**24.974**

(ii) Possible deviation in the expected value

Year I				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_1	$(X - \bar{X})^2 P^1$
14 – 27	-13	169	0.1	16.9
18 – 27	-9	81	0.2	16.2
25 – 27	-2	4	0.4	1.6
40 – 27	13	169	0.3	50.7
				85.4

$\sigma_1 = \sqrt{85.4} = 9.241$

Year II				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_2	$(X - \bar{X})^2 \times P^2$
15-29.3	-14.3	204.49	0.1	20.449
20-29.3	-9.3	86.49	0.3	25.947
32-29.3	2.7	7.29	0.4	2.916
45-29.3	15.7	246.49	0.2	49.298
				98.61

$\sigma_2 = \sqrt{98.61} = 9.930$

Year III				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_3	$(X - \bar{X})^2 \times P^3$
18-27.9	-9.9	98.01	0.2	19.602
25-27.9	-2.9	8.41	0.5	4.205
35-27.9	7.1	50.41	0.2	10.082
48-27.9	20.1	404.01	0.1	40.401
				74.29

$\sigma_3 = \sqrt{74.29} = 8.619$

Standard deviation about the expected value:

$$\sigma = \sqrt{\frac{85.4}{(1.06)^2} + \frac{98.61}{(1.06)^4} + \frac{74.29}{(1.06)^6}} = 14.3696$$

(iii) Standard deviation is a statistical measure of dispersion; it measures the deviation from a central number i.e. the mean.

In the context of capital budgeting decisions especially where we take up two or more projects giving somewhat similar mean cash flows, by calculating standard deviation in such cases, we can measure in each case the extent of variation. It can then be used to identify which of the projects is least risky in terms of variability of cash flows.

A project, which has a lower coefficient of variation will be preferred if sizes are heterogeneous. Besides this, if we assume that probability distribution is approximately normal we are able to calculate the probability of a capital budgeting project generating a net present value less than or more than a specified amount.

Question 9

Aeroflot airlines is planning to procure a light commercial aircraft for flying class clients at an investment of ₹50 lakhs. The expected cash flow after tax for next three years is as follows:

Year 1		Year 2		Year 3	
CFAT	Prob.	CFAT	Prob.	CFAT	Prob.
15	0.1	15	0.1	18	0.2
18	0.2	20	0.3	22	0.5
22	0.4	30	0.4	35	0.2
35	0.3	45	0.2	50	0.1

The company wishes to consider all possible risk factors relating to an airline.

The company wants to know-

(i) The expected NPV of this proposal assuming independent probability distribution with 6 per cent risk free rate of interest, and

(ii) The possible deviation on expected values.

Answer:

(i) Determination of expected CFAT

₹ in lakh

Year-1				Year-2				Year – 3			
CFAT	P_1	Cash flow		CFAT	P_2	Cash flow		CFAT	P_3	Cash flow	
15	0.1		1.5	15	0.1		1.5	18	0.2		3.6
18	0.2		3.6	20	0.3		6	22	0.5		11
22	0.4		8.8	30	0.4		12	35	0.2		7
35	0.3		10.5	45	0.2		9	50	0.1		5
		$\overline{CF_1}$	**24.4**			$\overline{CF_2}$	**28.5**			$\overline{CF_3}$	**26.6**

CFAT (₹ in lakh)	PV factor @ 6%	Total PV (₹ in lakh)
24.4	0.943	23.009
28.5	0.89	25.365
26.6	0.84	22.344
	Total Cash Inflow	70.718
	Total Cash Outflow	50

	NPV	20.718

(ii) Determination of Standard deviation for each year

Year 1

$(CF_1 - \overline{CF}_1)^2$	$(CF_1 - \overline{CF}_1)^2$	P_1	
$(15\text{-}24.4)^2$	88.36	0.1	8.836
$(18\text{-}24.4)^2$	40.96	0.2	8.192
$(22\text{-}24.4)^2$	5.76	0.4	2.304
$(35\text{-}24.4)^2$	112.36	0.3	33.708
			53.04

$\boldsymbol{\sigma = \sqrt{53.04} = 7.282}$

Year 2

$(CF_2 - \overline{CF}_2)^2$	$(CF_2 - \overline{CF}_2)^2$	P_2	
$(15\text{-}28.5)^2$	182.25	0.1	18.225
$(20\text{-}28.5)^2$	72.25	0.3	21.675
$(30\text{-}28.5)^2$	2.25	0.4	0.9
$(45\text{-}28.5)^2$	272.25	0.2	54.45
			95.25

$\boldsymbol{\sigma = \sqrt{95.25} = 9.76}$

Year 3

$(CF_3 - \overline{CF}_3)^2$	$(CF_3 - \overline{CF}_3)^2$	P_3	
(18-26.6)2	73.96	0.2	14.792
(22-26.6)2	21.16	0.5	10.58
(35-26.6)2	70.56	0.2	14.112
(50-26.6)2	547.56	0.1	54.756
			94.24

$\boldsymbol{\sigma = \sqrt{94.24} = 9.70}$

Standard deviation of the expected Values

$$\sqrt{\sum_{t=1}^{n} \frac{\sigma^2{}_t}{(1+i)^{2t}}}$$

$$\sigma = \sqrt{\frac{53.04}{(1+0.06)^2} + \frac{95.25}{(1+0.06)^4} + \frac{94.24}{(1+0.06)^6}}$$

$$\sigma = \sqrt{47.21 + 75.45 + 66.44} = \sqrt{189.10} = \mathbf{13.75}$$

Question 10

Project X and Project Y are under the evaluation of XY Co. The estimated cash flows and their probabilities are as below:

Project X : Investment (year 0) ₹70 lakhs

Probability weights	0.30	0.40	0.30
Years	₹lakhs	₹lakhs	₹lakhs
1	30	50	65
2	30	40	55
3	30	40	45

Project Y: Investment (year 0) ₹80 lakhs.

Probability weighted	Annual cash flows through life ₹lakhs
0.20	40
0.50	45
0.30	50

a) Which project is better based on NPV, criterion with a discount rate of 10%?

b) Compute the standard deviation of the present value distribution and analyse the inherent risk of the projects.

Answer:

(a) Calculation of NPV of XY Co.:

Project X		Cash Flow	PVF	PV
Year				
1	(30 × 0.3) + (50 × 0.4) + (65 × 0.3)	48.5	0.909	44.09
2	(30 × 0.3) + (40 × 0.4) + (55 × 0.3)	41.5	0.826	34.28
3	(30 × 0.3) + (40 × 0.4) + (45 × 0.3)	38.5	0.751	28.91
				107.28
			NPV : (107.28 - 70.00) =	**(+) 37.28**

Project Y (For 1-3 Years)

1-3	(40 × 0.2) + (45 × 0.5) + (50 × 0.3)	45.5	2.487	113.16
			NPV (113.16 - 80.00) =	**(+) 33.16**

(b) Calculation of Standard deviation σ

As per Hiller's model

$$M = \sum_{i=0}^{n} (1 + r)^{-1} Mi$$

$$\sigma^2 = \sum_{i=0}^{n} (1+r)^{-2i} \sigma_i^2$$

Hence

Project X

Year

1 $\sqrt{(30 - 48.5)^2\ 0.30 + (50 - 48.5)^2\ 0.40 + (65 - 48.5)^2\ 0.30}$ = $\sqrt{185.25}$ = **13.61**

2 $\sqrt{(30 - 41.5)^2\ 0.30 + (40 - 41.5)^2\ 0.40 + (55 - 41.5)^2\ 0.30}$ = $\sqrt{95.25}$ = **9.76**

3 $\sqrt{(30 - 38.5)^2\ 0.30 + (40 - 38.5)^2\ 0.40 + (45 - 38.5)^2\ 0.30}$ = $\sqrt{35.25}$ = **5.94**

Standard Deviation about the expected value

$$= \sqrt{\frac{185.25}{(1+0.10)^2} + \frac{95.25}{(1+0.10)^4} + \frac{35.25}{(1+0.10)^6}}$$

$$= \sqrt{\frac{185.25}{1.21} + \frac{95.25}{1.4641} + \frac{35.25}{1.7716}} = \sqrt{153.10 + 65.06 + 19.90}$$

$$= \sqrt{238.06} = \mathbf{15.43}$$

Project Y (For 1-3 Years)

$$\sqrt{(40 - 45.5)^2\ 0.20 + (45 - 45.5)^2\ 0.50 + (50 - 45.5)^2\ 0.30} = \sqrt{12.25} = \mathbf{3.50}$$

Standard Deviation about the expected value

$$= \sqrt{\frac{12.25}{(1+0.10)^2} + \frac{12.25}{(1+0.10)^4} + \frac{12.25}{(1+0.10)^6}}$$

$$= \sqrt{\frac{12.25}{1.21} + \frac{12.25}{1.4641} + \frac{12.25}{1.7716}} = \sqrt{10.12 + 8.37 + 6.91}$$

$$= \sqrt{25.4} = \mathbf{5.03}$$

Analysis: Project Y is less risky as its Standard Deviation is less than Project X.

Question 11

Determine the risk adjusted net present value of the following projects:

	X	Y	Z
Net cash outlays (₹)	2,10,000	1,20,000	1,00,000
Project life	5 years	5 years	5 years
Annual Cash inflow (₹)	70,000	42,000	30,000
Coefficient of variation	1.2	0.8	0.4

The Company selects the risk-adjusted rate of discount on the basis of the coefficient of variation:

Coefficient of Variation	Risk-Adjusted Rate of Return	P.V. Factor 1 to 5 years At risk adjusted rate of discount
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

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Answer:

Statement showing the determination of the risk adjusted net present value

Projects (i)	Net cash outlays ₹ (ii)	Coefficient of variation (iii)	Risk adjusted discount rate (iv)	Annual cash inflow ₹ (v)	PV factor 1-5 years (vi)	Discounted cash inflow ₹ (vii) = (v) × (vi)	Net present Value ₹ (viii) = (vii) −(ii)
X	2,10,000	1.20	16%	70,000	3.274	2,29,180	**19,180**
Y	1,20,000	0.80	14%	42,000	3.433	1,44,186	**24,186**
Z	1,00,000	0.40	12%	30,000	3.605	1,08,150	**8,150**

Question 12

New Projects Ltd. is evaluating 3 projects, P-I, P-II, P-III. Following information is available in respect of these projects:

	P-I	P-II	P-III
Cost	₹15,00,000	₹11,00,000	₹19,00,000
Inflows-Year 1	6,00,000	6,00,000	4,00,000
Year 2	6,00,000	4 ,00,000	6,00,000
Year 3	6,00,000	5 ,00,000	8,00,000
Year 4	6,00,000	2 ,00,000	12,00,000
Risk Index	1.80	1.00	0.60

Minimum required rate of return of the firm is 15% and applicable tax rate is 40%. The risk free interest rate is 10%.

Required:

i. Find out the risk-adjusted discount rate (RADR) for these projects.

ii. Which project is the best?

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Answer:

(i) The risk free rate of interest and risk factor for each of the projects are given. The risk adjusted discount rate (RADR) for different projects can be found on the basis of CAPM as follows:

Required Rate of Return	= I_{Rf} + (k_o - I_{RF}) Risk Factor
For P-I : RADR	= 0.10 + (0.15 – 0.10) 1.80 = 19%
For P-II : RADR	= 0.10 + (0.15 – 0.10) 1.00 = 15 %
For P-III : RADR	= 0.10 + (0.15 – 0.10) 0.60 = 13 %

(ii) The three projects can now be evaluated at 19%, 15% and 13% discount rate as follows:

Project P-I	
Annual Inflows	₹ 6,00,000
PVAF (19 %, 4)	2.639
PV of Inflows (₹6,00,000 × 2.639)	₹15,83,400
Less: Cost of Investment	₹15,00,000
Net Present Value	**₹ 83,400**

Project P-II

Year	Cash Inflow (₹)	PVF (15%,n)	PV (₹)
1	6,00,000	0.870	5,22,000
2	4,00,000	0.756	3,02,400
3	5,00,000	0.658	3,29,000
4	2,00,000	0.572	1,14,400
Total Present Value			12,67,800
Less: Cost of Investment			11,00,000
Net Present Value			**1,67,800**

Project P-III

Year	Cash Inflow (₹)	PVF (13%,n)	PV (₹)
1	4,00,000	0.885	3,54,000
2	6,00,000	0.783	4,69,800
3	8,00,000	0.693	5,54,400
4	12,00,000	0.613	7,35,600
Total Present Value			21,13,800
Less: Cost of Investment			19,00,000
Net Present Value			**2,13,800**

Project P-III has highest NPV. So, it should be accepted by the firm

Question 13

The Textile Manufacturing Company Ltd., is considering one of two mutually exclusive proposals, Projects M and N, which require cash outlays of ₹8,50,000 and ₹8,25,000 respectively. The certainty-equivalent (C.E) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bonds is 6% and this is used as the risk free rate. The expected net cash flows and their certainty equivalents are as follows:

Project M			Project N	
Year-end	**Cash Flow ₹**	**C.E.**	**Cash Flow ₹**	**C.E.**
1	4,50,000	0.8	4,50,000	0.9
2	5,00,000	0.7	4,50,000	0.8
3	5,00,000	0.5	5,00,000	0.7

Present value factors of ₹1 discounted at 6% at the end of year 1, 2 and 3 are 0.943, 0.890 and 0.840 respectively.

Required:

i. Which project should be accepted?

ii. If risk adjusted discount rate method is used, which project would be appraised with a higher rate and why?

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Answer:

(i) Statement Showing the Net Present Value of Project M

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor at 6% (d)	Total Present value (₹) (e) = (c) × (d)
1	4,50,000	0.8	3,60,000	0.943	3,39,480
2	5,00,000	0.7	3,50,000	0.890	3,11,500
3	5,00,000	0.5	2,50,000	0.840	2,10,000
					8,60,980
Less: Initial Investment					8,50,000
Net Present Value					**10,980**

Statement Showing the Net Present Value of Project N

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor (d)	Total Present value (₹) (e) = (c) × (d)
1	4,50,000	0.9	4,05,000	0.943	3,81,915

2	4,50,000	0.8	3,60,000	0.890	3,20,400
3	5,00,000	0.7	3,50,000	0.840	2,94,000
					9,96,315
Less: Initial Investment					8,25,000
Net Present Value					**1,71,315**

Decision: Since the net present value of Project N is higher, so the project N should be accepted.

(ii) Certainty - Equivalent (C.E.) Co-efficient of Project M (2.0) is lower than Project N (2.4). This means Project M is riskier than Project N as "higher the riskiness of a cash flow, the lower will be the CE factor". If risk adjusted discount rate (RADR) method is used, Project M would be analysed with a higher rate.

RADR is based on the premise that riskiness of a proposal may be taken care of, by adjusting the discount rate. The cash flows from a more risky proposal should be discounted at a relatively higher discount rate as compared to other proposals whose cash flows are less risky. Any investor is basically risk averse. However, he may be ready to take risk provided he is rewarded for undertaking risk by higher returns. So, more risky the investment is, the greater would be the expected return. The expected return is expressed in terms of discount rate which is also the minimum required rate of return generated by a proposal if it is to be accepted. Therefore, there is a positive correlation between risk of a proposal and the discount rate.

Question 14

A firm has projected the following cash flows from a project under evaluation:

Year	₹lakhs
0	(70)
1	30
2	40
3	30

The above cash flows have been made at expected prices after recognizing inflation. The firm's cost of capital is 10%. The expected annual rate of inflation is 5%.

Show how the viability of the project is to be evaluated.

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Answer:

It is stated that the cash flows have been adjusted for inflation; hence they are "nominal". The cost of capital or discount rate is "real". In order to be compatible, the cash flows should be converted into "real flow". This is done as below:

Year	Nominal cash flows	Adjusted Inflation* factor	Real cash flows	PVF @ 10%	PV of cash flows
0	(70)	-	(70)	1.000	(70)
1	30	0.952	28.56	0.909	25.96
2	40	0.907	36.28	0.826	29.97
3	30	0.864	25.92	0.751	19.47
				Total	75.40
				Less: Cash out flow	70.00
				NPV (+)	**5.40**

* $1/1.05$; $1/(1.05)^2$; $1/(1.05)^3$;

Advise: With positive NPV, the project is financially viable.

Alternatively, instead of converting cash flows into real terms, the discount rate can be converted into nominal rate. Result will be the same.

An alternative solution is presented herewith

Alternative solution:

Year	Nominal cash flows	PVF @ 15.50% adjusted by the inflation factor i.e. 5%*	PV of cash flows
1	30	0.866	25.98
2	40	0.749	29.96
3	30	0.649	19.47
		Cash inflow	75.41
		Less: Cash out flow	70.00
		Net present value	**5.41**

$* \frac{0.909}{1.05} = 0.866, \frac{0.826}{1.1025} = 0.749, \frac{0.751}{1.1576} = 0.649$

Advise: With positive NPV, the project is financially viable.

Question 15

Shashi Co. Ltd has projected the following cash flows from a project under evaluation:

Year	0	1	2	3
₹ (in lakhs)	(72)	30	40	30

The above cash flows have been made at expected prices after recognizing inflation. The firm's cost of capital is 10%. The expected annual rate of inflation is 5%. Show how the viability of the project is to be evaluated. PVF at 10% for 1-3 years are 0.909, 0.826 and 0.751.

StudyMat

Answer:

Here the given cash flows have to be adjusted for inflation. Alternatively, the discount rate can be converted into nominal rate, as follows:-

$$\text{Year 1} = \frac{0.909}{1.05} = 0.866;\ \text{Year 2} = \frac{0.826}{(1.05)^2} \text{ or } \frac{0.826}{1.1025} = \mathbf{0.749}$$

$$\text{Year 3} = \frac{0.751}{(1.05)^3} = \frac{0.751}{1.1576} = \mathbf{0.649}$$

Year	Nominal Cash Flows (₹ in lakhs)	Adjusted PVF as above	PV of Cash Flows (₹ in lakhs)
1	30	0.866	25.98
2	40	0.749	29.96
3	30	0.649	19.47
		Cash Inflow	75.41
		Less: Cash Outflow	72.00
		Net Present Value	**3.41**

With positive NPV, the project is financially viable.

Alternative Solution

Assumption: The cost of capital given in the question is "Real".

Nominal cost of capital = (1.10) (1.05) -1 = 0.155 =15.50%

DCF Analysis of the project

(₹Lakhs)

	Period	PVF @15.50%	CF	PV
Investment	0	1	-72	-72.00
Operation	1	0.866	30	+25.98
---do---	2	0.750	40	+30.00
---do---	3	0.649	30	+19.47
NPV				**+3.45**

The proposal may be accepted as the NPV is positive.

Question 16

KLM Ltd. requires ₹15,00,000 for a new project.

Useful life of project is 3 years.

Salvage value - NIL.

Depreciation is ₹5,00,000 p.a.

Given below are projected revenues and costs (excluding depreciation) ignoring inflation:

Year →	1	2	3
Revenues in ₹	10,00,000	13,00,000	14,00,000

Costs in ₹	5,00,000	6,00,000	6,50,000

Applicable tax rate is 35%. Assume cost of capital to be 14% (after tax). The inflation rates for revenues and costs are as under:

Year	Revenues %	Costs %
1	9	10
2	8	9
3	6	7

PVF at 14%, for 3 years =0.877, 0.769 and 0.675

Show amount to the nearest rupee in calculations.

You are required to calculate net present value of the project.

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Answer:

(i) Inflation adjusted Revenues

Year	Revenues (₹)	Revenues (Inflation Adjusted) (₹)	
1	10,00,000	10,00,000(1.09)	**10,90,000**
2	13,00,000	13,00,000(1.09) (1.08)	**15,30,360**
3	14,00,000	14,00,000(1.09) (1.08)(1.06)	**17,46,965**

(ii) Inflation adjusted Costs

Year	Revenues (₹)	Revenues (Inflation Adjusted) (₹)	
1	5,00,000	5,00,000(1.10)	**5,50,000**
2	6,00,000	6,00,000(1.10)(1.09)	**7,19,400**
3	6,50,000	6,50,000(1.10)(1.09)(1.07)	**8,33,905**

(iii) Tax Benefit on Depreciation = ₹5,00,000 × 0.35 **= ₹1,75,000**

(iv) Net Profit after Tax

Year	Revenues (Inflation Adjusted) (₹)	Costs (Inflation Adjusted) (₹)	Net Profit (₹)	Tax (₹)	Profit after Tax (₹)
	(1)	(2)	(3) =(1) -(2)	(4) = 35% of (3)	(3) - (4)
1	10,90,000	5,50,000	5,40,000	1,89,000	**3,51,000**
2	15,30,360	7,19,400	8,10,960	2,83,836	**5,27,124**
3	17,46,965	8,33,905	9,13,060	3,19,571	**5,93,489**

(v) Present Value of Cash Inflows

Year	Net Profit after tax (₹)	Tax Benefit on Depreciation (₹)	Cash Inflow (₹)	PVF@ 14%	PV (₹)
1	3,51,000	1,75,000	5,26,000	0.877	4,61,302
2	5,27,124	1,75,000	7,02,124	0.769	5,39,933
3	5,93,489	1,75,000	7,68,489	0.675	5,18,730
					15,19,965

NPV = ₹15,19,965 - ₹15,00,000 = **₹19,965**

Question 17

From the following details relating to a project, analyse the sensitivity of the project to changes in initial project cost, annual cash inflow and cost of capital:

Initial Project Cost (₹)	1,20,000
Annual Cash Inflow (₹)	45,000
Project Life (Years)	4
Cost of Capital	10%

To which of the three factors, the project is most sensitive? (Use annuity factors: for 10% 3.169 and 11% 3.103).

Answer:

CALCULATION OF NPV

	₹
PV of cash inflows (₹45,000 × 3.169)	1,42,605
Initial Project Cost	1,20,000
NPV	**22,605**
If initial project cost is varied adversely by 10%*	
NPV (Revised) (₹1,42,605 - ₹1,32,000)	₹10,605
Change in NPV (₹22,605 - ₹10,605)/ ₹22,605 i.e.	**53.08%**
If annual cash inflow is varied adversely by 10%*	
Revised annual inflow	₹40,500
NPV (Revised) (₹40,500 × 3.169) - (₹1,20,000)	(+) ₹8,345
Change in NPV (₹22,605 - ₹8,345) / ₹22,605	**63.08%**
If cost of capital is varied adversely by 10%*	
NPV (Revised) (₹45,000 × 3.103) - ₹1,20,000	(+) ₹19,635
Change in NPV (₹22,605 - ₹19,635) / ₹22,605	**13.14%**

Conclusion: Project is most sensitive to 'annual cash inflow'

*Note: Students may please note that they may assume any other percentage rate other than 10 % say 15%, 20 % 25 % etc.

Question 18

XYZ Ltd. is considering a project for which the following estimates are available:

	₹
Initial Cost of the project	10,00,000
Sales price/unit	60
Cost/unit	40
Sales volumes	
Year 1	20000 units
Year 2	30000 units
Year 3	30000 units

Discount rate is 10% p.a.

You are required to measure the sensitivity of the project in relation to each of the following parameters:

a) Sales Price/unit
b) Unit cost
c) Sales volume
d) Initial outlay and
e) Project lifetime

Taxation may be ignored.

StudyMat

Answer:

Calculation of NPV

$$NPV = -10,00,000 + \frac{20,000 \times 20}{1.1} + \frac{30,000 \times 20}{1.21} + \frac{30,000 \times 20}{1.331}$$

= - 10,00,000 + 3,63,636 + 4,95,868 + 4,50,789

= 13,10,293 - 10,00,000

= ₹3,10,293/-.

Measurement of sensitivity is as follows:

(c) Sales Price:-

Let the sale price/Unit be S so that the project would break even with 0 NPV.

$$\therefore 10,00,000 = \frac{20,000 \times (S-40)}{1.1} + \frac{30,000 \times (S-40)}{1.21} + \frac{30,000\ (S-40)}{1.331}$$

S - 40 = 10,00,000/65,514

S - 40 = ₹15.26

S = ₹55.26 which represents a fall of (60-55.26)/60

Or 0.079 or 7.9%

Alternative Method

$$\frac{10,00,000 \times 20}{13,10,293} = ₹15.26$$

S= ₹40 + ₹15.26

= ₹55.26

Alternative Solution

If sale Price decreased by say 10%, then NPV (at Sale Price of ₹60 - ₹6 = ₹54)

$$\text{NPV} = -10,00,000 + \frac{20000 \times 14}{(1.1)^1} + \frac{30000 \times 14}{(1.1)^2} + \frac{30000 \times 14}{(1.1)^3}$$

= -10,00,000 +2,54,545 + 3,47,107 + 3,15,552

= -82,796

$$\text{NPV decrease (\%)} = \frac{3,10,293 - (-82,796)}{3,10,293} \times 100 = \mathbf{126.68\%}$$

(d) Unit Cost:-

If sales price = ₹60 the cost price required to give a margin of ₹15.26 is (₹60 - ₹15.26) or ₹44.74 which would represent a rise of 11.85% i.e., $\left(\frac{44.74 - 40}{40} \times 100\right)$

Alternative Solution

If unit cost increased by say 10%. The new NPV will be as follows:

$$\text{NPV} = -10,00,000 + \frac{20000 \times 16}{(1.1)^1} + \frac{30000 \times 16}{(1.1)^2} + \frac{30000 \times 16}{(1.1)^3}$$

= -10,00,000 + 2,90,909 + 3,96,694 + 3,60,631

= 48,234

$$\text{NPV decrease (\%)} = \frac{3,10,293 - (-48,234)}{3,10,293} \times 100 = \mathbf{84.46\%}$$

(e) Sales volume:-

The requisite percentage fall is:-

3,10,293/13,10,293 × 100 = 23.68%

Alternative Solution

If sale volume decreased by say 10%. The new NPV will be as follows:

$$\text{NPV} = -10,00,000 + \frac{18000 \times 20}{(1.1)^1} + \frac{27000 \times 20}{(1.1)^2} + \frac{27000 \times 20}{(1.1)^3}$$

= -10,00,000 + 3,27,272 + 4,46,281 + 4,05,710

= 1,79,263

$$\text{NPV decrease (\%)} = \frac{3,10,293 - 1,79,263}{3,10,293} \times 100 = \mathbf{42.22\%}$$

(f) Since PV of inflows remains at ₹13,10,293 the initial outlay must also be the same.

∴ Percentage rise = 3,10,293/10,00,000 × 100 = 31.03%.

Alternative Solution

If initial outlay increased by say 10%. The new NPV will be as follows:

$$\text{NPV} = -11,00,000 + \frac{20000 \times 20}{(1.1)^1} + \frac{30000 \times 20}{(1.1)^2} + \frac{30000 \times 20}{(1.1)^3}$$

= -11,00,000 + 3,63,636 + 4,95,868 + 4,50,789 = 2,10,293

$$\text{NPV decrease (\%)} = \frac{3,10,293 - 2,10,293}{3,10,293} \times 100 = \mathbf{32.22\%}$$

(g) Present value for 1st two years.

= - 10,00,000 + 4,00,000 × 0.909 + 6,00,000 × 0.826

= - 10,00,000 + 3,63,600 + 4,95,600

= - 10,00,000 + 8,59,200

= - 1,40,800

∴The project needs to run for some part of the third year so that the present value of return is ₹1,40,800. It can be computed as follows:

i. 30,000 units × ₹20 × 0.751 = ₹4,50,600

ii. $\text{Per day Production in (₹)assuming a year of 360 days} = \frac{₹4,50,600}{360} = ₹1,252$

iii. $\text{Days needed to recover ₹1,40,800} = \frac{₹1,40,800}{₹1,252} = 112$

Thus, if the project runs for 2 years and 112 days then breakeven would be achieved representing a fall of $\frac{(3-2.311)}{3} \times 100 = \mathbf{22.97\%}$

Question 19

Red Ltd. is considering a project with the following Cash flows:

₹

Years	Cost of Plant	Recurring Cost	Savings
0	10,000		
1		4,000	12,000
2		5,000	14,000

The cost of capital is 9%. Measure the sensitivity of the project to changes in the levels of plant value, running cost and savings (considering each factor at a time) such that the NPV becomes zero. The P.V. factor at 9% are as under:

Year	Factor
0	1
1	0.917
2	0.842

Which factor is the most sensitive to affect the acceptability of the project? StudyMat

Answer:

P.V. of Cash Flows

Year 1	Running Cost	₹4,000 × 0.917	= (₹3,668)
	Savings	₹12,000 × 0.917	= ₹11,004
Year 2	Running Cost	₹5,000 × 0.842	= (₹4,210)
	Savings	₹14,000 × 0.842	= ₹11,788
			₹14,914
Year 0	Less: P.V. of Cash Outflow	₹10,000 × 1	₹10,000
		NPV	**₹4,914**

Sensitivity Analysis

(i) Increase of Plant Value by ₹4,914

$$\therefore \frac{4,914}{10,000} \times 100 = \mathbf{49.14\%}$$

(ii) Increase of Running Cost by ₹4,914

$$\frac{4,914}{3,668 + 4,210} = \frac{4,914}{7,878} \times 100 = \mathbf{62.38\%}$$

(iii) Fall in Saving by ₹4,914

$$\frac{4,914}{11,004 + 11,788} = \frac{4,914}{22,792} \times 100 = \mathbf{21.56\%}$$

Hence, savings factor is the most sensitive to affect the acceptability of the project as in comparison of other two factors a slight % change in this fact shall more affect the NPV than others.

Alternative Solution

P.V. of Cash Flows

Year 1	Running Cost	₹4,000 × 0.917	= (₹3,668)
	Savings	₹12,000 × 0.917	= ₹11,004
Year 2	Running Cost	₹5,000 × 0.842	= (₹4,210)
	Savings	₹14,000 × 0.842	= ₹11,788
			₹14,914
Year 0	Less: P.V. of Cash Outflow	₹10,000 × 1	₹10,000
		NPV	**₹4,914**

Sensitivity Analysis

(i) If the initial project cost is varied adversely by say 10%*.

NPV (Revised) (₹4,914 - ₹1,000) = ₹3,914

$$\text{Change in NPV}\frac{₹4{,}914 - ₹3{,}914}{₹4{,}914} = \mathbf{20.35\%}$$

(ii) If Annual Running Cost is varied by say 10%*.

NPV (Revised) (₹4,914 - ₹400 × 0.917 -₹500 × 0.843)

= ₹4,914 - ₹367 - ₹421= ₹4,126

$$\text{Change in NPV}\frac{₹4{,}914 - ₹4{,}126}{₹4{,}914} = \mathbf{16.04\%}$$

(iii) If Saving is varied by say 10%*.

NPV (Revised) (₹4,914 - ₹1,200 × 0.917 - ₹1,400 × 0.843)

= ₹4,914 - ₹1,100 - ₹1,180 = ₹2,634

$$\text{Change in NPV}\frac{₹4{,}914 - ₹2{,}634}{₹4{,}914} = \mathbf{46.40\%}$$

Hence, savings factor is the most sensitive to affect the acceptability of the project.

* Any percentage of variation other than 10% can also be assumed.

Question 20

X Ltd. is considering its new project with the following details:

Sr. No.	Particulars	Figures
1.	Initial capital cost	₹400 Cr.
2.	Annual unit sales	5 Cr.
3.	Selling price per unit	₹100
4.	Variable cost per unit	₹50
5.	Fixed costs per year	₹50 Cr.
6.	Discount Rate	6%

Required:

(i) Tabulate the NPV of the project. Does it represent the actual outcome? Comment.

(ii) Examine the impact of 2.5 percent adverse variance in each of the variables on the project's NPV. Decide which variable is having maximum effect?

(iii) Critically analyse the Sensitivity analysis as method of incorporating risk in capital budgeting decisions.

Consider Life of the project as 3 years.

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Answer:

i. Calculation of Net Cash Inflow per year

	Particulars	Amount (₹)
A	Selling price per unit	100
B	Variable cost per unit	50
C	Contribution per unit (A - B)	50
D	Number of units sold per year	5 Cr.
E	Total Contribution (C × D)	₹250 Cr.
F	Fixed cost per year	₹50 Cr.
G	Net cash inflow per year (E - F)	₹200 Cr.

Calculation of Net Present Value (NPV) of the Project

Year	Year Cash Flow (₹in Cr.)	PV factor @ 6%	Present Value (PV) (₹in Cr.)
0	(400.00)	1.000	(400.00)
1	200.00	0.943	188.60
2	200.00	0.890	178.00
3	200.00	0.840	168.00
Net Present Value			**134.60**

Here, NPV represent the most likely outcomes and not the actual outcomes. The actual outcome can be lower or higher than the expected outcome.

ii. Sensitivity Analysis considering 2.5 % Adverse Variance in each variable

	Particulars	Base (₹)	Initial capital cost increased to ₹410 crore (₹)	Selling Price per Unit Reduced to ₹97.5 (₹)	Variable Cost Per Unit increased to ₹51.25 (₹)	Fixed Cost Per Unit increased to ₹51.25 (₹)	Units sold per year reduced to 4.875 crore (₹)
A	Selling price per unit	100	100	97.50	100	100	100
B	Variable cost per unit	50	50	50	51.25	50	50
C	Contribution per unit (A - B)	**50**	**50**	**47.50**	**48.75**	**50**	**50**
		(₹in Cr.)	**(₹in Cr.)**	**(₹in Cr.)**	**(₹in Cr.)**	**(₹in Cr.)**	**(₹in Cr.)**
D	Number of units sold per year (units in Crores)	5	5	5	5	5	4.875
E	Total Contribution (C × D)	250	250	237.50	243.75	250	243.75
F	Fixed cost per year	50	50	50	50	51.25	50
G	Net Cash Inflow per year (E - F)	200	200	187.50	193.75	198.75	193.75
H	PV of Net cash Inflow per year (G × 2.673)	534.60	534.60	501.19	517.89	531.26	517.89
I	Initial capital cost	400	410	400	400	400	400
J	**NPV (H - I)**	**134.60**	**124.60**	**101.19**	**117.89**	**131.26**	**117.89**
K	**Percentage Change in NPV**	**-**	**-7.43%**	**-24.82%**	**-12.41%**	**-2.48%**	**-12.41%**

The above table shows that by changing one variable at a time by 2.5% (adverse) while keeping the others constant, the impact in percentage terms on the NPV of the project can be calculated. Thus, the change in selling price has the maximum effect on the NPV by 24.82%.

Advantages of Sensitivity Analysis:

Following are the main advantages of Sensitivity Analysis:

(1) **Critical Issues:** This analysis identifies critical factors that impinge on a project's success or failure.

(2) **Simplicity:** It is a simple technique.

Disadvantage of Sensitivity Analysis

Following are the main disadvantages of Sensitivity Analysis:

(1) **Assumption of Independence:** This analysis assumes that all variables are independent i.e. they are not related to each other, which is unlikely in real life.

(2) **Ignore probability:** This analysis does not look to the probability of changes in the variables

Question 21

Unnat Ltd. is considering investing ₹50,00,000 in a new machine. The expected life of machine is five years and has no scrap value. It is expected that 2,00,000 units will be produced and sold each year at a selling price of ₹30.00 per unit. It is expected that the variable costs to be ₹16.50 per unit and fixed costs to be ₹10,00,000 per year. The cost of capital of Unnat Ltd. is 12% and acceptable level of risk is 20%.

You are required to measure the sensitivity of the project's net present value to a change in the following project variables:

a) sale price;

b) sales volume;

c) variable cost;

d) On further investigation it is found that there is a significant chance that the expected sales volume of 2,00,000 units per year will not be achieved. The sales manager of Unnat Ltd. suggests that sales volumes could depend on expected economic states which could be assigned the following probabilities:

State of Economy	Annual Sales (in Units)	Prob.
Poor	1,75000	0·30
Normal	2,00,000	0·60
Good	2,25,000	0·10

Calculate expected net present value of the project and give your decision whether company should accept the project or not.

StudyMat

Answer:

Calculation of NPV

= - ₹50,00,000 + [2,00,000 (₹30 - ₹16.50) - ₹10,00,000] PVIAF (12%,5)

= - ₹50,00,000 + [2,00,000 (₹13.50) - ₹10,00,000] 3.605

= - ₹50,00,000 + [₹27,00,000 - ₹10,00,000] 3.605

= - ₹50,00,000 + ₹61,28,500

= ₹11,28,500

Measurement of Sensitivity Analysis

(a) Sales Price:-

Let the sale price/Unit be S so that the project would break even with 0 NPV.

∴₹50,00,000 = [2,00,000 (S - ₹16.50) - ₹10,00,000] PVIAF (12%,5)

₹50,00,000 = [2,00,000S - ₹33,00,000 - ₹10,00,000] 3.605

₹50,00,000 = [2,00,000S - ₹43,00,000] 3.605

₹13,86,963 = 2,00,000S - ₹43,00,000

₹56,86,963 = 2,00,000S

S = ₹28.43 which represents a fall of (30 - 28.43)/30 or 0.0523 or 5.23%

(b) Sales volume:-

Let V be the sale volume so that the project would break even with 0 NPV.

∴ ₹50,00,000 = [V (₹30 - ₹16.50) - ₹10,00,000] PVIAF (12%,5)

₹50,00,000 = [V (₹13.50) - 10,00,000] PVIAF (12%,5)

₹50,00,000 = [₹13.50V - ₹10,00,000] 3.605

₹13,86,963 = ₹13.50V - ₹10,00,000

₹23,86,963 = ₹13.50V

V = 1,76,812 which represents a fall of (2,00,000 - 1,76,812)/2,00,000 or 0.1159 or 11.59%

(c) Variable Cost:

Let the variable cost be V so that the project would break even with 0 NPV.

₹50,00,000 = [2,00,000(₹30 - V) - ₹10,00,000] PVIAF(12%,5)

₹50,00,000 = [₹60,00,000 - 2,00,000 V - ₹10,00,000] 3.605

₹50,00,000 = [₹50,00,000 - 2,00,000 V] 3.605

₹13,86,963 = ₹50,00,000 - 2,00,000 V

₹36,13,037 = 2,00,000V

V = ₹18.07 which represents a fall of (18.07 - 16.50)/16.50 or 0.0951 or 9.51%

(d) Expected Net Present Value

(1,75,000 × 0.30) + (2,00,000 × 0.60) + (2,25,000 × 0.10) =1,95,000

NPV = [1,95,000 × ₹13.50 - ₹10,00,000] 3.605 - ₹50,00,000 **= ₹8,85,163**

Further NPV in worst and best cases will be as follows:

Worst Case:

[1,75,000 × ₹13.50 - ₹10,00,000] 3.605 - ₹50,00,000 **= - ₹88,188**

Best Case:

[2,25,000 × ₹13.50 - ₹10,00,000] 3.605 - ₹50,00,000 **= ₹23,45,188**

Thus, there are 30% chances that the rise will be a negative NPV and 70% chances of positive NPV. Since acceptable level of risk of Unnat Ltd. is 20% and there are 30% chances of negative NPV hence project should not be accepted.

Question 22

The Easygoing Company Limited is considering a new project with initial investment, for a product "Survival". It is estimated that IRR of the project is 16% having an estimated life of 5 years.

Financial Manager has studied that project with sensitivity analysis and informed that annual fixed cost sensitivity is 7.8416%, whereas cost of capital (discount rate) sensitivity is 60%.

Other information available are:

Profit Volume Ratio (P/V) is 70%,

Variable cost ₹60/- per unit

Annual Cash Flow ₹57,500/-

Ignore Depreciation on initial investment and impact of taxation.

Calculate

i. Initial Investment of the Project
ii. Net Present Value of the Project
iii. Annual Fixed Cost
iv. Estimated annual unit of sales
v. Break Even Units

Cumulative Discounting Factor for 5 years

8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%
3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127

Answer:

(i) Initial Investment

IRR = 16% (Given)

At IRR, NPV shall be zero, therefore

Initial Cost of Investment = PVAF (16%,5) × Cash Flow (Annual)

= 3.274 × ₹57,500

= ₹1,88,255

(ii) Net Present Value (NPV)

$$\text{Let Cost of Capital be X, then } \frac{16 - X}{X} = 60\%\ X = 10\%$$

Thus NPV of the project

= Annual Cash Flow × PVAF (10%, 5) - Initial Investment

= ₹57,500 × 3.791 - ₹1,88,255

= ₹2,17,982.50 - ₹1,88,255

= ₹29,727.50

(iii) Annual Fixed Cost

Let change in the Fixed Cost which makes NPV zero is X. Then,

₹29,727.50 - 3.791X = 0

Thus X = ₹7,841.60

Let original Fixed Cost be Y then,

Y × 7.8416% = ₹7,841.60

Y = ₹1,00,000

Thus Fixed Cost is equal to ₹1,00,000

(iv) Estimated Annual Units of Sales

$$\text{Selling Price per unit } = \frac{₹60}{100\% - 70\%} = ₹200$$

$$\frac{\text{Annual Cash Flow } + \text{ Fixed Cost}}{\text{P/VRatio}} = \text{Sales Value}$$

$$\frac{₹57,500 + ₹1,00,000}{0.70} = ₹2,25,000$$

$$\textbf{Sales in Units } = \frac{\textbf{₹2,25,000}}{\textbf{₹200}} = \textbf{1,125 units}$$

(v) Break Even Units

$$\frac{\text{Fixed Cost}}{\text{Contribution Per Unit}} = \frac{1,00,000}{140} = 714.285 \text{ units}$$

Question 23

A firm has an investment proposal, requiring an outlay of ₹80,000. The investment proposal is expected to have two years economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹50,000 and 0.6 probability that cash inflow after tax will be ₹60,000. The probability assigned to cash inflow after tax for the year 2 is as follows:

The cash inflow year 1	**₹50,000**		**₹60,000**	
The cash inflow year 2	**Probability**		**Probability**	
	₹24,000	0.2	₹40,000	0.4
	₹32,000	0.3	₹50,000	0.5
	₹44,000	0.5	₹60,000	0.1

The firm uses a 10% discount rate for this type of investment.

Required:

ii. Construct a decision tree for the proposed investment project and calculate the expected net present value (NPV).

iii. What net present value will the project yield, if worst outcome is realized? What is the probability of occurrence of this NPV?

iv. What will be the best outcome and the probability of that occurrence?

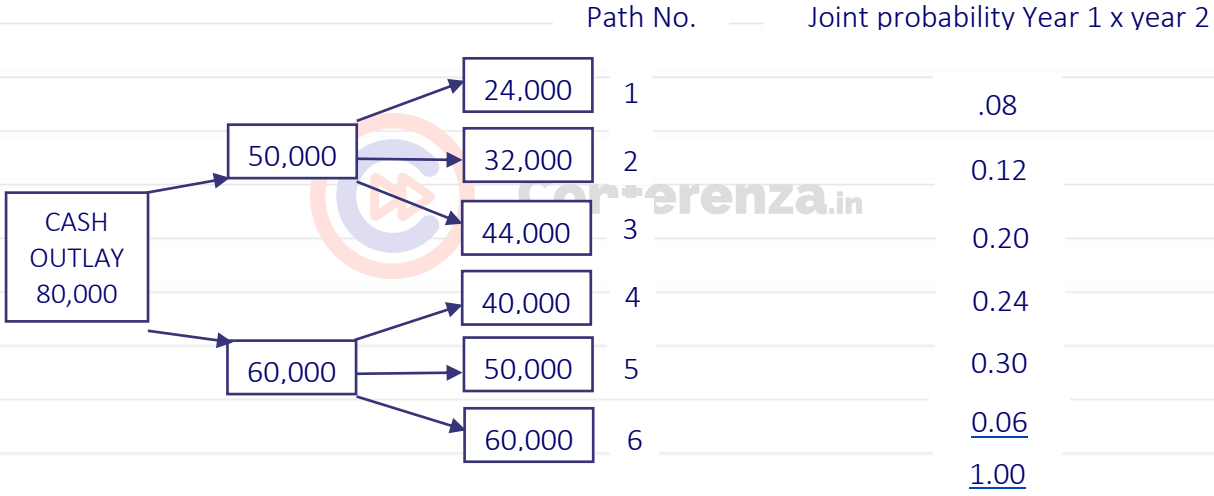
v. Will the project be accepted?

(Note: 10% discount factor 1 year 0.909; 2 year 0.826)

StudyMat

Answer:

(i) The decision tree diagram is presented in the chart, identifying various paths and outcomes, and the computation of various paths/outcomes and NPV of each path are presented in the following tables:



The Net Present Value (NPV) of each path at 10% discount rate is given below:

Path	Year 1 Cash Flows	Year 2 Cash Flows	Total Cash Inflows (PV)	Cash Inflows	NPV
	₹	₹	₹	₹	₹
1	50,000×.909 = 45,450	24,000×.826 = 19,824	65,274	80,000	**(—) 14,726**
2	45,450	32,000×.826 = 26,432	71,882	80,000	**(—) 8,118**
3	45,450	44,000×.826 = 36,344	81,794	80,000	**1,794**
4	60,000×.909 = 54,540	40,000×.826 = 33,040	87,580	80,000	**7,580**
5	54,540	50,000×.826 = 41,300	95,840	80,000	**15,840**
6	54,540	60,000×.826 = 49,560	1,04,100	80,000	**24,100**

Statement showing Expected Net Present Value

₹

z	NPV (₹)	Joint Probability	Expected NPV
1	—14,726	0.08	—1,178.08
2	—8,118	0.12	—974.16
3	1,794	0.20	358.80
4	7,580	0.24	1,819.20
5	15,840	0.30	4,752.00
6	24,100	0.06	1,446.00
			6,223.76

(ii) If the worst outcome is realized the project will yield NPV of -₹14,726. The probability of occurrence of this NPV is 8% and a loss of ₹1,178 (path 1).

(iii) The best outcome will be path 6 when the NPV is at ₹24,100. The probability of occurrence of this NPV is 6% and a expected profit of ₹1,446.

(iv) The project should be accepted because the expected NPV is positive at ₹6,223.76 based on joint probability.

Question 24

Company X is forced to choose between two machines A and B. The two machines are designed differently but have identical capacity and do exactly the same job. Machine A costs ₹1,50,000 and will last for 3 years. It costs ₹40,000 per year to run. Machine B is an 'economy' model costing only ₹1,00,000, but will last only for 2 years, and costs ₹60,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 10 per cent. Which machine company X should buy? StudyMat

Answer:

Statement showing the evaluation of two machines

Machines	**A**	**B**
Purchase cost (₹): (i)	1,50,000	1,00,000
Life of machines (years)	3	2
Running cost of machine per year (₹): (ii)	40,000	60,000
Cumulative present value factor for 1-3 years @ 10% (iii)	2.486	-
Cumulative present value factor for 1-2 years @ 10% (iv)	-	1.735
Present value of running cost of machines (₹): (v)	**99,440**	**1,04,100**
	[(ii) × (iii)]	[(ii) × (iv)]
Cash outflow of machines (₹): (vi) = (i) + (v)	2,49,440	2,04,100
Equivalent present value of annual cash outflow	**1,00,338**	**1,17,637**
	[(vi) ÷ (iii)]	[(vi) ÷ (iv)]

Decision: Company X should buy machine A since its equivalent cash outflow is less than machine B.

Question 25

ABC Chemicals is evaluating two alternative systems for waste disposal, System A and System B, which have lives of 6 years and 4 years respectively. The initial investment outlay and annual operating costs for the two systems are expected to be as follows:

	System A	System B
Initial Investment Outlay	₹5 million	₹4 million
Annual Operating Costs	₹1.5 million	₹1.6 million
Salvage value	₹1 million	₹0.5 million

If the hurdle rate is 15%, which system should ABC Chemicals choose?

The PVIF @ 15% for the six years are as below:

Year	1	2	3	4	5	6
PVIF	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323

Answer:

PV of Total Cash Outflow under System A

	₹
Initial Outlay	50,00,000
PV of Annual Operating Cost (1-6 years) 15,00,000 × 3.7845	56,76,750
Less: PV of Salvage Value ₹10,00,000 × 0.4323	(4,32,300)
	1,02,44,450
PVAF (15%, 6)	3.7845
Equivalent Annual Cost (1,02,44,450/3.7845)	**27,06,949**

PV of Total Cash Outflow under System B

	₹
Initial Outlay	40,00,000
PV of Annual Operating Cost (1-4 years) 16,00,000 × 2.855	45,68,000
Less: PV of Salvage Value ₹5,00,000 × 0.5718	(2,85,900)
	82,82,100
PVAF (15%, 4)	2.855
Equivalent Annual Cost (82,82,100/2.855)	**29,00,911**

Since Equivalent Annual Cost (EAC) is least in case of system A hence same should be opted.

Question 26

Company Y is operating an elderly machine that is expected to produce a net cash inflow of ₹40,000 in the coming year and ₹40,000 next year. Current salvage value is ₹80,000 and next year's value is ₹70,000. The machine can be replaced now with a new machine, which costs ₹1,50,000, but is much more efficient and will provide a cash inflow of ₹80,000 a year for 3 years. Company Y wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Ignore tax. Take opportunity cost of capital as 10 per cent. Advise with reasons.

StudyMat

Answer:

Statement showing present value of cash inflow of new machine when it replaces elderly machine now

NPV of New Machine	
PV of Cash Inflow (80000 × 2.486)	₹1,98,880
Less: Purchase Cost of New Machine	₹1,50,000
	₹48,880
Since NPV of New Machine is positive, it should be purchased.	
Timing Decision	
Replace Now	
Current Realizable Value	₹80,000
NPV of New Machine	₹48,880
Total NPV	**₹1,28,880**
Replace after 1 Year	
Cash Inflow for Year 1	₹40000
Realisable Value of Old Machine	₹70000
NPV of New Machine	₹48,880
Total NPV after 1 Year	₹1,58,880
PV of Total NPV (158880/1.1)	**₹1,44,436**

Advise: Since Total NPV is higher in case of Replacement after one year Machine should be replaced after 1 year.

Question 27

A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co. currently pays no taxes. The replacement machine costs ₹90,000 now and requires maintenance of ₹10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of ₹20,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance	Salvage
	(₹)	(₹)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0

The opportunity cost of capital for A & Co. is 15%.

Required:

When should the company replace the machine?

(Notes: Present value of an annuity of Re. 1 per period for 8 years at interest rate of 15% : 4.4873; present value of Re. 1 to be received after 8 years at interest rate of 15% : 0.3269).

StudyMat

Answer:

A & Co.

Equivalent cost of (EAC) of new machine

		₹
(i)	Cost of new machine now	90,000
	Add: PV of annual repairs @ ₹10,000 per annum for 8 years (₹10,000 × 4.4873)	44,873
		1,34,873
	Less: PV of salvage value at the end of 8 years (₹20,000×0.3269)	6,538
		1,28,335
	Equivalent annual cost (EAC) (₹1,28,335/4.4873)	**28,600**

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow ₹	PV @ 15%	PV ₹
Replace Immediately	0	(28,600)	1.00	(28,600)
		40,000	1.00	40,000
				11,400
Replace in one year	1	(28,600)	0.870	(24,882)
	1	(10,000)	0.870	(8,700)
	1	25,000	0.870	21,750
				(11,832)
Replace in two years	1	(10,000)	0.870	(8,700)
	2	(28,600)	0.756	(21,622)
	2	(20,000)	0.756	(15,120)
	2	15,000	0.756	11,340

				(34,102)
Replace in three years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(28,600)	0.658	(18,819)
	3	(30,000)	0.658	(19,740)
	3	10,000	0.658	6,580
				(55,799)
Replace in four years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(30,000)	0.658	(19,740)
	4	(28,600)	0.572	(16,359)
	4	(40,000)	0.572	(22,880)
				(82,799)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

Alternatively, optimal replacement period can also be computed using the following table:

Scenario	Year	Cash Flow	PV @ 15%	PV
Replace Immediately	0	(40,000)	1	(40,000)
	1 to 4	28,600	2.855	81,652
				41,652
Replace after 1 year	1	10,000	0.870	8,696
	1	(25,000)	0.870	(21,739)
	2 to 4	28,600	1.985	56,783
				43,739
Replace after 2 years	1	10,000	0.870	8,696
	2	20,000	0.756	15,123
	2	(15,000)	0.756	(11,342)
	3 and 4	28,600	1.229	35,157
				47,633
Replace after 3 years	1	10,000	0.870	8,696
	2	20,000	0.756	15,123
	3	30,000	0.658	19,725
	3	(10,000)	0.658	(6,575)
	4	28,600	0.572	16,352
				53,321

Replace after 4 years	1	10,000	0.870	8,696
	2	20,000	0.756	15,123
	3	30,000	0.658	19,725
	4	40,000	0.572	22,870
				66,414

Question 28

A company has an old machine having book value zero – which can be sold for ₹50,000. The company is thinking to choose one from following two alternatives:

i. To incur additional cost of ₹10,00,000 to upgrade the old existing machine.

ii. To replace old machine with a new machine costing ₹20,00,000 plus installation cost ₹50,000.

Both above proposals envisage useful life to be five years with salvage value to be nil.

The expected after tax profits for the above three alternatives are as under:

Year	Old existing Machine (₹)	Upgraded Machine (₹)	New Machine (₹)
1	5,00,000	5,50,000	6,00,000
2	5,40,000	5,90,000	6,40,000
3	5,80,000	6,10,000	6,90,000
4	6,20,000	6,50,000	7,40,000
5	6,60,000	7,00,000	8,00,000

The tax rate is 40 per cent.

The company follows straight line method of depreciation. Assume cost of capital to be 15 per cent.

P.V.F. of 15%, 5 = 0.870, 0.756, 0.658, 0.572 and 0.497. You are required to advise the company as to which alternative is to be adopted. StudyMat

Answer:

(A)	Cash Outflow		₹
	(i)	In case machine is upgraded:	
		Upgradation Cost	10,00,000
	(ii)	In case new machine installed:	
		Cost	20,00,000
		Add: Installation cost	50,000
		Total Cost	**20,50,000**
		Less: Disposal of old machine	
		₹50,000 – 40% tax	30,000
		Total Cash Outflow	**20,20,000**

Working Note:

i. Depreciation – in case machine is upgraded

₹10,00,000 ÷ 5 = ₹2,00,000

ii. Depreciation – in case new machine is installed

₹20,50,000 ÷ 5 = ₹4,10,000

iii. Old existing machine – Book Value is zero. So, no depreciation.

(B) Cash Inflows after Taxes (CFAT)

Year	Old Existing Machine	Upgraded Machine			
	(i)	(ii)	(iii)	(iv)	= (iv)-(i)
	EAT/CFAT	EAT	DEP	CFAT	Incremental CFAT
	₹	₹	₹	₹	₹
1	5,00,000	5,50,000	2,00,000	7,50,000	2,50,000
2	5,40,000	5,90,000	2,00,000	7,90,000	2,50,000
3	5,80,000	6,10,000	2,00,000	8,10,000	2,30,000
4	6,20,000	6,50,000	2,00,000	8,50,000	2,30,000
5	6,60,000	7,00,000	2,00,000	9,00,000	2,40,000

Cash Inflow after Taxes (CFAT)

Year	New Machine			
	(vi)	(vii)	(viii)	(ix) = (viii) – (i)
	EAT	DEP	CFAT	Incremental CFAT
	₹	₹	₹	₹
1	6,00,000	4,10,000	10,10,000	5,10,000
2	6,40,000	4,10,000	10,50,000	5,10,000
3	6,90,000	4,10,000	11,00,000	5,20,000
4	7,40,000	4,10,000	11,50,000	5,30,000
5	8,00,000	4,10,000	12,10,000	5,50,000

P.V. AT 15% - 5 Years – on Incremental CFAT

Year	Upgraded Machine			New Machine		
	Incremental CFAT	PVF	Total P.V.	Incremental CFAT	PVF	Total P.V.
	₹		₹	₹		₹
1	2,50,000	0.870	2,17,500	5,10,000	0.870	4,43,700
2	2,50,000	0.756	1,89,000	5,10,000	0.756	3,85,560
3	2,30,000	0.658	1,51,340	5,20,000	0.658	3,42,160

4	2,30,000	0.572	1,31,560	5,30,000	0.572	3,03,160
5	2,40,000	0.497	1,19,280	5,50,000	0.497	2,73,350
Total P.V. of CFAT			**8,08,680**			**17,47,930**
Less: Cash Outflows			10,00,000			20,20,000*
N.P.V. =			**-1,91,320**			**- 2,72,070**

*Acquisition Cost (including installation cost)	₹20,50,000
Less: Salvage Value of existing machine net of Tax	₹30,000
	₹20,20,000

As the NPV in both the new (alternative) proposals is negative, the company should continue with the existing old Machine.

Question 29

A machine used on a production line must be replaced at least every four years. Costs incurred to run the machine according to its age are:

Age of the Machine (years)					
	0	**1**	**2**	**3**	**4**
Purchase price (in ₹)	60,000				
Maintenance (in ₹)		16,000	18,000	20,000	20,000
Repair (in ₹)		0	4,000	8,000	16,000
Scrap Value (in ₹)		32,000	24,000	16,000	8,000

Future replacement will be with identical machine with same cost. Revenue is unaffected by the age of the machine. Ignoring inflation and tax, determine the optimum replacement cycle. PV factors of the cost of capital of 15% for the respective four years are 0.8696, 0.7561, 0.6575 and 0.5718.

May 24 (8 Marks), May 2012 (10 Marks), StudyMat

Answer:

Working Notes

First of all, we shall calculate cash flows for each replacement cycle as follows:

One Year Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Residual Value	**Net cash Flow**
0	(60,000)	-	-	**(60,000)**
1	-	(16,000)	32,000	**16,000**

Two Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Residual Value	**Net cash Flow**
0	(60,000)	-	-	**(60,000)**

1	-	(16,000)	-	**(16,000)**
2	-	(22,000)	24,000	**2,000**

Three Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Residual Value	Net cash Flow
0	(60,000)	-	-	**(60,000)**
1	-	(16,000)	-	**(16,000)**
2	-	(22,000)	-	**(22,000)**
3	-	(28,000)	16,000	**(12,000)**

Four Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Residual Value	Net cash Flow
0	(60,000)	-	-	**(60,000)**
1	-	(16,000)	-	**(16,000)**
2	-	(22,000)	-	**(22,000)**
3	-	(28,000)	-	**(28,000)**
4	-	(36,000)	8,000	**(28,000)**

Now we shall calculate NPV for each replacement cycles

		1 Year		2 Years		3 Years		4 Years	
Year	PVF@ 15%	Cash Flows	PV	Cash Flows	PV	Cash Flows	PV	Cash Flows	PV
0	1	-60,000	-60,000	-60,000	-60,000	-60,000	-60,000	-60,000	-60,000
1	0.8696	16,000	13,914	-16,000	-13,914	-16,000	-13,914	-16,000	-13,914
2	0.7561	-	-	2,000	1,512	-22,000	-16,634	-22,000	-16,634
3	0.6575	-	-	-	0	-12,000	-7,890	-28,000	-18,410
4	0.5718	-	-	-	0		0	-28,000	-16,010
			-46,086		**-72,402**		**-98,438**		**-1,24,968**

Replacement Cycles		EAC (₹)
1 Year	$\frac{46,086}{0.8696}$	**52,997**
2 Years	$\frac{72,402}{1.6257}$	**44,536**
3 Years	$\frac{98,438}{2.2832}$	**43,114**
4 Years	$\frac{1,24,968}{2.855}$	**43,772**

Since EAC is least in case of replacement cycle of 3 years hence machine should be replaced after every three years.

Note: Alternatively, Answer can also be computed by excluding initial outflow as there will be no change in final decision

Question 30

Trouble Free Solutions (TFS) is an authorized service center of a reputed domestic air conditioner manufacturing company. All complaints/service related matters of Air conditioner are attended by this service center. The service center employs a large number of mechanics, each of whom is provided with a motor bike to attend the complaints. Each mechanic travels approximately 40000 kms per annuam. TFS decides to continue its present policy of always buying a new bike for its mechanics but wonders whether the present policy of replacing the bike every three year is optimal or not. It is of believe that as new models are entering into market on yearly basis, it wishes to consider whether a replacement of either one year or two years would be better option than present three year period. The fleet of bike is due for replacement shortly in near future.

The purchase price of latest model bike is ₹55,000. Resale value of used bike at current prices in market is as follows:

Period	₹
1 Year old	35,000
2 Year old	21,000
3 Year old	9,000

Running and Maintenance expenses (excluding depreciation) are as follows:

Year	Road Taxes Insurance etc. (₹)	Petrol Repair Maintenance etc. (₹)
1	3,000	30,000
2	3,000	35,000
3	3,000	43,000

Using opportunity cost of capital as 10% you are required to determine optimal replacement period of bike. StudyMat

Answer:

In this question the effect of increasing running cost and decreasing resale value have to be weighted upto against the purchase cost of bike. For this purpose, we shall compute Equivalent Annual Cost (EAC) of replacement in different years shall be computed and compared.

Year	Road Taxes (₹)	Petrol etc. (₹)	Total (₹)	PVF @10%	PV (₹)	Cumulative PV (₹)	PV of Resale Price (₹)	Net Outflow (₹)

1	3,000	30,000	33,000	0.909	29,997	29,997	31,815	(1,818)
2	3,000	35,000	38,000	0.826	31,388	61,385	17,346	44,039
3	3,000	43,000	46,000	0.751	34,546	95,931	6,759	89,172

Computation of EACs

Year*	Purchase Price of Bike (₹)	Net Outflow (₹)	Total Outflow (₹)	PVAF @ 10%	EAC♠ (₹)
1	55,000	(1,818)	53,182	0.909	58,506
2	55,000	44,039	99,039	1.735	57,083
3	55,000	89,172	1,44,172	2.486	57,993

Thus, from above table it is clear that EAC is least in case of 2 years, hence bike should be replaced every two years.

Question 31

XYZ Ltd., an infrastructure company is evaluating a proposal to build, operate and transfer a section of 35 kms. of road at a project cost of ₹200 crores to be financed as follows:

Equity Shares Capital ₹50 crores, loans at the rate of interest of 15% p.a. from financial institutions ₹150 crores. The Project after completion will be opened to traffic and a toll will be collected for a period of 15 years from the vehicles using the road. The company is also required to maintain the road during the above 15 years and after the completion of that period, it will be handed over to the Highway authorities at zero value. It is estimated that the toll revenue will be ₹50 crores per annum and the annual toll collection expenses including maintenance of the roads will amount to 5% of the project cost. The company considers to write off the total cost of the project in 15 years on a straight line basis. For Corporate Income tax purposes the company is allowed to take depreciation @ 10% on WDV basis. The financial institutions are agreeable for the repayment of the loan in 15 equal annual instalments – consisting of principal and interest.

Calculate Project IRR and Equity IRR. Ignore corporate taxation.

Explain the difference in Project IRR and Equity IRR

Answer:

Computation of Project IRR

Project IRR is computed by using the following equation:

Where,

CO_0 = Cash outflow at time zero

CF_i = Net cash inflow at different points of time

N = Life of the project and

R = Rate of discount (IRR)

Now,

CO0 = ₹200 crores

CFi = ₹40 crores p.a. for 15 years

(Refer to working note (i))

Therefore,

$$₹200\text{crore} = \frac{₹40\text{crores}}{(1+\text{r})^{15}}$$

The value of IRR of the project:

1. An approximation of IRR is made on the basis of cash flow data. A rough approximation may be made with reference to the payback period. The payback period in the given case is 5 years i.e. $\left(\frac{₹200\text{crores}}{₹40\text{ crores}}\right)$ From the PVAF table the closest figures are given in rate 18% (5.092) and the rate 19% (4.876). This means the IRR of the project is expected to be between 18% and 19%.
2. The estimate of IRR cash inflow of the project for both these rates is as follows:

At 18% = ₹40 crores × PVAF (18%, 15 years)

= ₹40 crores × 5.092

= ₹203.68 crores

At 19% = ₹40 crores × PVAF (19%, 15 years)

= ₹40 crores × 4.876

= ₹195.04 crores

3. The exact IRR by interpolating between 18% and 19% is worked out as follows:

$$\text{IRR} = 18\% + \frac{₹203.68\text{ crores} - ₹200\text{ crores}}{₹203.68\text{ crores} - ₹195.04\text{ crores}} \times 1\%$$

$$= 18\% + \frac{₹3.68\text{ crores}}{₹8.64\text{ crores}} \times 1\%$$

= 18% + 0.426%

= 18.43%

Therefore, the IRR of the project is 18.43%.

Working Notes:

(i) Net cash inflow of the project

Cash inflow	₹
Toll revenue	50 crores p.a. for 15 years
Cash outflow	₹
Toll collection expenses including maintenance of the roads (5% of ₹200 crores)	10 crores p.a. for 15 years
Net cash inflow	40 crores p.a. for 15 years

Note: Since corporate taxes is not payable. The impact of depreciation need not be considered.

Computation of Equity IRR

Equity IRR is computed by using the following equation:

$$\text{Cash inflow at zero date from equity shareholders} = \frac{\text{Cash inflow available for equity shareholders}}{(1+r)^n}$$

Where,

r = Equity IRR

n = Life of the project

Here, Cash inflow at zero date from equity shareholders = ₹50 crores

Cash inflow for equity shareholders = ₹14.35 crores p.a.

(Refer to working note)

Therefore:

$$₹50 \text{ crores} = \frac{₹14.35 \text{ crores}}{(1+r)^{15}}$$

The value of equity IRR of the project is calculated as follows:

1. An approximation of IRR is made on the basis of cash flow data. A rough approximation may be made with reference to the payable period. The payback period in the given case is $3.484\left(\frac{₹50 \text{ crores}}{₹14.35 \text{ crores}}\right)$From the PVAF table the closest figure may be about 25% and 30%. This means the equity IRR of project must be between 25% and 30%.
2. The estimated NPV of the project at 25% = ₹14.35 crores × 3.859 = ₹55.3766 crores The estimated NPV of the project at 30% = ₹14.35 crores × 3.268 = ₹46.896 crores
3. IRR by using Interpolation Formula will be

$$= 25\% + \frac{55.377 - 50}{55.3766 - 46.896} \times 5\%$$

$$= 25\% + \frac{5.377}{8.4806} \times 5\%$$

= 25%+ 3.17%

= 28.17%

(ii) Equated annual instalment (i.e. principal + interest) of loan from financial institution:

Amount of loan from financial institution	₹150 crores
Rate of interest	15% p.a.
No. of years	15
Cumulative discount factor for 1-15 years	5.847

Hence, equated yearly instalment will be ₹150 crores/5.847 **i.e. ₹25.65 crores.**

(iii) Cash inflow available for equity shareholders

Net cash inflow of the project	₹40.00 crores
[Refer to working note (i)]	
Equated yearly instalment of the project	₹25.65 crores

[Refer to working note (ii)]

Cash inflow available for equity shareholders ₹14.35 crores

Difference in Project IRR and Equity IRR:

The project IRR is 18.4% whereas Equity IRR is 28%. This is attributed to the fact that XYZ Ltd. is earning 18.4% on the loan from financial institution but paying only 15%. The difference between the return and cost of funds from financial institution has enhanced equity IRR. The 3.4% (18.4% - 15%) earnings on ₹150 crores goes to equity shareholders who have invested ₹ 50 crore i.e.

$$3.4\% \times \frac{₹150 \text{ crores}}{₹50 \text{ crores}} = 10.2\% \text{ is added to the project IRR which gives equity IRR of } 28\%.$$

Question 32

X Ltd. an existing profit making company is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be ₹120 lakhs and additional equipment costing ₹10 lakhs will be needed at the beginning of the third year. At the end of the 8 year the original equipment will have a resale value equivalent to the cost of removal, but the additional equipment would be sold for ₹1 lakh. Working capital of ₹15 lakhs will be needed. The 100% capacity of the plant is 4,00,000 units per annum, but the production and sales volume expected are as under.

Year	Capacity
1	20%
2	30%
3-5	75%
6-8	50%

A sale price of ₹100 per unit with a profit volume ratio of 60% is likely to be obtained. Fixed operating cash cost is likely to be ₹16 lakhs per annum. In addition to this the advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure in ₹lakhs each year	30	15	10	4

The company is subject to 50% tax, straight line method of depreciation (permissible for tax purposes also) and taking 12% as appropriate after tax cost of capital, should the project be accepted?

Answer:

Computation of initial cash outlay

	(₹ in lakhs)
Equipment Cost	120
Working Capital	15
	135

Calculation of Cash Inflows:

Year	1	2	3-5	6-8
Sales in units	80,000	1,20,000	3,00,000	2,00,000
	₹	₹	₹	₹
Contribution @ ₹60 p.u.	48,00,000	72,00,000	1,80,00,000	1,20,00,000
Fixed cost	16,00,000	16,00,000	16,00,000	16,00,000
Advertisement	30,00,000	15,00,000	10,00,000	4,00,000
Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Profit/(loss)	**(13,00,000)**	**26,00,000**	**1,37,50,000**	**83,50,000**
Tax @ 50%	Nil	13,00,000	68,75,000	41,75,000
Profit/(loss) after tax	**(13,00,000)**	**13,00,000**	**68,75,000**	**41,75,000**
Add: Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Cash Inflow	**2,00,000**	**28,00,000**	**85,25,000**	**58,25,000**

Computation of PV of CIF

Year	CIF	PV Factor @ 12%	
	₹		₹
1	2,00,000	0.893	1,78,600
2	28,00,000	0.797	22,31,600
3	85,25,000	0.712	60,69,800
4	85,25,000	0.636	54,21,900
5	85,25,000	0.567	48,33,675
6	58,25,000	0.507	29,53,275
7	58,25,000	0.452	26,32,900
8	58,25,000	0.404	23,53,300
WC	15,00,000	0.404	6,06,000
SV	1,00,000	0.404	40,400
			2,73,21,450
PV of COF			1,35,00,000
Additional Investment = ₹10,00,000 × 0.797			7,97,000
			1,42,97,000
		NPV	**1,30,24,450**

Recommendation: Accept the project in view of positive NPV.

Question 33

DL Services is in the business of providing home services like plumbing, sewerage line cleaning etc. There is a proposal before the company to purchase mechanized sewerage cleaning line for a sum of ₹20 lacs. The life of the machine is 10 years. The present system of the company is to use manual labour for the job. You are provided with the following information.

Cost of the machine	₹20 lacs
Depreciation	20% straight line
Operating cost	₹5 lacs p.a.
Present system	
Manual labour	200 Labour
Cost of Manual Labour	₹10,000 (ten thousand) per person per annum

The company has an after tax cost of funds of 10% p.a. Tax rate applicable is 35%

Based on the above you are required to:

a) State whether it is advisable to purchase the machine.

b) Compute the savings/additional cost as applicable if the machine is purchased.

May 2008 (8 Marks)

Answer:

Present System

Cost per annum	
200 persons @ ₹10,000 per annum	20,00,000
Cumulative Annuity factor at 10%	6.1446
Present value of cash outflow over a period of ten years at 10%	122,89,200
Less: Tax benefit at 35% for 10 years	43,01,220
Net cost over ten years	**79,87,980**
If machine is purchased	
Cost of Machine	20,00,000
Depreciation per annum	4,00,000
Annual cost of operation	5,00,000
Present value of operating cost for 10 years at 10%	30,72,300
Less: Tax saving on operating cost at 35% for 10 years	10,75,305
Net operating cost	19,96,995
Annuity factor for 5 years at 10%	3.7908
Tax saving on depreciation at 35%	5,30,712
Summary	
Outflow on machine	20,00,000
Less: Tax saving on depreciation of Machine	-5,30,712

Add: Operating cost over 10 years	19,96,995
Total cost of machine over 10 years	**34,66,283**
Total saving	**45,21,697**

Since there is a saving of ₹45.21 lacs it is advisable to purchase the machine.

Alternative Solution:

Calculation of Savings in operating cost if the mechanized cleaning line is purchased:

Annual Cost of the present system – cost of manual labour	**₹ lakhs**
200 persons × ₹10,000	20.00
Less: Operating cost with the new line	5.00
Annual Savings	15.00

Calculation of incremental cash inflows if the mechanized cleaning line is purchased:

Year 1 - 5	₹ lakhs
Annual Savings in operating cost (before tax)	15.00
Less: Annual depreciation @ 20% on cost	4.00
Taxable annual incremental income	11.00
Less: Tax @ 35%	3.85
After-tax annual incremental income	7.15
Add: Annual depreciation	4.00
Annual incremental cash-in-flow	11.15
Present Value Factor (of an Annuity for a period of 5 years @ 10%)	3.79
Present Value of 5-year annual incremental cash-in-flow (₹ Lakhs)	**42.26**

Year 6 – 10	₹ lakhs
Annual Savings in operating cost (before tax)	15.00
Less: Tax @ 35%	5.25
After-tax annual incremental income/cash in flow	9.75
Present Value Factor (of an Annuity between year 6 and 10)	2.35
Present Value of cash-in-flow in years 6 to 10 (₹ Lakhs)	**22.91**
(Salvage value presumed 'nil')	

	₹ in lakhs
Calculation of Net Present Value:	
Aggregate Present Value of Cash inflows in years 1 – 10	
(42.26 + 22.91)	65.17

Less: Initial investment – cost of machine	20.00
Net Present Value(+)	45.17

Advise: Since the NPV is positive, it is advisable to purchase the mechanized line.

Question 34

A manufacturing unit engaged in the production of automobile parts is considering a proposal of purchasing one of the two plants, details of which are given below:

	Plant A	**Plant B**
Cost	₹20,00,000	₹38,00,000
Installation Charges	₹4,00,000	₹2,00,000
Life	20 years	15 years
Scrap Value after Full Life	₹4,00,000	₹4,00,000
Output per minute (units)	200	400

The annual costs of the two plants are as follows:

	Plant A	**Plant B**
Running hours per annum	2500	2500
Costs		
Wages	1,00,000	1,40,000
Indirect Materials	4,80,000	6,00,000
Repairs	80,000	1,00,000
Power	2,40,000	2,80,000
Fixed Cost	60,000	80,000

Will it be advantageous to buy Plant A or Plant B? Substantiate your answer with the help of comparative unit cost of the plants. Assume interest on capital at 10 percent. Make other relevant assumptions

May 2015 (7 Marks)

Answer:

Working Notes:

Calculation of Equivalent Annual Cost

	Machine A	**Machine B**
Cash Outlay	₹24,00,000	₹40,00,000
Less: PV of Salvage Value		
4,00,000 × 0.1486	₹59,440	
4,00,000 × 0.2394		₹95,760
Annuity Factor	0.1175	0.1315
	₹2,75,016	₹5,13,408

Computation of Cost Per Unit

	Machine A	Machine B
Annual Output (a)	2500 × 60 × 200	2500 x 60 x 400
	= 3,00,00,000	= 6,00,00,000
Annual Cost (b)	₹	₹
Wages	1,00,000	1,40,000
Indirect Material	4,80,000	6,00,000
Repairs	80,000	1,00,000
Powers	2,40,000	2,80,000
Fixed Cost	60,000	80,000
Equivalent Annual Cost	2,75,016	5,13,408
Total	12,35,016	17,13,408
Cost Per Unit (b)/(a)	0.041167	0.02860

Decision: As the unit cost is less in proposed Plant B, it may be recommended that it is advantageous to acquire Plant B.

Question 35

Investment projects are exposed to various types of factors, what are those factors

Answer:

1) Inflation
2) Change in Technology
3) Change in Government Policies

Question 36

Discuss the Impact of Inflation on Capital Budgeting Decisions

Answer:

Impact on Costs:

- Inflation leads to an increase in the cost of raw materials, labor, and other operational expenses, affecting project budgets.
- It can erode the purchasing power of money, requiring higher capital investment to achieve the same level of output.

Impact on Returns:

- Inflation can reduce the real returns on investment as the nominal returns might not keep up with the rising costs.

- Investors need to factor in inflation while calculating expected returns to ensure profitability.

Question 37

Discuss the Impact of Change in Technology on Capital Budgeting Decisions

Answer:

Changes in technology can significantly impact capital budgeting decisions. Here's how:

1) Changes can also yield benefits such as improved quality, delivery time greater flexibility, etc.

2) Changed technology can also result in reduction in cost of capital

3) Improved cash inflows can be achieved through technological changes.

4) There may be need to incur additional cost in the form of additional capital expenditure.

5) The sale volume can be impacted as the anticipated life cycle of the product can be shortened because of change in consumer preference.

Question 38

How to Incorporate the Impact of Change in Technology in Capital Budgeting Decisions

Answer:

The various ways in which the impact of change in technology can be incorporated in capital Budgeting decisions are as follows.

1. At the time of making Capital Budgeting decisions the risk of change in technology should be considered using various techniques such as sensitivity analysis, Scenario Analysis, Simulation Analysis etc.
2. Once project has been launched analyze the impact of change in technology both positive or negative and revise estimates in monetary terms.
3. If continuation of project is proving to be unviable then look for abandonment option and evaluate the same.
4. Suitably adjusting the discounting rate.

Question 39

Discuss the Impact of Change in Government Policies on Capital Budgeting Decisions

Answer:

The change in Government Policy can be analysed under two headings:

(1) Impact of change of Policies on Domestic Capital Budgeting Decision.

(2) Impact of change of Policies on International Capital Budgeting Decision.

(1) Domestic Capital Budgeting Decisions:

- **Interest Rate Changes (Monetary Policy):**

- Changes in interest rates affect the cost of capital, particularly impacting working capital decisions due to adjustments in bank overdrafts.
- Major interest rate changes (e.g., 100 basis points) may require revisions to cash flow estimates.

- **Fiscal Policy Changes:**
  - Adjustments in tax rates and depreciation rates can alter annual cash flows, necessitating revisions in financial projections.

(2) International Capital Budgeting Decisions:

- **Foreign Exchange Rates:**
  - Changes in exchange rates, influenced by monetary policy, can impact the valuation of international investments, requiring updates to financial estimates.
- **Tax Rates and Double Taxation Agreements:**
  - Alterations in tax rates on foreign income or changes in DTAA provisions may lead to revisions in expected cash flows for international projects.

Question 40

Investment projects are exposed to various degrees of risk. Discuss

Answer:

There can be three types of decision making:

(1) Decision making under certainty: When cash flows are certain.

(2) Decision making involving risk: When cash flows involves risk and probability can be assigned.

(3) Decision making under uncertainty: When the cash flows are uncertain and probability cannot be assigned.

Question 41

What are the main Reasons for adjustment of Risk in Capital Budgeting decisions?

Answer:

Main reasons for considering risk in capital budgeting decisions are as follows:

1. There is an opportunity cost involved while investing in a project for the level of risk. Adjustment of risk is necessary to help make the decision as to whether the returns out of the project are proportionate with the risks borne and whether it is worth investing in the project over the other investment options available.
2. Risk adjustment is required to know the real value of the Cash Inflows. Higher risk will lead to higher risk premium and also expectation of higher return.

Question 42

Discuss the internal and external factors that affect capital budgeting decisions. Provide examples for each type of factor and explain their potential impact on investment projects.

Answer:

Capital budgeting decisions are influenced by a variety of factors, which can be categorized into **internal and external factors**. Each category presents unique risks that can affect the cash flows and overall viability of investment projects.

Internal Factors

These factors originate within the company and are specific to the organization or the project being undertaken:

1. **Project-Specific Risk:**

   Definition: Risks related to the particular characteristics of a project that can impact its cash flows.

   Examples:

   - Completion delays and resource allocation errors in a nuclear power project versus a hydel project.
   - Incorrect estimation of future cash flows.

   Impact: Affects project timelines, costs, and expected returns.

2. **Company-Specific Risk:**

   Definition: Risks arising from company-specific factors that can affect its financial health and access to funds.

   Examples:

   - Downgrading of credit ratings.
   - Changes in key managerial personnel or legal disputes, such as intellectual property rights violations.

   Impact: Can lead to increased financing costs and reduced investor confidence.

External Factors

These factors are external to the company and involve industry-wide or broader economic and market conditions:

1. **Industry-Specific Risk:**

   Definition: Risks affecting the entire industry in which a company operates.

   Examples: Regulatory restrictions on industries like leather or breweries.

   Impact: Can limit operational capabilities or necessitate costly compliance measures.

2. **Market Risk:**

   Definition: Risks related to market conditions and dynamics.

   Examples:

- Entry of substitute products or changes in demand conditions.
- Supply chain disruptions, such as coal shortages affecting thermal power projects.

Impact: Can affect sales volumes, pricing strategies, and profit margins.

3. **Competition Risk:**

Definition: Risks related to competition within the market.

Examples:

- Entry of new rivals and changes in consumer preferences.
- Product innovation by competitors.

Impact: Can lead to loss of market share and require strategic adjustments.

4. **Risk Due to Economic Conditions:**

Definition: Risks related to macroeconomic factors.

Examples: Changes in monetary and fiscal policies, inflation, and GDP fluctuations.

Impact: Can influence interest rates, investment levels, and consumer spending.

5. **International Risk:**

Definition: Risks arising from global economic and political conditions.

Examples:

- Restrictions on free trade and outsourcing jobs overseas.
- Bilateral agreements and geopolitical tensions.

Impact: Can affect international operations, cross-border investments, and global supply chains.

Conclusion:

- Both internal and external factors must be carefully considered in capital budgeting decisions to accurately assess potential risks and returns.
- A comprehensive understanding of these factors helps in making informed investment decisions and developing strategies to mitigate adverse impacts.

Question 43

Explain the importance of variance and standard deviation in capital budgeting decisions. How do these concepts help in assessing the risk and profitability of investment proposals?

Answer:

- ✓ For making capital budgeting decisions, these two concepts are important to measure the volatility in estimated cash flows and profitability in an investment proposal.
- ✓ Both the concepts measures the difference between the expected cash flows and estimated cash flows (mean or average).
- ✓ Variance measures the range of variability (difference) in cash flows data while Standard deviation determines risk in an investment proposal.

- ✓ An investment proposal in which expected cash flows are close to the estimated net cash flow are seen as less risky and has the potential to make profit.
- ✓ Standard deviation and Variance are two different statistical concepts but are closely interrelated. Standard deviation is calculated as square root of variance, hence, variance is prerequisite for calculation of SD.

Question 44

Discuss briefly the concept of Coefficient of Variation

Answer:

The standard deviation is a useful measure of calculating the risk associated with the estimated cash inflows from an Investment. However, in Capital Budgeting decisions, the management is several times faced with choosing between many investments' avenues. Under such situations, it becomes difficult for the management to compare the risk associated with different projects using Standard Deviation as each project has different estimated cash flow values. In such cases, the Coefficient of Variation becomes useful. The Coefficient of Variation calculates the risk borne for every percent of expected return. It is calculated as:

$$\text{Coefficient of variation} = \frac{\text{Stanadrd Deviation}}{\text{Expected Return or Expected Cash Flow}}$$

The Coefficient of Variation enables the management to calculate the risk borne by the concern for every unit of estimated return from a particular investment. Simply put, the investment avenue which has a lower ratio of standard deviation to expected return will provide a better risk – return trade off. Thus, when a selection has to be made between two projects, the management would select a project which has a lower Coefficient of Variation.

Question 45

Write Short Notes on Risk Adjusted Discount Rate (RADR) and Certainty Equivalent Approach

Answer:

Risk Adjusted Discount Rate (RADR)

- ✓ The use of risk adjusted discount rate (RADR) is based on the concept that investors demand higher returns from the risky projects. The required rate of return on any investment should include compensation for delaying consumption plus compensation for inflation equal to risk free rate of return, plus compensation for any kind of risk taken.
- ✓ If the risk associated with any investment project is higher than risk involved in a similar kind of project, discount rate is adjusted upward in order to compensate this additional risk borne. A risk adjusted discount rate is a sum of risk-free rate and risk premium.

- ✓ The Risk Premium depends on the perception of risk by the investor of a particular investment and risk aversion of the Investor.

So, Risk adjusted discount rate (RADR) = Risk free rate + Risk premium

Risk Free Rate: It is the rate of return on Investments that bear no risk. For e.g., Government securities yield a return of 6% and bear no risk. In such case, 6% is the risk-free rate.

Risk Premium: It is the rate of return over and above the risk free rate, expected by the Investors as a reward for bearing extra risk. For high risk projects, the risk premium will be high and for low risk projects, the risk premium would be lower.

Certainty Equivalent Approach (CE):

As per CIMA terminology, "Certainty Equivalent is an approach dealing with risk in a capital budgeting context. It involves expressing risky future cash flows in terms of the certain cash flow which would be considered, by the decision maker, as their equivalent, that is the decision maker would be indifferent between the risky amount and the (lower) riskless amount considered to be its equivalent." The certainty equivalent is a guaranteed return that the management would accept rather than accepting a higher but uncertain return. This approach allows the decision maker to incorporate his or her utility function into the analysis. In this approach a set of risk less cash flow is generated in place of the original cash flows.

Steps in the Certainty Equivalent (CE) approach

Step 1: Remove risks by substituting equivalent certain cash flows from risky cash flows. This can be done by multiplying each risky cash flow by the appropriate α value (CE coefficient)

$$\alpha = \frac{\text{Certain Cash Flows}}{\text{Risk or Expected Cash Flows}}$$

Suppose on tossing out a coin, if it comes head, you will win ₹10,000 and if it comes out to be tail, you will win nothing. Thus, you have 50% chance of winning and expected value is ₹5,000 (₹10,000 × 0.50). In such case, if you are indifferent at receiving ₹3,000 for a certain amount and not playing then ₹3,000 will be certainty equivalent and 0.3 (i.e. ₹3,000/₹10,000) will be certainty equivalent coefficient.

Step 2: Discounted value of cash flow is obtained by applying risk less rate of interest. Since you have already accounted for risk in the numerator using CE coefficient, using the cost of capital to discount cash flows will tantamount to double counting of risk.

Step 3: After that, normal capital budgeting method is applied except in case of IRR method, where IRR is compared with risk free rate of interest rather than the firm's required rate of return. Certainty Equivalent Coefficient transforms expected values of uncertain flows into their Certainty Equivalents. It is important to note that the value of Certainty Equivalent Coefficient lies between 0 & 1. Certainty

Equivalent Coefficient 1 indicates that the cash flow is certain or management is risk neutral. In industrial situation, cash flows are generally uncertain and managements are usually risk averse. Under this method, NPV is calculated as follows:

NPV = Sum of (PVF × Certain Cash Flows × CE Coefficient) of all the years

Question 46

What are the advantages and disadvantages of Certainty Equivalent Method?

Answer:

Advantages

1. The certainty equivalent method is simple and easy to understand and apply.
2. It can easily be calculated for different risk levels applicable to different cash flows. For example, if in a particular year, a higher risk is associated with the cash flow, it can be easily adjusted and the NPV can be recalculated accordingly.

Disadvantages

1. There is no objective or mathematical method to estimate certainty equivalents. Certainty Equivalents are subjective and vary as per each individual's estimate.
2. Certainty equivalents are decided by the management based on their perception of risk. However, the risk perception of the shareholders who are the money lenders for the project is ignored. Hence, it is not used often in corporate decision making.

Question 47

Certainty Equivalent Method is superior to Risk Adjusted Discount Rate Method. Explain

Answer:

Certainty Equivalent Method is superior to Risk Adjusted Discount Rate Method as it does not assume that risk increases with time at constant rate. Each year's Certainty Equivalent Coefficient is based on level of risk impacting its cash flow.

Despite its soundness, it is not preferable like Risk Adjusted Discount Rate Method. It is difficult to specify a series of Certainty Equivalent Coefficients but simple to adjust discount rates.

Question 48

Write Short Notes on Sensitivity Analysis

Answer:

- ✓ As per CIMA terminology, "Sensitivity Analysis a modelling and risk assessment procedure in which changes are made to significant variables in order to determine the effect of these changes on the planned outcome. Particular attention is thereafter paid to variables identified as being of special significance".

- ✓ Sensitivity analysis put in simple terms is a modelling technique which is used in Capital Budgeting decisions, to study the impact of changes in the variables on the outcome of the project. In a project, several variables like weighted average cost of capital, consumer demand, price of the product, cost price per unit etc. operate simultaneously.
- ✓ The changes in these variables impact the outcome of the project. Therefore, it becomes very difficult to assess, change in which variable impacts the project outcome in a significant way. In Sensitivity Analysis, the project outcome is studied after taking into account change in only one variable.
- ✓ The more sensitive is the NPV (or IRR), the more critical is that variable. So, Sensitivity analysis is a way of finding impact on the project's NPV (or IRR) for a given change in one of the variables.

Steps involved in Sensitivity Analysis

1. Finding variables, which have an influence on the NPV (or IRR) of the project.
2. Establishing mathematical relationship between the variables.
3. Analysing the effect of the change in each of the variables on the NPV (or IRR) of the project.

Question 49

What are the advantages and disadvantages of Sensitivity Analysis

Answer:

Advantages of Sensitivity Analysis:

1. **Critical Issues:** This analysis identifies critical factors that impinge on a project's success or failure.
2. **Simplicity:** It is a simple technique.

Disadvantage of Sensitivity Analysis

1. **Assumption of Independence**: This analysis assumes that all variables are independent i.e. they are not related to each other, which is unlikely in real life.
2. **Ignore probability:** This analysis does not look to the probability of changes in the variables.

Question 50

Write Short Notes on Scenario Analysis

Answer:

- ✓ Although sensitivity analysis is probably the most widely used risk analysis technique, it does have limitations. Therefore, we need to extend sensitivity analysis to deal with the probability distributions of the inputs.

- ✓ In addition, it would be useful to vary more than one variable at a time so we could see the combined effects of changes in the variables. Scenario analysis provides answer to these situations of extensions.
- ✓ This analysis brings in the probabilities of changes in key variables and also allows us to change more than one variable at a time. This analysis begins with base case or most likely set of values for the input variables.
- ✓ Then, go for worst case scenario (low unit sales, low sale price, high variable cost, etc.) and best case scenario (high unit sales, high sale price, low variable cost, etc.). Alternatively, Scenarios analysis is possible where some factors are changed positively and some factors are changed negatively.
- ✓ So, in a nutshell Scenario analysis examine the risk of investment, to analyse the impact of alternative combinations of variables, on the project's NPV (or IRR).

Question 51

Differentiate between Sensitivity Analysis and Scenario Analysis

Answer:

Aspect	Scenario Analysis	Sensitivity Analysis
Purpose	Examines the impact of simultaneous changes in multiple input variables on project outcomes under different scenarios (e.g., boom, recession).	Analyzes the impact of changing a single input variable on the project outcome, keeping all other variables constant.
Complexity	More complex, as it involves changing all input variables simultaneously based on specific scenarios.	Less complex, as it involves changing only one input variable at a time.
Input Variables	All input variables change simultaneously according to the scenario (e.g., unit sales, sale price, costs).	Only one input variable is changed at a time (e.g., unit sales, sale price, or cost).
Outcome Analysis	Evaluates the project's NPV or IRR under different scenarios, such as boom, normal, and recession, to assess the variability and risk associated with the project.	Identifies the single critical variable that has the most significant impact on the project's NPV or IRR and determines the range of possible outcomes.
Risk Assessment	Assesses the risk by comparing outcomes across different scenarios; higher deviation indicates higher risk.	Highlights sensitive variables for targeted risk management.

Aspect	Scenario Analysis	Sensitivity Analysis
Application	Used for comprehensive risk assessment by considering various possible future states of the world and their impact on project outcomes.	Used for pinpointing specific variables that could critically impact project success, allowing management to focus on these variables for mitigation.

Question 52

Write Short Notes on Simulation Analysis

Answer:

- ✓ Simulation is the exact replica of the actual situation. To simulate an actual situation, a model shall be prepared.
- ✓ The simulation Analysis is a technique, in which infinite calculations are made to obtain the possible outcomes and probabilities for any given action. Monte Carlo simulation ties together sensitivities and probability distributions.
- ✓ The method came out of the work of first nuclear bomb and was so named because it was based on mathematics of Casino gambling.
- ✓ Fundamental appeal of this analysis is that it provides decision makers with a probability distribution of NPVs rather than a single point estimates of the expected NPV.
- ✓ This analysis starts with carrying out a simulation exercise to model the investment project. It involves identifying the key factors affecting the project and their inter relationships.
- ✓ It involves modelling of cash flows to reveal the key factors influencing both cash receipt and payments and their inter relationship.
- ✓ This analysis specifies a range for a probability distribution of potential outcomes for each of model's assumptions.

Steps for Simulation Analysis:

1. **Modelling the project:** The model shows the relationship of NPV with parameters and exogenous variables. (Parameters are input variables specified by decision maker and held constant over all simulation runs. Exogenous variables are input variables, which are stochastic in nature and outside the control of the decision maker).
2. Specify values of parameters and probability distributions of exogenous variables.
3. Select a value at random from probability distribution of each of the exogenous variables.
4. Determine NPV corresponding to the randomly generated value of exogenous variables and pre-specified parameter variables.
5. Repeat steps (3) & (4) a large number of times to get a large number of simulated NPVs.

6. Plot probability distribution of NPVs and compute a mean and Standard Deviation of returns to gauge the project's level of risk.

Question 53

What are the advantages and disadvantages of Simulation Analysis

Answer:

Advantages of Simulation Analysis: Strength lies in Variability.

1. We can predict all type of bad market situation beforehand.
2. Handle problems characterised by:
   a) Numerous exogenous variables following any kind of distribution.
   b) Complex inter-relationships among parameters, exogenous variables and endogenous variables. Such problems defy capabilities of analytical methods.
   c) Compels decision maker to explicitly consider the inter-dependencies and uncertainties featuring the project.

Shortcomings

1. Difficult to model the project and specify probability distribution of exogenous variables.
2. Simulation is inherently imprecise. Provides rough approximation of probability distribution of NPV Due to its imprecision, simulation probability distribution may be misleading when a tail of distribution is critical.
3. Realistic simulation model being likely to be complex would probably be constructed by management expert and not by the decision maker. Decision maker lacking understanding of the model may not use it.
4. Determine NPV in simulation run, risk free discount rate is used. It is done to avoid pre- judging risk, which is reflected in the dispersion of the distribution of N.P.V. This derived measure of NPV takes a different meaning from its original value, and, therefore, is difficult to interpret.

Question 54

Write short notes on Decision Tree Analysis

Answer:

- ✓ Investment decisions may have implications for future or further investment decisions and may also impact future decision and events. Such situation can be handled by taking a sequence of decisions over a period.
- ✓ The technique to handle this type of sequential decisions is done through "Decision Tree" technique. Basically, decision tree is a graphic display of the relationship between a present decision and future events, future decision, and their consequences.

- ✓ This approach assumes that there are only two types of situations that a finance manager has to face. The first situation is where the manager has control or power to determine what happens next. This is known as "Decision", as he can do what he desires to do.
- ✓ The second situation is where finance manager has no control over what happens next. This is known as "Event". Since the outcome of the events is not known, a probability distribution needs to be assigned to the various outcomes or consequences.
- ✓ It should, however, be noted when a finance manager faced with a decision situation, he is assumed to act rationally. For example, in a commercial business, he will choose the most profitable course of action and in non-profit organization, the lowest cost may be rational choice.

Question 55

Write short notes on Adjusted Present Value

Answer:

- ✓ As we are well aware that to evaluate a capital project we discount the expected cash flows by overall Cost of Capital i.e. WACC. Further, to incorporate risk in the evaluation of any project we can adjust the same discount rate.
- ✓ However instead of adjusting the cost of capital we can use an alternative approach called Adjusted Present Value (APV) Method. This approach separates the investment decision and financing decision.
- ✓ Following formula is used to evaluate a project as per this approach:

  Base Case NPV + PV of Tax Benefit on Interest

  Base Case NPV is calculated using cost of equity assuming the company is unlevered i.e., all equity financed.
- ✓ Since viability of the project is partly dependent on how project is financed the PV of Tax Benefits on Interest payment allows for such adjustment. Thus, this method provides a broader view to evaluate a project considering the benefit of increased use of debt in financing of any project.

Question 56

Write a note on project appraisal under inflationary conditions.

Answer:

Project Appraisal Under Inflationary Conditions:

Project appraisal typically involves evaluating the feasibility of a project from technical, commercial, economic, and financial perspectives. This process focuses on analyzing cash flows throughout the

project's life. Under inflationary conditions, various factors must be considered as inflation impacts costs, purchasing power, demand patterns, and financing.

Key Considerations:

1. **Cost Escalation:**
   - Inflation increases costs across all project components, including labor, raw materials, fixed assets, and personnel. It is crucial to account for potential cost escalations in project estimates.
2. **Financing Costs:**
   - Inflation can lead to higher interest rates, affecting the cost of borrowed funds. It is important to evaluate financing options and anticipate changes in lending rates.
3. **Profitability and Cash Flow Adjustments:**
   - Inflation can alter demand patterns, impacting projected profitability and cash flows. Adjustments should be made to reflect these changes and ensure accurate financial projections.
4. **Financial Viability:**
   - Assess the project's financial viability under revised conditions, considering the economic rate of return that accommodates inflation. This measure equates the present value of capital expenditures with net cash flows over the project's life.
5. **Payback Period:**
   - In an inflationary environment, prioritize projects with shorter payback periods as they carry lower risk than those with longer payback periods.

Approaches to Project Appraisal Under Inflation:

1. **Inflation Index Adjustment:**
   - Adjust annual cash flows to reflect selling price and cost increases linked to an inflation index.
2. **Acceptance Rate Adjustment:**
   - Modify the project's acceptance rate by considering expected inflation, keeping cash flow projections at current price levels.

Example:

- Normal Acceptance Rate: 15.0%
- Expected Annual Inflation: 5.0%
- Adjusted Discount Rate: 15.0% × 1.05 = 15.75%

Project appraisal during inflation requires careful consideration of cost escalations, financing, profitability, and project viability to make informed decisions.

Question 57

Explain the concept 'Zero date of a Project' in project management.

Answer:

Zero Date of a Project means a date is fixed from which implementation of the project begins. It is a starting point of incurring cost. The project completion period is counted from the zero date. Pre-project activities should be completed before zero date. The pre-project activities should be completed before zero date. The pre-project activities are:

a. Identification of project/product
b. Determination of plant capacity
c. Selection of technical help/collaboration
d. Selection of site.
e. Selection of survey of soil/plot etc.
f. Manpower planning and recruiting key personnel
g. Cost and finance scheduling.

CHAPTER 4
SECURITY ANALYSIS

Question 1

Closing Values of NIFTY Index from 3rd to 12th day of the month of January 2022 were as follows:

Days	Date	Closing Values of NIFTY Index
1	03/01/2022	17626
2	04/01/2022	17805
3	05/01/2022	17925
4	06/01/2022	17746
5	07/01/2022	17813
6	10/01/2022	18003
7	11/01/2022	18056
8	12/01/2022	18212

The simple moving average of NIFTY Index for the month of December 2021 was 17174.

You are required to calculate

(i) The value of exponent for 15 days EMA.

(ii) The exponential moving average (EMA) of NIFTY during the above period. (Calculations to be done up to 2 decimals only).

(iii) Analyse the buy & sell signal on the basis of your calculations.

May 22 (8 Marks)

Answer:

(i) Value of Exponent for 15 days EMA

$$= \frac{2}{n+1} = 0.125$$

(ii) $EMA_t = a \times P_t + (1 - a)\ (EMA_{(t-1)})$ Where, a = exponent, P_t = Price of today

Date	1	2	3	4	5
	Sensex	EMA for Previous day (EMA (t – 1))	1-2	3 × 0.125	EMA 2 + 4
03/01/2022	17626	17174	452	56.50	17230.50
04/01/2022	17805	17230.50	574.50	71.81	17302.31
05/01/2022	17925	17302.31	622.69	77.84	17380.15
06/01/2022	17746	17380.15	365.85	45.73	17425.88
07/01/2022	17813	17425.88	387.12	48.39	17474.27
10/01/2022	18003	17474.27	528.73	66.09	17540.36
11/01/2022	18056	17540.36	515.64	64.45	17604.82
12/01/2022	18212	17604.82	607.18	75.90	17680.71

A buy (bullish) signal is generated when actual price line (NIFTY in the give case) rises through the moving average, while a sell a (bearish) signal is generated when actual NIFTY level declines through the moving averages. In the case under consideration the price line of NIFTY never breaches the 15-day EMA line. In-fact it is hovering around the 15-day EMA line only.

Question 2

The Closing values of NSE Nifty from 2nd January, 2024 to 11th January, 2024 were as follows:

Days	Date	Day	Nifty
1	2	TUE	21,742
2	3	WED	21,665
3	4	THU	21,517
4	5	FRI	21,462
5	6	SAT	No Trading
6	7	SUN	No Trading
7	8	MON	21,238
8	9	TUE	21,182
9	10	WED	20,997
10	11	THU	20,926
11	12	FRI	20,901

You are required to:

(i) Calculate Exponential Moving Average (EMA) of Nifty during the above period. The previous day exponential moving average of Nifty can be assumed as 21,500. The value of exponent for 31 days EMA is 0.062.

(ii) Give brief analysis on the basis of your calculations.

May 24 (8 Marks)

Answer:

EMA =Previous EMA+ [(CP-Previous EMA) x e] or

EMA = [CP x e]+ [Previous EMA x (1-e)]

	1 Sensex	2 EMA for Previous Day	3 (1 – 2)	4 (3) × 0.062	5 EMA (2 + 4)
02/01/2024	21742	21500.00	242.00	15.00	21515.00
03/01/2024	21665	21515.00	150.00	9.30	21524.30
04/01/2024	21517	21524.30	-7.30	-0.45	21523.85

05/01/2024	21462	21523.85	-61.85	-3.83	21520.02
08/01/2024	21238	21520.02	-282.02	-17.49	21502.53
09/01/2024	21182	21502.53	-320.53	-19.87	21482.66
10/01/2024	20997	21482.66	-485.66	-30.11	21452.55
11/01/2024	20926	21452.55	-526.55	-32.65	21419.90
12/01/2024	20901	21419.90	-518.90	-32.17	21387.73

Question 3

What are the two main approaches to Security Analysis?

Answer:

The two main approaches to Security Analysis are

1) Fundamental analysis: Fundamental analysis focuses on factors affecting the risk-return characteristics of securities, such as the company's financial health, management policies, and economic conditions.
2) Technical analysis: Technical analysis examines the demand and supply position of securities, along with prevalent share price trends, to make investment decisions.

Question 4

What are the key variables an investor must monitor for fundamental analysis?

Answer:

The key variables an investor must monitor for fundamental analysis are

1) Economy-wide factors,
2) Industry-wide factors, and
3) Company-specific factors.

Question 5

In a rational, well ordered and efficient market, technical analysis may not work very well". Is it true? List out the reasons for this statement regarding Technical Analysis.

Nov 23 (4 Marks)

Answer:

The reasons for the statement "In a rational, well ordered and efficient market, technical analysis may not work very well" are as follows:

1) **Lack of Convincing Explanation:** Most technical analysts are not able to offer a convincing explanation for the tools employed by them.
2) **Random Walk Hypothesis:** Empirical evidence in support of the random walk hypothesis casts its shadow over the usefulness of technical analysis.
3) **Delayed Signals:** By the time an uptrend or downtrend may have been signaled by technical analysis, it may already have taken place.
4) **Self-Defeating Proposition:** Ultimately, technical analysis must be a self-defeating proposition. With more and more people employing it, the value of such analysis tends to decline.

Question 6

Discuss the Empirical Evidence on Strong form Efficient Market Theory

Answer:

The strong form of Efficient Market Theory posits that all available information, both public and private, is reflected in stock prices. This represents an extreme hypothesis that no investor can consistently achieve higher returns using insider or privileged information.

To test this theory, researchers analyzed returns earned by groups with potential access to non-public information, such as corporate insiders, stock exchange specialists, and mutual fund managers:

- **Corporate Insiders and Stock Exchange Specialists:** These groups often earn superior returns after adjusting for risk, suggesting they benefit from access to private information or monopolistic exposure.
- **Mutual Fund Managers:** On average, mutual fund managers do not earn superior returns. Studies, including Burton Malkiel's *A Random Walk Down Wall Street*, show no scientific evidence that professionally managed portfolios perform better than randomly selected portfolios. This suggests that even with expert analysis, these managers cannot consistently outperform the market.

These findings challenge the strong form of market efficiency, indicating that while certain insiders may exploit private information, professional fund managers do not generally achieve better results than random selections.

Question 7

Explain "Charting Techniques".

Answer:

Broadly technical analysts use four types of charts for analyzing data. They are as follows:

1. Line Chart
2. Bar Chart
3. Japanese Candlestick Chart
4. Point and Figure Chart

Question 8

Write short notes on

1. Triangle or coil
2. Flags and Pennants
3. Double Top
4. Double Bottom

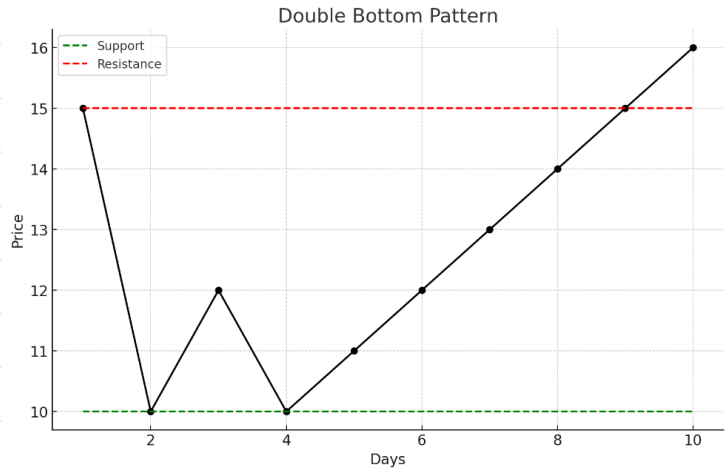
Answer:

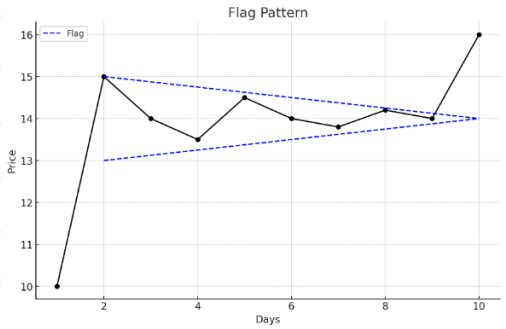
1. Triangle or Coil

- **Triangle patterns** are continuation patterns that occur in a trending market and can be symmetrical, ascending, or descending.
- A **symmetrical triangle** forms when the price consolidates with lower highs and higher lows, indicating a period of indecision before the trend continues.
- **Ascending triangles** have a flat upper trendline and a rising lower trendline, suggesting bullish potential.
- **Descending triangles** have a declining upper trendline and a flat lower trendline, suggesting bearish potential.

2. Flags and Pennants

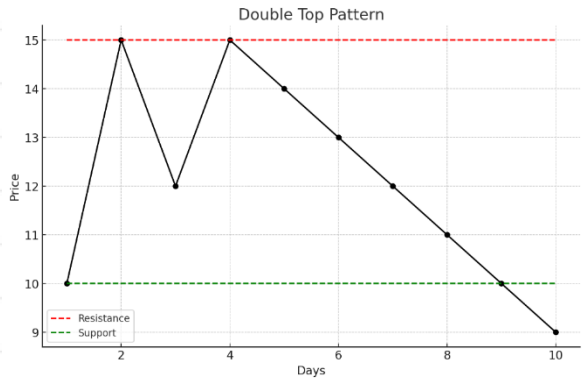
- **Flags and pennants** are short-term continuation patterns that appear after a strong price movement, often referred to as the "flagpole."
- A **flag** is a rectangular pattern that slopes against the prevailing trend, while a **pennant** is a small symmetrical triangle.
- Both indicate a brief consolidation before the trend resumes.





3. Double Top

- A **double top** is a bearish reversal pattern that forms after an uptrend, characterized by two peaks at approximately the same price level.
- It indicates that the upward momentum is weakening, and a downtrend may follow once the support level is broken.



4. Double Bottom

- A **double bottom** is a bullish reversal pattern that forms after a downtrend, characterized by two troughs at approximately the same price level.
- It signals that the downward momentum is weakening, and an uptrend may occur once the resistance level is broken.

Question 9

Write Short Notes on Moving Averages

Answer:

Moving averages are a widely used technical analysis tool that smooths out price data by creating a constantly updated average price. They help identify trends by filtering out the noise from short-term price fluctuations.

Types of Moving Averages:

1. **Simple Moving Average (SMA):**
   - The SMA calculates the average price over a specific period by adding the closing prices of an asset for a set number of periods and then dividing the sum by that number of periods.
   - Example: A 10-day SMA adds up the closing prices of the last 10 days and divides by 10.
2. **Exponential Moving Average (EMA):**
   - The EMA gives more weight to recent prices, making it more responsive to new information compared to the SMA.
   - It is calculated by applying a multiplier to the difference between the current price and the previous EMA.

$$\text{EMAt} = \text{aPt} + (1 - \text{a})(\text{EMAt} - 1)$$

Where,

a (exponent) = 2/n+1

Pt = Price of today

EMAt-1 = Previous day's EMA

Or

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

n = Number of days for which average is to be calculated.

3. **Weighted Moving Average (WMA):**
   - The WMA assigns a specific weight to each data point within the period, giving more importance to certain prices.
   - The sum of the weights must equal one.

Uses of Moving Averages:

- **Trend Identification:** Moving averages help traders and analysts determine the direction of a trend. If the price is above the moving average, it suggests an uptrend; if below, it indicates a downtrend.
- **Support and Resistance Levels:** Moving averages can act as dynamic support or resistance levels, where the price tends to bounce off the moving average.

Limitations:

- Moving averages are lagging indicators, meaning they rely on past prices and may not predict future movements accurately.
- They can give false signals during sideways or choppy markets, where the price fluctuates around the moving average without a clear trend.

Moving averages are a fundamental tool in technical analysis, providing valuable insights into market trends and helping traders make informed decisions. However, they are best used in conjunction with other indicators and analysis methods for a comprehensive market view.

CHAPTER 5
SECURITY VALUATION

Question 1

A company has a book value per share of ₹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.

StudyMat

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

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

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

$$\mathbf{P_0 = ₹91.89}$$

(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,

$$V_c = \frac{8.27 + \frac{0.15}{0.18}(20.67 - 8.27)}{0.18} = \frac{18.60}{0.18} = \mathbf{₹103.35}$$

Question 2

Given the following information:

Current Dividend (Do)	₹5.00
Discount Rate (k)	10.5%
Growth rate (g)	4%

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

(ii) Evaluate whether the stock is overvalued if stock price is ₹70, ROE = 18% and EPS (E0) = ₹4.50 applying:

- PE Multiple approach and
- Earnings Growth model. (using discount rate of 10.5%).

Jan 21 (8 Marks), Nov 12 (8 Marks), MTP Mar 24 (8 Marks), MTP March 15 (5 Marks), Study Mat

Answer:

(i) Present Value of the stock:- $V_0 = \frac{5.00(1.04)}{0.105-0.04}$ = ₹80

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

Particulars	
Actual Stock Price	₹70.00
Return on equity	18%
EPS	₹4.50
PE Multiple (1/Return on Equity) = 1/18%	5.56
Market Price per Share	**₹25.02**

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

Value of the Stock under the Earnings Growth Model

Particulars	
Actual Stock Price	₹17.00
Return on equity	18%
EPS	₹4.50

Growth Rate	4%
Market Price per Share [EPS × (1+g)]/(K_e – g) = ₹4.50 × 1.04/(0.105-0.04)	**₹72.00**

Since, Actual Stock Price is lower, hence it is undervalued.

Question 3

DEF Ltd has been regularly paying a dividend of ₹19,20,000 per annum for several years and it is expected that same dividend would continue at this level in near future. There are 12,00,000 equity shares of ₹ 10 each and the share is traded at par.

The company has an opportunity to invest ₹8,00,000 in one year's time as well as further ₹8,00,000 in two years' time in a project as it is estimated that the project will generate cash inflow of ₹3,60,000 per annum in three years' time which will continue forever. This investment is possible if dividend is reduced for next two years.

Whether the company should accept the project? Also analyze the effect on the market price of the share, if the company decides to accept the project.

Answer:

First we calculate cost of Equity (K_e)/PE Ratio

$$D_1 = \frac{19,20,000}{12,00,000} = 1.6$$

$$P_0 = 10$$

$$K_e = \frac{D}{P} = \frac{₹1.6}{10} = 16\%$$

$$P/E = \frac{10}{1.6} = 6.25$$

Now we shall compute NPV of the project

$$NPV = \frac{-800000}{(1 + 0.16)} + \frac{-800000}{(1 + 0.16)^2} + \left[\left[\left[\frac{360000}{0.16} \times \frac{1}{(1+0.16)^3}\right]\right]\right]$$

= -6,89,655 – 5,94,530 + 14,41,480

= 1,57,295

As NPV of the project is positive, the value of the firm will increase by ₹1,57,295 and spread over the number of shares e.g. 12,00,000, the market price per share will increase by 13 paisa.

Question 4

An investor is considering purchasing equity shares of Alpha Ltd., whose current Market price is ₹172.45. The company is proposing a dividend of ₹6 for the year ending 31st March, 2024. Alpha Ltd. is expected to grow @ 20 percent per annum for the next four years. Thereafter, the growth, over the next three

years, will decline linearly by 100 basis points per annum. Thereafter, it will stabilize at a certain growth rate per annum infinitely. The required rate of return for the investor is 20%.

Dividend value is to be taken in 2 decimal points only.

You are required:

(i) To calculate the stable growth rate of Alpha Ltd. after the end of 7 years.

(ii) To advise whether it is worth to purchase the share at this price if the investor has a stable target growth rate of 15% per annum.

Period	1	2	3	4	5	6	7
PVIF (20%,n)	0.8333	0.6944	0.5787	0.4823	0.4019	0.3349	0.2791

May 23 (8 Marks)

Answer:

(i) Working Notes:

D_1 = ₹6

D_2 = 6 (1.20) = ₹7.20

D_3 = 6 $(1.20)^2$ = ₹8.64

D_4 = 6 $(1.20)^3$ = ₹10.37

D_5 = 10.37(1.19) = ₹12.34

D_6 = 10.37 (1.19) (1.18) = ₹14.56

D_7 = 10.37 (1.19) (1.18) (1.17) = ₹17.04

Price at the end of 7th year

Year	Dividend (₹)	PVF@20%	PV (₹)
1	6.00	0.8333	5.00
2	7.20	0.6944	5.00
3	8.64	0.5787	5.00
4	10.37	0.4823	5.00
5	12.34	0.4019	4.96
6	14.56	0.3349	4.88
7	17.04	0.2791	4.76
Total			34.60

Current Market Price	₹172.45
Less: PV of Dividends upto the year ending 7th year	₹34.60
PV of Expected Market Price at the end of 7th year	₹137.85

Let g be growth rate then: $137.85 = \frac{17.04\ (1+g)}{0.20-g} \times 0.2791$

g = 0.16 i.e. 16%

Thus, the stable growth rate after the end of the 7 years shall be 16%.

(ii) Since growth rate is more than target growth rate it is worth to purchase the share.

Question 5

Mr. X wants to buy shares of A Ltd. (having a Beta of 2) at the current market price of ₹500 each, with a face value of ₹100. He is expecting a bonus at the ratio of 1:4 during the fifth year. The annual expected dividend is 20%, and the same rate is expected to be maintained throughout the holding period. He intends to sell the shares at the end of the 7th year and expects that the market price shall be doubled during this holding period. Incidental expenses for the purchase of shares are estimated to be 5% of the market price. The risk-free rate of return and market rate of return are 5% and 7.50%, respectively.

Objective: Advise Mr. X on whether he should buy this share or not. If so, then recommend the maximum price he should pay for each share.

Note: Assume no tax on dividend income and capital gains.

MTP Nov 22 (8 Marks), MTP Apr 19 (6 Marks), StudyMat

Answer:

1. **Calculate the Required Rate of Return using CAPM:**

   Required Rate of Return(R)

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

   $=0.05+2\times(0.075-0.05)$

   $=0.10$ or 10%

2. **Calculate the Present Value of Expected Cash Flows:**

Year	Cash Flow (₹)	Present Value Factor (10%)	Present Value (₹)
1	20	0.909	18.18
2	20	0.826	16.52
3	20	0.751	15.02
4	20	0.683	13.66
5	25	0.621	15.53
6	25	0.564	14.10
7	25	0.513	12.83
7	1000 x 1.25 = 1250	0.513	641.25
Total Present Value (₹)			747.09

Year	Cash Flow (₹)	Present Value Factor (10%)	Present Value (₹)
Less: Cost of shares 500 x 1.05			525
Net Gain			222.09

3. Compare the Present Value to the Current Market Price:

Parameter	Value (₹)
Present Value of Expected Cash Flows	619.05
Current Market Price	500
Incidental Expenses (5%)	25
Maximum Price to Pay	594.05

Since Mr. X is gaining ₹222.09 per share, he should buy the share.

Maximum price Mr. A should be ready to pay is ₹747.09.

Question 6

Mr. Amit is happy with the investment in a company as it is paying good dividend for the last few years. Last year it paid a dividend of ₹2 per share. The share is currently trading at ₹150 per share. He is of view that if he applies dividend discount model, the share is undervalued. As a financial expert examine his view that dividend discount model represents the fair value.

You being an expert is required to evaluate the market value of the share of the company.

Profit after tax of the company	₹290 crores
Equity capital of company	₹1,300 crores
Par value of share	₹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	₹47
Depreciation per share	₹39
Change in Working capital	₹3.45 per share

Note: Round off figures (e.g. EPS etc.) upto 2 decimal points.

June 09 (6 Marks), RTP May 24, MTP Feb 15 (6 Marks), MTP Oct 15 (5 Marks), MTP April 19 (5 Marks), MTP Aug 18 (4 Marks), RTP Nov 13, RTP Nov 14, RTP May 20 RTP Nov 19, StudyMat

Answer:

No. of Shares = (₹1300 crores)/(₹40) = 32.5 crores

$$EPS = \frac{PAT}{No.\ of\ Shares} = \frac{₹290\ crores}{32.5\ crores} = ₹8.923$$

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

= 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%

$$P_o = \frac{FCFE(1+g)}{K_e - g} = \frac{0.5645(1.08)}{0.0886-0.08} = \frac{0.60966}{0.0086} = ₹70.89$$

Calculation of value per share using dividend discount model:

$$P_o = \frac{D_o\ (1+g)}{K_e - g} = \frac{2(1.08)}{0.0886-0.08} = \frac{2.16}{0.0086} = ₹251.16$$

- From the above we can see that the value per share on the basis of the dividend discount model is more than the value per share on the basis of the free cash flow to equity model.
- In the dividend discount model, the analyst considers the stream of expected dividends to value the company's stock. It is assumed that the company follows a consistent dividend payout ratio, which can be less than the actual cash available with the firm.
- A stock's intrinsic value based on the dividend discount model may not represent the fair value for the shareholders because dividends are distributed in the form of cash from profits. In case the company is maintaining healthy cash in its balance sheet, it means that the dividend payout is low, which could result in undervaluation of the stock.
- In the case of the free cash flow to equity model, a stock is valued on the cash flow available for distribution after all the reinvestment needs of capex and incremental working capital are met. Thus, using the free cash flow to equity model provides a better measure for valuations in comparison to the dividend discount model.
- Thus, the view of Mr. Amit that the dividend discount model represents the fair value is incorrect. The share is not undervalued; rather, it is overvalued if we take the "free cash flow to equity model" into consideration.

Question 7

Mr. X wants to invest ₹1,00,000 in the 7 years 8% bonds in the market (Face Value ₹100) which were issued 2 years ago.

i. You are requested to advise him what is the maximum price for bonds to be paid in the following scenarios:
   (1) If Mr. X is expecting minimum 9% return on the bonds
   (2) If Mr. X is expecting minimum 7% return on the bonds
   (3) If the present rate of similar bonds issued is 8.25%
   (4) If the present rate of similar bonds issued is 7.75%

ii. If the bonds are available at par and 1% is the transaction cost, what is the effective yield?

iii. Find the number of days required to breakeven transaction cost if the bonds are available at par and 2% is the transaction cost.

Nov 22 (8 Marks)

Answer:

i. The maximum price to be paid for Bond

(1) To have a return of 9% return on Bond.

$$₹100 \times \frac{8}{9} = ₹88.89$$

Alternative Answer

$$= \frac{8}{(1.09)^1} + \frac{8}{(1.09)^2} + \frac{8}{(1.09)^3} + \frac{8}{(1.09)^4} + \frac{8}{(1.09)^5}$$

= ₹7.34 + ₹6.73 + ₹6.18 + ₹5.67 + ₹70.19 = ₹96.11

(2) To have a return of 7% return on Bond.

$$₹100 \times \frac{8}{7} = ₹114.29$$

Alternative Answer

$$= \frac{8}{(1.07)^1} + \frac{8}{(1.07)^2} + \frac{8}{(1.07)^3} + \frac{8}{(1.07)^4} + \frac{8}{(1.07)^5}$$

= ₹7.48 + ₹6.99 + ₹6.53 + ₹6.10 + ₹77.00 = ₹104.10

(3) If present rate of similar bond issued is 8.25%

$$= \frac{8}{(1.0825)^1} + \frac{8}{(1.0825)^2} + \frac{8}{(1.0825)^3} + \frac{8}{(1.0825)^4} + \frac{8}{(1.0825)^5}$$

= ₹7.39 + ₹6.83 + ₹6.31 + ₹5.83 + ₹72.66 = ₹99.02

Alternative Answer

$$₹100 \times \frac{8}{8.25} = ₹96.97$$

(4) If present rate of similar bond issued is 7.75%

$$= \frac{8}{(1.0775)^1} + \frac{8}{(1.0775)^2} + \frac{8}{(1.0775)^3} + \frac{8}{(1.0775)^4} + \frac{8}{(1.0775)^5}$$

= ₹7.42 + ₹6.89 + ₹6.39 + ₹5.94 + ₹74.36 = ₹101.00

Alternative Answer

$$₹100 \times \frac{8}{7.75} = ₹103.23$$

ii. Effective yield if transaction cost is 1% $= \frac{8}{101} \times 100 = 7.92$

iii. No. of Days required for break even

$$= \frac{2\% \times 1{,}00{,}000}{1{,}00{,}000 \times \frac{8\%}{360}} = \frac{2{,}000}{22.22} = 90 \text{ days}$$

Alternatively, if 365 days used in Calculation then answer will be as follows:

$$= \frac{2\% \times 1{,}00{,}000}{1{,}00{,}000 \times \frac{8\%}{360}} = \frac{2{,}000}{21.92} = 91.24 \text{ days say } 91 \text{ days}$$

Question 8

An investor, in the beginning of 2022, has purchased substantial number of 8 year 7.50%, ₹1000 bond with 5% premium on maturity at a required Yield to Maturity (YTM) of 8.50 %. However, due to the continuing war in Europe, the inflation is running very high in the economies of the countries. The yield on the bonds is decreasing. The risk averse investor wants to protect himself from further loss and decides to sell the bonds in 2023. He has got a proposal from another investor who is willing to purchase these bonds by shelling out a maximum amount of ₹797.50 per bond.

Investor follows intrinsic value method for valuation of the Bonds.

You are required to determine

(i) The Market price, Duration and Volatility of the bond.

(ii) Will it be a right decision of the new investor if he is looking for Required Yield to Maturity (YTM) as 12% p.a.?

Period	1	2	3	4	5	6	7
PVIF (8.50%,n)	0.9217	0.8495	0.7829	0.7216	0.6650	0.6129	0.5649

May 23 (9 Marks)

Answer:

(A) Market Price of Bond

= 1,000 × 7.50% × (PVIAF 8.50%, 7) + 1,050 × (PVIF 8.5%, 7)

= 75 × 5.1185 + 1050 × 0.5649

= 383.89 + 593.15 = ₹977.04

(B) Duration of Bond

Year	Cash flow	P.V. @ 8.5%		Proportion of bond value	Proportion of bond value x time (years)
1	75	0.9217	69.128	0.071	0.071
2	75	0.8495	63.713	0.065	0.130
3	75	0.7829	58.718	0.060	0.180
4	75	0.7216	54.120	0.055	0.220
5	75	0.6650	49.875	0.051	0.255
6	75	0.6129	45.968	0.047	0.282
7	1125	0.5649	635.513	0.651	4.557
			977.035		5.695

Duration of the Bond is 5.695 years.

Alternatively, it can also be calculated as follows:

Year (1)	Cash flow (2)	PVF (3)	PV (4)	(1) × (4)
1	75	0.9217	69.13	69.13
2	75	0.8495	63.71	127.42
3	75	0.7829	58.72	176.16
4	75	0.7216	54.12	216.48
5	75	0.6650	49.88	249.40
6	75	0.6129	45.97	275.82
7	1125	0.5649	635.51	4448.57
			977.04	5562.98

$$\text{Duration of the Bond} = \frac{5562.98}{977.04} = 5.69 \text{ years}$$

(C) Volatility of Bond

Volatility = Duration/(1+YTM)

= 5.695/ (1+0.085) = 5.249

Or = 5.69/ (1+0.085) = 5.24

PV of Bond @ 12% YTM= ₹75 PVIAF (12%, 7) + ₹1050 X PVIF (12%, 7)

= ₹75 × 4.5637 + ₹1050 × 0.4523

= ₹342.28 + ₹474.92 = ₹817.20

Since, Intrinsic Value of Bond is ₹817.20 the decision of new investor is right at purchase price of ₹797.50.

Alternatively, it can also be solved as follows:

Price Difference between Current Selling Price & Intrinsic Value	₹179.54
Increase in Yield justified $\left[\frac{\text{Price Difference} \times 100}{\text{Volatility} \times P_0}\right]$	3.50%
Justified YTM (8.50% + 3.50%)	12%

Increase in Yield justified

Question 9

Why is understanding asset valuation important for investment decisions, and what are the core principles of asset valuation?

Answer:

- ✓ Knowing what an asset is worth and what determines its value is a prerequisite for making intelligent investment decisions.
- ✓ This understanding is crucial when choosing investments for a portfolio, deciding on an appropriate price to pay or receive in a business takeover, and making investment, financing, and dividend choices when running a business.
- ✓ We can make reasonable estimates of value for most assets, and the fundamental principles determining the values of all types of assets, whether real or financial, are the same.
- ✓ Some assets may be easier to value than others, and for different assets, the details of valuation and the uncertainty associated with their value estimates may vary.
- ✓ However, the core principles of valuation always remain the same. This consistency in valuation principles helps investors and business leaders make informed and rational decisions regarding their financial strategies.

Question 10

Briefly discuss following concepts used in Security Valuation

1. **Required Rate of Return or Opportunity Cost or Cost of Capital**
2. **Discount Rate**
3. **Internal Rate of Return**
4. **Equity Risk Premium**
5. **Nominal Cash Flow and Real Cash Flow**

Answer:

1. Required Rate of Return:

The required rate of return is the minimum return investors expect to receive from an investment to compensate for its risk. It considers factors like inflation, interest rates, and the investment's risk level.

- **Example:** If an investor expects a 5% return from risk-free Treasury bonds and a 3% additional return to compensate for stock market risks, the required rate of return for the stock would be 8%.

2. Discount Rate:

The discount rate is used to calculate the present value of future cash flows. It reflects the opportunity cost of capital, including the risk associated with an investment. The discount rate helps determine the value of an investment today based on expected future returns.

- **Example:** To calculate the present value of a ₹100 cash flow expected in one year with a discount rate of 10%, the present value is ₹90.91 (₹100 / (1 + 0.10)).

3. Internal Rate of Return (IRR):

The internal rate of return is the discount rate that makes the net present value (NPV) of an investment's cash flows equal to zero. It represents the investment's expected rate of return and is used to evaluate its profitability.

- **Example:** An investment that costs ₹1,000 today and generates ₹1,100 in one year has an IRR of 10%. This means the investment is expected to generate a 10% return over its lifetime.

4. Equity Risk Premium:

The equity risk premium is the excess return investors require for investing in stocks over risk-free assets, such as government bonds. It compensates investors for taking on the additional risk associated with equities.

- **Example:** If the expected return on the stock market is 8% and the risk-free rate is 3%, the equity risk premium is 5% (8% - 3%).

5. Nominal Cash Flow and Real Cash Flow:

Nominal cash flow refers to the actual monetary value of cash flows without adjusting for inflation, while real cash flow accounts for inflation, reflecting the true purchasing power of the cash flows.

- **Example:** If a project generates ₹1,000 in cash flow this year and inflation is 2%, the real cash flow is approximately ₹980, adjusting for the loss of purchasing power due to inflation.

Question 11

How the discount rate is selected in equity valuation, and why are nominal cash flows and discount rates used?

Answer:

- ✓ When cash flows are stated in real terms, then they are adjusted for inflation. However, in case of nominal cash flow, inflation is not adjusted.
- ✓ For nominal cash flow, nominal rate of discount is used and for real cash flow, real rate of discount is used.
- ✓ While valuing equity shares, only nominal cash flows are considered. Therefore, only nominal discount rate is considered. The reason is that the tax applying to corporate earnings is generally stated in nominal terms. Therefore, using nominal cash flow in equity valuation is the right approach because it reflects taxes accurately.
- ✓ Moreover, when the cash flows are available to equity shareholders only, nominal discount rate applicable in case of equity is used. And, the nominal after tax weighted average cost of capital is used when the cash flows are available to all the company's capital providers.

Question 12

What are the approaches used in Equity Valuation?

Answer:

In order to undertake equity valuations, an analyst can use different approaches, some of which are classified as follows:

(i) Dividend Based Models

(ii) Earning Based Models

(iii) Cash Flows Based Model

Question 13

Discuss the Dividend Based Model for Equity Valuation

Answer:

As we know that dividend is the reward for the provider of equity capital, the same can be used to value equity shares. Valuation of equity shares based on dividend are based on the following assumptions:

1. Dividend to be paid annually.
2. Payment of first dividend shall occur at the end of first year. Sale of equity shares occur at the end of a year and that to at ex-dividend price.
3. The value of any asset depends on the discounted value of cash streams expected from the same asset.

Accordingly, the value of equity shares can be determined on the basis of stream of dividend expected at Required Rate of Return or Opportunity Cost i.e. Ke (Cost of Equity).

Value of equity share can be determined based on holding period as follows:

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

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

2. **Valuation Based on Multi Holding Period:** In this type of holding following three types of dividend pattern can be analyzed.
   a. **Zero Growth:** Also, called as No Growth Model, as dividend amount remains same over the years infinitely. The value of equity can be found as follows:

$$P_0 = \frac{D_1}{Ke}$$

   b. **Constant Growth:** Constant Dividend assumption is quite an unrealistic assumption. Accordingly, one very common model used is based on Constant Growth in dividend for infinitely long period. In such situation, the value of equity shares can be found by using following formula:

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

It is important to observe that the above formula is based on Gordon Growth Model of Calculation of Cost of Equity.

c. **Variable Growth in Dividend:** Just like no growth in dividend assumption, the constant growth assumption also appears to be unrealistic. Accordingly, valuation of equity shares can be done on the basis of variable growth in dividends. It should however be noted that though we can assume multiple growth rates but one growth rate should be assumed for infinity, only then we can find value of equity shares. Although stages of Company's growth fall into following categories such as Growth, Transition and Maturity Phase but for Valuation the multiple dividend growth can be divided into following two categories.

a. **Two Stage Dividend Discount Model:** While simple two stage model assumes extraordinary growth (or supernormal growth) shall continue for finite number of years, the normal growth shall prevail for infinite period. Accordingly, the formula for computation of Share Price or equity value shall be as follows:

$$P_0 = \left[\frac{D_0(1+g_1)}{(1+Ke)^1} + \frac{D_0(1+g_2)}{(1+Ke)^2} + \cdots + \frac{D_0(1+g_n)}{(1+Ke)^n}\right] + \frac{P_n}{(1+Ke)^n}$$

Where,

D0 = Dividend Just Paid 0

g1 = Finite or Super Growth Rate

g2 = Normal Growth Rate 2

Ke = Required Rate of Return on Equity

Pn = Price of share at the end of Super Growth i.e. beginning of Normal Growth Period

b. **Three Stage Dividend Discount Model:** As per one version there are three phases for valuations:

- extraordinary growth period,
- transition period and
- stable growth period.

In the initial phase, a firm grows at an extraordinarily high rate, after which its advantage gets depleted due to competition leading to a gradual decline in its growth rate. This phase is the transition phase, which is followed by the phase of a stable growth rate. Accordingly, the value of equity share shall be computed, as in case of two stage growth model by adding discounted value of Dividends for two growth periods and finally discounted value of share price at the beginning of

sustainable or stable growth period. There is another version of three stage growth model called H Model. In the first stage dividend grows at high growth rate for a constant period, then in second stage it declines for some constant period and finally grow at sustainable growth rate. H Model is based on the assumption that before extraordinary growth rate reach to normal growth it declines lineally for period 2H.

$$P_0 = \frac{D_0(1+g_n)}{r-g_n} + \frac{D_0 H_1(g_c - g_n)}{r-g_n}$$

Where

g_n= Normal Growth Rate Long Run

g_c= Current Growth Rate i.e. initial short term growth rate

H_1= Half of duration of the transition growth period

Question 14

Discuss the Earnings Based Model for Equity Valuation

Answer:

An investor might be willing to forego cash dividend in lieu of higher earnings on retained earning ultimately leading to higher growth in dividend. Hence, these investors may be interested in determination of value of equity share based on Earning rather than Dividend. The different models based on earnings are as follows:

Gordon's Model: This model is based on following broad assumptions:

1. Return on Retained earnings remains the same.
2. Retention Ratio remains the same.

Valuation as per this model shall be

$$P_0 = \frac{EPS_1(1-b)}{Ke - br}$$

Where, r = Return on Equity b = Retention Ratio

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

$$P_0 = \frac{D + (E-D)\frac{r}{Ke}}{Ke}$$

Price Earning Ratio or Multiplier Approach: This is one of the common valuation approaches followed. Since, Price Earning (PE) Ration is based on the ratio of Share Price and EPS, with a given PE Ratio and EPS, the share price or value can simply be determined as follows:

Value = EPS X PE Ratio

Now, the question arises how to estimate the PE Ratio. This ratio can be estimated for a similar type of company or of industry after making suitable adjustment in light of specific features pertaining to the

company under consideration. It should further be noted that EPS should be of equity shares. Accordingly, it should be computed after payment of preference dividend as follows:

$$\text{EPS} = \frac{\text{Profit After Tax} - \text{Preference Dividend}}{\text{Number of Equity Shares}}$$

Question 15

Discuss the Cash Flow Model of Equity Valuation

Answer:

In the case of Dividend Discounting Valuation model (DDM) the cash flows are dividend which are to be distributed among equity shareholders. This cash flow does not take into consideration the cash flows which can be utilised by the business to meet its long-term capital expenditure requirements and short-term working capital requirement.

Hence dividend discount model does not reflect the true free cash flow available to a firm or the equity shareholders after adjusting for its capex and working capital requirement. Free cash flow valuation models discount the cash flows available to a firm and equity shareholders after meeting its long term and short-term capital requirements.

Based on the perspective from which valuations are done, the free cash flow valuation models are classified as:

1. Free Cash Flow to Firm Model (FCFF)
2. Free Cash Flow to Equity Model (FCFE)

In the case of FCFF model, the discounting factor is the cost of capital (Ko) whereas in the case of FCFE model the cost of equity (Ke) is used as the discounting factor.

FCFE along with DDM is used for valuation of the equity whereas FCFF model is used to find out the overall value of the firm.

Question 16

Discuss the FCFF Model of Equity Valuation

Answer:

FCFF can be calculated as follows:

Based on its Net Income:

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

Based on Operating Income or Earnings Before Interest and Tax (EBIT):

FCFF= EBIT *(1 - tax rate) + Depreciation -/+ Capital Expenditure –/+ Change in Non-Cash Net Working Capital

Based on Earnings before Interest, Tax , Depreciation and Amortisation (EBITDA):

FCFF = EBITDA* (1-Tax) +Depreciation* (Tax Rate) -/+ Capital Expenditure – /+Change in Non-Cash Net Working Capital

Based on Free Cash Flow to Equity (FCFE):

FCFF = FCFE + Interest* (1-t) + Principal Prepaid – New Debt Issued + Preferred Dividend

Based on Cash Flows:

FCFF = Cash Flow from Operations (CFO) + Interest (1-t) -/+ Capital Expenditure

Capital Expenditure or Capex for a single year is calculated as Purchase of Fixed Asset current year - Sale of Fixed Asset current year taken from Cash Flow from Investing Activities. Change in Non- Cash Working Capital is calculated as:

Step 1: Calculate Working Capital for the current year: Working Capital =Current Asset-Current Liability

Step 2: Calculate Non-Cash Net Working Capital for the current year: Current Assets – Cash and Bank Balance – Current Liabilities

Step 3: In a similar way calculate Working Capital for the previous year

Step 4: Calculate change in Non-Cash Working Capital as: Non-Cash Working Capital for the current year- Non-Cash Working Capital for the previous year

Step 5: If change in Non-Cash Working Capital is positive, it means an increase in the working capital requirement of a firm and hence is reduced to derive at free cash flow to a firm.

Based on the type of model discussed above **the value of Firm** can be calculated as follows:

For one stage Model: Intrinsic Value = Present Value of Stable Period Free Cash Flows to Firm

For two stage Model: Intrinsic Value = Present value of Explicit Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to a Firm, or Intrinsic Value = Present Value of Transition Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to a Firm

For three stage Model: Intrinsic Value=Present value of Explicit Period Free Cash Flows to Firm + Present Value of Transition Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to Firm.

Question 17

Discuss the FCFE Model of Equity Valuation

Answer:

Free Cash flow to equity is used for measuring the intrinsic value of the stock for equity shareholders. The cash that is available for equity shareholders after meeting all operating expenses, interest, net debt obligations and reinvestment requirements such as working capital and capital expenditure. It is computed as:

Free Cash Flow to Equity (FCFE) = Net Income - Capital Expenditures + Depreciation -/+ Change in Non-cash Net Working Capital + New Debt Issued - Debt Repayments + Net issue of Preference Shares – Preference Share Dividends

FCFE = Net Profit + depreciation - ΔNWC - CAPEX + New Debt - Debt Repayment + Net issue of Preference Shares – Preference Share Dividends

- **ΔNWC =** changes in Net Working Capital.
- **CAPEX =** Addition in fixed assets to sustain the basis.

FCFE can also be used to value share as per Multistage Growth Model approach.

Question 18

Write Short Notes on Money Market Instruments

Answer:

The money market instruments are important source of finance to industry, trade, commerce and the government sector for meeting their short-term requirement for both national and international trade. These financial instruments also provide an investment opportunity to the banks and others to deploy their surplus funds so as to reduce their cost of liquidity and earn some income.

The instruments of money market are characterised by:

(a) Short duration.

(b) Large volume.

(c) De–regulated interest rates.

(d) The instruments are highly liquid.

(e) They are safe investments owing to issuer's inherent financial strength.

The traditional short-term money market instruments consist of mainly

- call money and notice money with limited players,
- treasury bills and
- commercial bills.

Question 19

Write a short note on Certificate of Deposit.

Answer:

The Certificate of Deposits (CDs) are negotiable term-deposits accepted by commercial bank from bulk depositors at market related rates. CDs are usually issued in Demat form or as a Usance Promissory Note.

Just like Commercial Bills, Certificate of Deposit (CD) is a front–ended negotiable instrument, issued at a discount and the face value is payable at maturity by the issuing bank.

Benefits:

- **Safety:** CDs are considered low-risk investments as they are issued by reputable banks and financial institutions.
- **Higher Returns:** They often offer higher returns compared to regular savings accounts, making them attractive to investors seeking better yields on short-term investments.
- **Diversification:** CDs provide an opportunity to diversify an investment portfolio with a stable, fixed-income product.

Question 20

Differentiate between Repo and Reverse Repo or

What are the major differences between Repo and Reverse?

Answer:

Aspect	Repo Rate	Reverse Repo Rate
Definition	The rate at which the Reserve Bank of India (RBI) lends to commercial banks for a short period against government securities.	The rate at which commercial banks lend to the RBI by depositing their surplus funds.
Transaction Perspective	Viewed as a Repo from the perspective of the seller of securities (the party acquiring funds).	Viewed as a Reverse Repo from the perspective of the supplier of funds (the RBI).
Purpose	To fulfill the deficiency of funds for banks, helping them manage short-term liquidity needs.	To absorb excess liquidity from the banking system, controlling the money supply.
Rate Comparison	The Repo rate is comparatively higher than the Reverse Repo rate.	The Reverse Repo rate is comparatively lower than the Repo rate.
Impact on Economy	Aims to contain inflation by making borrowing more expensive for banks, reducing money supply.	Aims to control the money supply by encouraging banks to deposit excess funds with the RBI.

Question 21

Discuss the role of Valuers OR

Discuss the statutory purposes for which valuations by valuers are required in various financial and business contexts. What are some key scenarios where valuation is mandated by law?

Answer:

The role of Valuers has increased a lot due to increased statutory and information requirements. The valuations made by a Valuers are required statutorily for the following purposes: -

1. **Mergers/Acquisitions/ De-Mergers/Takeovers:** Valuation is mandated in cases of Mergers/ Acquisitions/ De-Mergers/ Takeovers by the Income Tax Act, 1961 for the purpose of determining the tax (if any) payable in such cases.
2. **Slump Sale/ Asset Sale/ IPR Sale:** Valuation is required by Insolvency and Bankruptcy Code, 2016 in case of liquidation of company and sale of assets of corporate debtor for the purpose of ascertaining fair value or liquidation value.
3. **Conversion of Debt/ Security:** Valuation is a necessitated by RBI for Inbound Foreign Investment, Outbound Foreign Investment and other business transactions.
4. **Capital Reduction:** SEBI regulations such as ICDR/ LODR/ Preferential Allotment etc. also require valuations to be made for listed securities for various purposes on a period basis.
5. **Strategic Financial Restructuring:** Various statutes such as Companies Act, 2013, SARFAESI Act, 2002, Arbitration and Conciliation Act 1996 etc., warrant valuations to be made for meeting various statutory requirements. Valuation is also made for fulfilling IND AS purposes and may also be made on Court Orders.

Question 22

Discuss the responsibilities of Valuers OR

Write a short note on Model Code of Conduct for Registered Valuers

Answer:

The Model Code of Conduct for Registered Valuers outlines ethical and professional standards that valuers must adhere to, ensuring integrity, independence, and competence in their work. Key aspects include:

1. **Integrity and Fairness:**
   - Valuers must maintain high standards of integrity and fairness in dealings with clients and peers.
   - They should provide truthful information and avoid actions that could discredit the profession.
2. **Professional Competence and Due Care:**
   - Valuers must deliver high standards of service, exercise due diligence, and maintain professional knowledge and skills.
   - They should adhere to relevant technical and professional standards and avoid disclaiming liability for their expertise.
3. **Independence and Disclosure of Interest:**
   - Valuers should act objectively and disclose any potential conflicts of interest.

- They must maintain independence, refrain from "mandate snatching," and avoid charging a success fee.

4. **Confidentiality:**
   - Valuers must not disclose confidential information without proper authority unless legally obligated.
5. **Information Management:**
   - Valuers should maintain records of their decisions and be available for inspections by regulatory bodies.
   - They must keep working papers for three years and respect confidentiality during professional services.
6. **Gifts and Hospitality:**
   - Valuers and their relatives must not accept gifts or hospitality that compromise independence.
   - They should not offer gifts to gain advantage in their professional conduct.
7. **Remuneration and Costs:**
   - Services should be transparently charged, reflecting the work undertaken.
   - Valuers should only accept disclosed fees approved by the remuneration-setting authority.
8. **Occupation, Employability, and Restrictions:**
   - Valuers should not take on more assignments than they can handle and avoid employment without temporarily surrendering their membership.
   - They must not engage in business inconsistent with the profession's reputation.

Question 23

What precautions should a valuer take before accepting any valuation assignment?

Answer:

It should be evidently clear to the valuation professional as well as to the end consumer that a good valuation is much more than just numbers. While it is critical to get the maths and application right- however it is equally important to have a comprehensive understanding of the narrative behind the valuation. Attention should be given to the following points while making a valuation:

1. **Acknowledge Assumptions and Estimates:** A good valuation does not provide a precise estimate of value. A valuation by necessity involves many assumptions and is a professional estimate of value. The quality and veracity of a good valuation model does not depend just on number crunching. The quality of a valuation will be directly proportional to the time spent in collecting the data and in understanding the firm being valued.
2. **Consider Narrative-Driven Factors:** Valuing a company is much more than evaluating the financial statements of a company and estimating an intrinsic value based on numbers. This

concept is getting more and more critical in today's day and age where most emerging business are valued not on their historical performances captured in the financial statement but rather on a narrative driven factors like scalability, ease of replication, growth potential, cross sell opportunities etc.

3. **Balance Quantitative and Qualitative Analysis:** More often than not, investors/users tend to focus on either numbers or the story without attempting to reach a middle ground. In both these cases, investors will fail to capture opportunities that could have been unlocked had they been willing to reach some middle ground between the two concepts.
4. **Recognize the Role of Emotions:** While it is true that a robust intrinsic value calculation using financial statements data and an error-free model makes investing a more technical subject, in reality, emotions play a massive role in moving stocks higher or lower. Not accounting for this fact, therefore, could become an obstacle in consistently getting the valuation right.

CHAPTER 6
PORTFOLIO MANAGEMENT

Question 1

You have been given the following information about Swecha Ltd.

	Swecha Ltd		Market		
Year	Average Share price	Dividend per share	Average Index	Dividend Yield %	Return on Govt. bond %
2017	460	30	4060	5	5.5
2018	497	33	4320	6.5	5.5
2019	523	38	4592	4.5	5.5
2020	556	43	4780	6	5.5
2021	589	50	4968	5.5	5.5

i. Compute the Beta value of the company as at the end of year 2021.

ii. What is 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 from Swecha Ltd.	Returns from market Index
2018	$\frac{33 + (497 - 460)}{460} \times 100 = 15.22\%$	$\frac{(4320 - 4060)}{4060} \times 100 + 6.50\% = 12.90\%$
2019	$\frac{38 + (523 - 497)}{497} \times 100 = 12.88\%$	$\frac{(4592 - 4320)}{4320} \times 100 + 4.50\% = 10.80\%$
2020	$\frac{43 + (556 - 523)}{523} \times 100 = 14.53\%$	$\frac{(4780 - 4592)}{4592} \times 100 + 6.00\% = 10.09\%$
2021	$\frac{50 + (589 - 556)}{556} \times 100 = 14.93\%$	$\frac{(4968 - 4780)}{4780} \times 100 + 5.50\% = 9.43\%$

Computation of Beta

Year	Swecha Ltd. (X)	Market Index (Y)	XY	Y^2
2018	15.22%	12.90%	196.34	166.41
2019	12.88%	10.80%	139.10	116.64
2020	14.53%	10.09%	146.61	101.81
2021	14.93%	9.43%	140.79	88.92
Total	57.56%	43.22%	622.84	473.78

$$\text{Average Return of Krishna Ltd.} = \frac{57.56}{4} = 14.39\%$$

$$\text{Average Market Return} = \frac{43.22}{4} = 10.81\%$$

$$\text{Beta } (\beta) \frac{\sum XY - n\overline{XY}}{\sum Y^2 - n(\overline{Y})^2} = \frac{622.84 - 4 \times 14.39 \times 10.81}{473.78 - 4(10.81)^2} = 0.097$$

ii. Observation

	Expected Return (%)	Actual Return (%)	Action
2017	5.5% + 0.097(12.90% - 5.5%) = 6.22%	15.22%	Buy
2018	5.5% + 0.097(10.80% - 5.5%) = 6.01%	12.88%	Buy
2019	5.5% + 0.097(10.09% - 5.5%) = 5.95%	14.53%	Buy
2020	5.5% + 0.097(9.43% - 5.5%) = 5.88%	14.93%	Buy

Question 2

On the basis of the given information, Mr. XLY wants to create a portfolio that is equally as risky as the market and has ₹20,00,000 to invest. The details of the assets are as follows:

Asset	Investment (₹)	Beta
Stock A	4,00,000	0.70
Stock B	5,00,000	1.10
Stock C	?	1.60
Debenture (D)	?	0

How do you recommend and interpret the risk scenario and investment in all the securities?

MTP Apr 24 (6 Marks), MTP Apr 23 (8 Marks)

Answer:

Let WA, WB, WC and WD be the weights of Stock A, B, C and Debenture respectively.

WA = 4,00,000 ÷ 20,00,000 = 0.20

WB = 5,00,000 ÷ 20,00,000 = 0.25

Now = WC + WD = 1 – WA – WB **= 0.55**

It is given in the question that Portfolio should be as risky as that of the market. It means Beta of the portfolio should be 1.

Hence,

WA (0.7) + WB (1.1) + WC (1.6) + WD (0) = 1

0.2 × 0.7 + 0.25 × 1.1 + 1.6WC + WD × 0 = 1

0.14 + 0.275 + 1.6WC + 0 = 1

1.6WC = 1 – 0.415

1.6 WC = 0.585

WC = 0.585 /1.6 **= 0.3656**

Weight of Debenture (WD) = 1- 0.2 – 0.25 – 0.3656 **= 0.1844**

Hence, Amount invested in Stock C = 0.3656 × 20,00,000 = ₹7,31,200

Amount invested in Debenture D = 0.1844 × 20,00,000 = ₹3,68,800

Thus, amount to be invested in Stock (C) is ₹ 7,31,200 and in Debenture is ₹3,68,800.

Question 3

M/s. Siri Ltd. Has a surplus amount of ₹3 crores to invest and has shortlisted the following equity shares:

Company	Beta
S Ltd.	1.6
K Ltd.	1
P Ltd.	-0.3
D Ltd.	2
C Ltd.	0.6

Required:

i. If M/s. Siri Ltd. invests an equal amount in all securities, what is the beta of the portfolio?

ii. If M/s. Siri Ltd. invests 15% of its investment in S Ltd., 15% in P Ltd., 10% in C Ltd. and the balance in equal amount in the other two securities, 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?

iv. If the Company changes its policy to invest in any 3 securities with a minimum of 20% in each of these 3 securities to diversify risk, you are requested to advise the company to have a right mix of securities to maximize the return in the following two scenarios and also calculate the expected return:

(1) Bull Phase: Expected Market returns 10%

(2) Bear Phase: Expected Market returns — 5%

Nov 22 (8 Marks)

Answer:

i. Beta of the Portfolio

Investment	Beta (β)	Investment (₹Lakhs)	Weighted Investment
S Ltd.	1.6	60	96
K Ltd.	1.0	60	60
P Ltd.	-0.3	60	-18
D Ltd.	2.0	60	120
C Ltd.	0.6	60	36
		300	294

$$\beta_p = \frac{294 \text{ lakh}}{300 \text{lakh}} = 0.98$$

Alternatively, it can also be computed as follows:

$$1.6 \times \frac{1}{5} + 1.0 \times \frac{1}{5} + (-0.30) \times \frac{1}{5} + 2 \times \frac{1}{5} + 0.6 \times \frac{1}{5} = 0.98$$

ii. With varied percentages of investments portfolio beta is calculated as follows:

Investment	Beta (β)	Investment (₹Lakhs)	Weighted Investment
S Ltd.	1.6	45	72
K Ltd.	1.0	90	90
P Ltd.	-0.3	45	-13.50
D Ltd.	2.0	90	180
C Ltd.	0.6	30	18
		300	346.50

$$\text{Beta} = \frac{346.50}{300} = 1.155$$

iii. Expected return of the portfolio with pattern of investment as in case (i) = 12% × 0.98 i.e. 11.76%

Expected Return with pattern of investment as in case (ii) = 12% × 1.155 i.e., 13.86%.

iv.

1. Securities to be selected during Bull Phase Expected Market returns 10%

As it is bull Market Higher Beta stocks should be selected.

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	20	1.6	60,00,000	96,00,000
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	0	-0.3	-	-
D Ltd.	60	2	1,80,00,000	3,60,00,000
C Ltd.	0	0.6	-	-
	100		3,00,00,000	5,16,00,000

Portfolio or Weighted Beta (β) (5,16,00,000/ 3,00,00,000)	1.72
Portfolio Beta (β)	1.72
Market Return	10%
Expected Return	17.20%

2. Securities to be selected During Bear Phase Expected Market returns – 5%

As it is bear market Lower Beta stocks should be selected

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	0	1.6	-	-
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	60	-0.3	1,80,00,000	-54,00,000

D Ltd.	0	2	-	-
C Ltd.	20	0.6	60,00,000	36,00,000
	100		3,00,00,000	42,00,000

Portfolio or Weighted Beta (β) (42,00,000/ 3,00,00,000)	0.14
Portfolio Beta (β)	0.14
Market Return	-5%
Expected Return	-0.70%

Question 4

M/s. Siri Ltd. Has a surplus amount of ₹3 crores to invest and has shortlisted the following equity shares:

Company	Beta
S Ltd.	1.6
K Ltd.	1
P Ltd.	-0.3
D Ltd.	2
C Ltd.	0.6

Required:

v. If M/s. Siri Ltd. invests an equal amount in all securities, what is the beta of the portfolio?

vi. If M/s. Siri Ltd. invests 15% of its investment in S Ltd., 15% in P Ltd., 10% in C Ltd. and the balance in equal amount in the other two securities, what is the beta of the portfolio?

vii. 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?

viii. If the Company changes its policy to invest in any 3 securities with a minimum of 20% in each of these 3 securities to diversify risk, you are requested to advise the company to have a right mix of securities to maximize the return in the following two scenarios and also calculate the expected return:

(3) Bull Phase: Expected Market returns 10%

(4) Bear Phase: Expected Market returns — 5%

Nov 22 (8 Marks)

Answer:

v. Beta of the Portfolio

Investment	Beta (β)	Investment (₹Lakhs)	Weighted Investment
S Ltd.	1.6	60	96
K Ltd.	1.0	60	60
P Ltd.	-0.3	60	-18

D Ltd.	2.0	60	120
C Ltd.	0.6	60	36
		300	294

$$\beta_p = \frac{294 \text{ lakh}}{300\text{lakh}} = 0.98$$

Alternatively, it can also be computed as follows:

$$1.6 \times \frac{1}{5} + 1.0 \times \frac{1}{5} + (-0.30) \times \frac{1}{5} + 2 \times \frac{1}{5} + 0.6 \times \frac{1}{5} = 0.98$$

vi. With varied percentages of investments portfolio beta is calculated as follows:

Investment	Beta (β)	Investment (₹Lakhs)	Weighted Investment
S Ltd.	1.6	45	72
K Ltd.	1.0	90	90
P Ltd.	-0.3	45	-13.50
D Ltd.	2.0	90	180
C Ltd.	0.6	30	18
		300	346.50

$$\text{Beta} = \frac{346.50}{300} = 1.155$$

vii. Expected return of the portfolio with pattern of investment as in case (i) = 12% × 0.98 i.e. 11.76%

Expected Return with pattern of investment as in case (ii) = 12% × 1.155 i.e., 13.86%.

viii.

3. Securities to be selected during Bull Phase Expected Market returns 10%

As it is bull Market Higher Beta stocks should be selected.

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	20	1.6	60,00,000	96,00,000
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	0	-0.3	-	-
D Ltd.	60	2	1,80,00,000	3,60,00,000
C Ltd.	0	0.6	-	-
	100		3,00,00,000	5,16,00,000

Portfolio or Weighted Beta (β) (5,16,00,000/ 3,00,00,000)	1.72
Portfolio Beta (β)	1.72
Market Return	10%
Expected Return	17.20%

4. Securities to be selected During Bear Phase Expected Market returns – 5%

As it is bear market Lower Beta stocks should be selected

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	0	1.6	-	-
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	60	-0.3	1,80,00,000	-54,00,000
D Ltd.	0	2	-	-
C Ltd.	20	0.6	60,00,000	36,00,000
	100		3,00,00,000	42,00,000

Portfolio or Weighted Beta (β) (42,00,000/ 3,00,00,000)	0.14
Portfolio Beta (β)	0.14
Market Return	-5%
Expected Return	-0.70%

Question 5

Following is the information related to return on shares of three different companies:

Years	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%
2019	6%	8%	7%
2020	13%	14%	15%
2021	7%	9%	11%

Required:

(i) Construct maximum number of portfolio and its return, if each portfolio consists of any two Company's shares in proportion of 65% and 35% and suggest which portfolio provides highest return.

(ii) Calculate portfolio return and beta (β), if Mr. X invests ₹65,000 in A Ltd. Having beta (β) of 0.45; ₹20,000 in B Ltd. having beta (β) of 1.15 and ₹15,000 in C Ltd. having beta (β) of 1.8.

Nov 22 (8 Marks)

Answer:

(a) Calculation of Average Return

Year	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%
2019	6%	8%	7%
2020	13%	14%	15%
2021	2021	9%	11%
Sum	28%	34%	38%
Average	7%	8.50%	9.50%

i.

(1) Combination 1 - 65% in A Ltd. & 35% B Ltd.

Return = 7% × 0.65 + 8.50% × 0.35 = 4.55% + 2.975% = 7.525% or 7.53%

(2) Combination 2 – 65% in B Ltd. & 35% in C Ltd.

Return = 8.50% × 0.65 + 9.50% × 0.35 = 5.525% + 3.325% = 8.85%

(3) Combination 3 – 65% in C Ltd. & 35% in A Ltd.

Return = 0.65 × 9.50% + 0.35 × 7.00% = 6.175% + 2.45% = 8.625% or 8.63%

(4) Combination 4 – 65% in A Ltd. & 35% in C Ltd.

Return = 0.65 × 7% + 0.35 × 9.50% = 4.55% + 3.325% = 7.875% or 7.88%

(5) Combination 5 – 35% in A Ltd. & 65% in B Ltd.

Return = 0.35 × 7% + 0.65 × 8.50% = 2.45% + 5.525% = 7.975% or 7.98%

(6) Combination 6 – 35% in B Ltd. & 65% in C Ltd.

Return = 0.35 × 8.50% + 0.65 × 9.50% = 2.975% + 6.175% = **9.15%**

ii. Calculation of Return and Beta of Portfolio

$$\text{Return of Portfolio} = 7\% \times \frac{65,000}{1,00,000} + 8.50\% \times \frac{20,000}{1,00,000} + 9.50\% \times \frac{15,000}{1,00,000}$$

= 7.675%

$$\text{Beta of Portfolio} = 0.45 \times \frac{65,000}{1,00,000} + 1.15 \times \frac{20,000}{1,00,000} + 1.80 \times \frac{15,000}{1,00,000}$$

= 0.7925 or 0.79

Question 6

An investor has categorized all the available stock in the market into the following types and the estimated weights of the categories of stocks in the market index are given below. Further, the sensitivity of returns of these categories of stocks to two factors Inflation and Stock market are also given below:

Category	Weight in Market Index	Factor 1 (Inflation)			Factor 2 (Stock Market)		
		Beta 1	Expected Value in %	Actual Value in %	Beta 2	Expected Value in %	Actual Value in %
Small Cap	20%	1.20	6.70	6.70	0.80	10.00	10.50
Medium Cap	30%	1.75	4.50	6.00	0.90	7.00	8.00
Large Cap	15%	1.30	6.75	8.00	1.165	9.00	10.00
Flexi Cap	35%	1.70	7.00	6.50	0.85	8.85	9.75

Risk Free Rate of Interest is 7.50%.

Round off to 2 decimal.

You are required to calculate:

i. Expected return on the market index for both the factors.

ii. Expected return on the market index under Arbitrage Pricing Theory (Existing Scenario).

iii. Expected return on the market index under Arbitrage Pricing Theory if the composition of the Portfolio is changed to 25% equally in all four categories.

iv. Which alternative (Existing or Changed) will be more profitable?

Nov 23 (8 Marks)

Answer:

i. Expected Return on Market Index for Both factors

Factor 1

= 0.20 × 6.70% + 0.30 × 4.50% + 0.15 × 6.75% + 0.35 × 7.00%

= 1.34% + 1.35% + 1.01% + 2.45% = 6.15%

Factor 2

= 0.20 × 10% + 0.30 × 7% + 0.15 × 9% + 0.35 × 8.85%

= 2% + 2.10% + 1.35% + 3.10%

= 8.55%

ii. Calculation of expected Return on the Market index under Arbitrage Pricing Theory (Existing Scenario):

	Factor 1 (Inflation)				
Category	Beta	Actual value	Expected value	Difference	Beta x Diff.
	(a)	(b) (%)	(c) (%)	(b) - (c) = (d) (%)	(e)
Small Cap	1.20	6.70	6.70	0.00	0.00
Medium Cap	1.75	6.00	4.50	1.50	2.63
Large Cap	1.30	8.00	6.75	1.25	1.63
Flexi cap	1.70	6.50	7.00	(0.50)	(0.85)

	Factor 2 (Stock Market)					
Category	Beta	Actual value	Expected value	Difference	Beta x Diff.	Total
	(f)	(g) (%)	(h) (%)	(g) - (h) = (i) (%)	(j)	(e) + (j) = (k)
Small Cap	0.80	10.50	10.00	0.50	0.40	0.40
Medium Cap	0.90	8.00	7.00	1.00	0.90	3.53
Large Cap	1.165	10.00	9.00	1.00	1.17	2.80
Flexi cap	0.85	9.75	8.85	0.90	0.77	(0.08)

Category	Weight in market index (1)	Total Beta x Diff (2)	Expected Return (2 × 1 = 3)
Small Cap	20%	0.40	0.08
Medium Cap	30%	3.53	1.06
Large Cap	15%	2.80	0.42
Flexi cap	35%	(0.08)	(0.03)
Total			1.53
Add: Risk Free Rate of Interest			7.50
Expected Return (%)			9.03

iii. Expected Return on the Market Index under Arbitrage Pricing Theory under changed scenario:

Category	Weight in market index (1)	Total Beta x Diff (2)	Expected Return (2 × 1 = 3)
Small Cap	25%	0.40	0.10
Medium Cap	25%	3.53	0.88

Large Cap	25%	2.80	0.70
Flexi cap	25%	(0.08)	(0.02)
Total			1.66
Add: Risk Free Rate of Interest			7.50
Expected Return (%)			9.16

As per the above calculation, the investors by investing 25% equally in all four categories, is profitable compared to the existing composition. As the proposed composition gives rate of return of 9.16% per annual when compared to the existing return of the present portfolio which is 9.03%.

Question 7

Expected returns on two stocks against BSE SENSEX returns are given in the following table under two scenarios-bullish and bearish:

Market return	Scenario -1: Bullish Case	Scenario -2: Bearish Case
BSE Sensex	25%	-5%
Stock R	32%	-4%
Stock Z	18%	-3%

You are required to calculate:

i. The Betas of two stocks R and Z.

ii. Expected return on each stock, if the likelihood of market achieving Scenario-1 is thrice the likelihood of the market achieving Scenario-2.

iii. The Security Market Line (SML), if the risk free rate is 8% and likelihood of the market return achieving the bullish base returns of 25% is thrice that of achieving -5% returns.

iv. The Alphas of the two stocks based on Sharpe Index Model.

Nov 23 (8 Marks), RTP May 14, RTP May 18, RTP May 19, MTP Aug 18 (8 Marks), MTP Sep 23 (8 Marks), MTP March 15 (8 Marks), MTP Oct 19 (8 Marks), MTP May 20 (5 Marks), StudyMat

Answer:

i. The Betas of two stocks:

Stock R - (32% + 4%)/(25% + 5%) = **1.2**

Stock Z - (18% + 3%)/(25% + 5%) = **0.70**

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

Rm= Market Return

For Stock R

$$32\% = \alpha + \beta(25\%)$$

$$-4\% = \alpha + \beta(-5\%)$$

36% = β(30%)

β = 1.2

For Stock Z

18% = α + β(25%)

-3% = α + β(-5%)

21% = β(30%)

β = 0.70

Alternatively, Beta can also be calculated as follows:

Basic Calculation for stock R

(R_R)	$\overline{R_R}$	$R_R - \overline{R_R}$	$(R_R - \overline{R_R})^2$	(R_m)	$\overline{R_M}$	$R_m - \overline{R_M}$	$(R_m - \overline{R_M})^2$	$(R_R - \overline{R_R})$ $(R_m - \overline{R_M})$
32%	14%	18%	324	25%	10%	15%	225	270
-4%	14%	-18%	324	-5%	10%	-15%	225	270
Total			648				450	540

Basic Calculation for stock Z

(R_R)	$\overline{R_R}$	$R_R - \overline{R_R}$	$(R_R - \overline{R_R})^2$	(R_m)	$\overline{R_M}$	$R_m - \overline{R_M}$	$(R_m - \overline{R_M})^2$	$(R_R - \overline{R_R})$ $(R_m - \overline{R_M})$
18%	7.5%	10.5%	110.25	25%	10%	15%	225	157.50
-3%	7.5%	-10.5%	-10.5%	-5%	10%	-15%	225	157.50
Total			220.50				450	315

Co- Variance (R, M) = 540/2=270

Co- Variance (Z, M) = 315/2=157.50

$(\sigma_M)2$ =450/2 = 225

Beta of stocks R & Z

$$\text{Beta(R)} = \frac{\text{Cov. (R, M)}}{\sigma_M^2} = 270/255 = \mathbf{1.2}$$

$$\text{Beta(Z)} = \frac{\text{Cov. (R, Z)}}{\sigma_M^2} = 157.5/255 = \mathbf{0.7}$$

ii. Expected returns of the two stocks:

Stock R - 0.75 × 32% - 0.25 × 4% = **23%**

Stock Z - 0.75 × 18% - 0.25 × 3% = **12.75%**

iii.

Expected return of market portfolio = 0.75 × 25% + 0.25% × (-5%) = 17.50%

∴ Market risk prem. = 17.50% - 8.00% = 9.5%

∴ SML is, required return = 8.00% + βi 9.5%

iv. Alpha for two stocks

Required Return for Stock R

$E(R) = \alpha_R + \beta R_M$

Accordingly

$23\% = \alpha_R + 1.20 \times 17.50\%$

α_R = 2%

Required Return for Stock Z

$E(Z) = \alpha_Z + \beta R_M$

Accordingly

$12.75\% = \alpha_Z + 0.70 \times 17.50\%$

Question 8

Following is the information related to three mutual funds:

Year	MF-A	MF-B	MF-C
2020	10%	5%	14%
2021	8%	10%	10%
2022	12%	8%	18%

Correlation between market and mutual fund:

	MF-A	MF-B	MF-C
Correlation with market	0.45	0.25	0.65

Variance of the market is 9% and rate of return of government bond is 7%.

You are required to Rank the Mutual fund using Sharpe's ratio and Treynor's ratio.

Nov 22 (8 Marks)

Answer:

i. Calculation of Standard Deviation of Funds

Year	MF-A (%)	Dev.	Dev.^{2}	MF-B (%)	Dev.	Dev.^{2}	MF-C (%)	Dev.	Dev.^{2}
2020	10	-	-	5	-2.67	7.13	14	-	-
2021	8	-2	4	10	2.33	5.43	10	-4	16
2022	12	2	4	8	0.33	0.11	18	4	16
	30		8	23		12.67	42		32
	Avg. = 30/3 = 10		Var. = 8/3 = 2.67 σA = 1.63	Avg. = 23/3 = 7.67		Var. 12.67/3 = 4.22 σB = 2.05	Avg. = 42/3 = 14		Var. 32/3 = 10.67 σC = 3.27

ii. Calculation of Beta of MFs

	r	σ_M	σ_i	Var. of Market	β_i
MF-A	0.45	3	1.63	9	0.244
MF-B	0.25	3	2.05	9	0.171
MF-C	0.65	3	3.27	9	0.709

Reward to Variability (Sharpe Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	σ_p	Reward to Variability	Ranking
MF-A	10.00	7.00	3.00	1.63	1.84	2
MF-B	7.67	7.00	0.67	2.05	0.33	3
MF-C	14.00	7.00	7.00	3.27	2.14	1

Reward to Volatility (Treynor Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	β_p	Reward to Variability	Ranking
MF-A	10.00	7.00	3.00	0.244	12.30	1
MF-B	7.67	7.00	0.67	0.171	3.92	3
MF-C	14.00	7.00	7.00	0.709	9.87	2

Question 9

Ms. Sreenidhi is learning the portfolio management techniques and wants to test one of the techniques she has developed on KIFS Equity Fund and compare the gains and losses from the technique with those from a passive buy and hold strategy.

The KIFS Equity Fund consists of equities only and the ending NAVs of the fund she constructed for the last 10 months are given below:

Month Ending	NAV (₹/unit)
Jan-22	100
Feb-22	78
Mar-22	92
Apr-22	86
May-22	102
Jun-22	98
Jul-22	100
Aug-22	102
Sep-22	118
Oct-22	120

Assume

(i) Sreenidhi had invested a notional amount of ₹5 lakhs equally in the equity fund and a conservative portfolio (of bonds) in the beginning of January 2022 and the total portfolio was being rebalanced each time the NAV of the fund increased or decreased by 15% compared to the NAV of previous month.

(ii) There is no income earned from the conservative portfolio during the period

(iii) There is no taxation and entry/exit loads.

You are required to determine:

(i) Value of the portfolio for each level of NAV following the Constant Ratio Plan.

(ii) Whether there are any errors in the technique developed by Sreenidhi? If so briefly explain.

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
100	2,50,000.00	2,50,000.00	5,00,000.00	-	2500
78	2,50,000.00 2,22,500.00	1,95,000.00 2,22,500.00	4,45,000.00 4,45,000.00	- Buy 352.56 Units	2500 2852.56
92	2,22,500.00 2,42,467.76	2,62,435.52 2,42,467.76	4,84,935.52 4,84,935.52	- Sell 217.04 Units	2852.56 2635.52
86	2,42,467.76	2,26,654.72	4,69,122.48	-	2635.52
102	2,42,467.76 2,55,645.40	2,68,823.04 2,55,646.40	5,11,290.80 5,11,290.80	- Sell 129.19 Units	2635.52 2506.33
98	2,55,645.40	2,45,620.34	5,01,265.74	-	2506.33
100	2,55,645.40	2,50,633.00	5,06,278.40	-	2506.33
102	2,55,645.40	2,55,645.66	5,11,291.06	-	2506.33
118	2,55,645.40 2,75,696.17	2,95,746.94 2,75,696.17	5,51,392.34 5,51,392.34	- Sell 169.92 Units	2506.33 2336.41
120	2,75,696.17	2,80,369.20	5,56,065.37	-	2336.41

Hence, the ending value of the mechanical strategy is ₹5,56,065.37 and buy & hold strategy is (₹2,50,000+ 2,500 × ₹120 = ₹5,50,000)

(i) Though the value of portfolio as per technique is lesser than Buy & Hold Strategy but there is no error as if market has been bearish then the value of much lesser under Buy & Hold Strategy.

Question 10

Write short note on Traditional Approach of Portfolio Management

Answer:

The traditional approach to portfolio management concerns itself with the investor, definition of portfolio objectives, investment strategy, diversification and selection of individual investment as detailed below:

(i) Investor's study includes an insight into his –

- age, health, responsibilities, other assets, portfolio needs;
- need for income, capital maintenance, liquidity;
- attitude towards risk; and

- taxation status;

(ii) Portfolio objectives are defined with reference to maximising the investors' wealth which is subject to risk. The higher the level of risk borne, the more the expected returns.

(iii) Investment strategy covers examining a number of aspects including:

- Balancing fixed interest securities against equities;
- Balancing high dividend payout companies against high earning growth companies as required by investor;
- Finding the income of the growth portfolio;
- Balancing income tax payable against capital gains tax;
- Balancing transaction cost against capital gains from rapid switching; and
- Retaining some liquidity to seize upon bargains.

(iv) Diversification reduces volatility of returns and risks and thus adequate equity diversification is sought. Balancing of equities against fixed interest bearing securities is also sought.

(v) Selection of individual investments is made on the basis of the following principles:

- Methods for selecting sound investments by calculating the true or intrinsic value of a share and comparing that value with the current market value (i.e. by following the fundamental analysis) or trying to predict future share prices from past price movements (i.e., following the technical analysis);
- Expert advice is sought besides study of published accounts to predict intrinsic value;
- Inside information is sought and relied upon to move to diversified growth companies, switch quickly to winners than loser companies;
- Newspaper tipsters about good track record of companies are followed closely;
- Companies with good asset backing, dividend growth, good earning record, high quality management with appropriate dividend paying policies and leverage policies are traced out constantly for making selection of portfolio holdings

The Traditional Approach suggests that one should not put all money in one basket, instead an investor should diversify by investing in different securities and assets. As long as an investor invests in different assets and securities, he shall get the advantage of diversification.

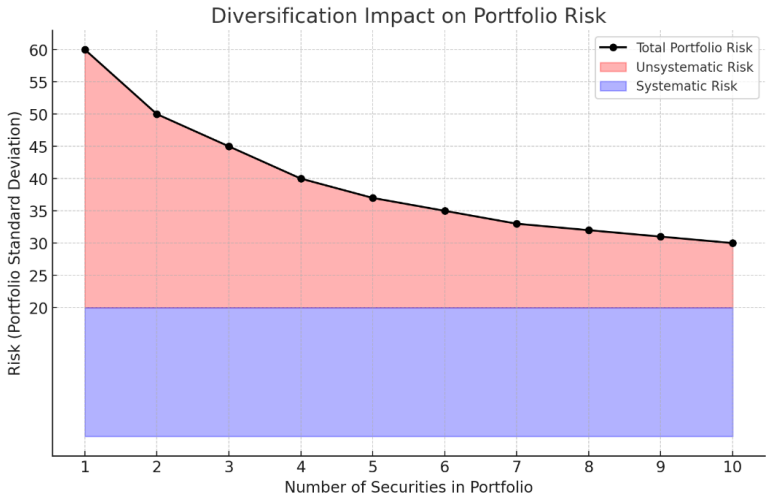
Markowitz questioned this wisdom of the Traditional Approach and proved that putting money in particular kinds of securities or assets will give the investor advantage of diversification. Therefore, one should not go blindly picking up securities and assets to make portfolio.

Question 11

Write short note on Diversification in Portfolio Management

Answer:

- **Definition:** Diversification is the process of spreading investments across various asset classes, sectors, or geographical regions to reduce risk.
- **Purpose:** The primary goal of diversification is to minimize the impact of poor performance by any single investment on the overall portfolio.
- **Risk Reduction:** By investing in a mix of assets, investors can lower the unsystematic risk (specific to individual assets) and enhance portfolio stability.
- **Asset Classes:** A diversified portfolio typically includes a combination of equities, bonds, real estate, and cash or cash equivalents.
- **Sector Diversification:** Investing in different industry sectors, such as technology, healthcare, and finance, helps mitigate risks associated with specific economic or industry downturns.
- **Geographical Diversification:** Including international investments can protect against domestic market volatility and currency risks.
- **Correlation:** Diversification works best when investments are not perfectly correlated, meaning their price movements do not follow the same pattern.
- **Limitations:** While diversification reduces risk, it cannot eliminate systemic risk (market-wide risk). Over-diversification can dilute potential returns and complicate portfolio management



Question 12

Discuss the various forms of gold investment available to investors, highlighting their advantages and limitations compared to traditional gold jewellery investment.

Answer:

Being a real asset Gold is an attractive alternative form of investment by various categories of investors. The most common avenue of making investment in the gold has been buying the jewellery by most of the households.

However, this form of investment in gold suffers from a serious limitation of making charges because jeweller charge them both at the time of selling and buying back.

Gold Bars:

- Gold bars and coins are alternatives to jewellery for gold investment.
- They come in various denominations but incur costs related to physical storage.

Sovereign Gold Bonds (SGBs):

- SGBs are government securities denominated in grams of gold, issued by the RBI on behalf of the Government of India.
- They offer a safe alternative to holding physical gold, eliminating storage risks and costs.
- Investors receive the market value of gold at maturity and periodic interest, with no issues related to making charges or purity.
- Bonds are held in demat form or in RBI books, minimizing the risk of loss.

Gold Exchange Traded Funds (ETFs):

- Gold ETFs combine the flexibility of stock investments with the simplicity of gold investments.
- They are traded on stock exchanges and their prices are based on gold bullion.
- ETFs offer transparency in holdings and have lower expenses compared to physical gold investments due to their structure.

E-gold:

- E-gold, introduced in India by the National Spot Exchange Ltd (NSEL), allows investment in gold through a trading account.
- Each unit of e-gold equals one gram of physical gold, held in a demat account.
- E-gold is fully backed by physical gold, with lower storage costs, and can be traded on the exchange.

CHAPTER 7
SECURITIZATION

Question 1

What are the various types of risks involved in a securitization transaction, and how do they impact investors at different stages of the transaction?

Answer:

In a securitization transaction, investors face several types of risks that can affect their returns and the performance of the transaction. The key risks involved are:

1. Credit Risk or Counterparty Risk

- Credit risk is the primary risk where investors are exposed to the possibility of bankruptcy or non-performance by the servicer.
- **Impact:** If the servicer fails to perform, it can result in delayed or missed payments to investors.

2. Legal Risks

- In India, securitization is a relatively new concept with limited judicial precedent or explicit statutory provisions.
- **Impact:** Legal disputes over asset ownership can lead to uncertainty regarding investor payouts, affecting the cash flow from the asset pool.

3. Market Risks

Market risks include external factors that influence the transaction's performance, such as:

- **(a) Macroeconomic Risks:**
  - These risks are related to broader economic factors, such as industry downturns or adverse price movements of underlying assets.
  - **Impact:** For example, in the transportation industry, a decline in industrial production can reduce demand for commercial vehicles, affecting cash flows from loans linked to those vehicles.
- **(b) Prepayment Risks:**
  - Changes in market interest rates can lead to increased loan prepayments, causing investors to receive funds earlier than expected.
  - **Impact:** Investors face reinvestment risk, as they may not be able to reinvest these funds at similar yields.
- **(c) Interest Rate Risks:**
  - This risk occurs when there is a mismatch between the interest rates of the loans in the pool and the investor payouts.
  - **Impact:** A mismatch can lead to insufficient cash inflows to meet investor payouts. Interest rate swaps can partially mitigate this risk by hedging against rate fluctuations.

Question 2

Discuss the Concept of Blockchain OR

Write Short Notes on Distributed Ledger Technology (DLT)

Answer:

1) Blockchain, sometimes referred to as Distributed Ledger Technology (DLT) is a shared, peer-to peer, and decentralized open ledger of transactions system with no trusted third parties in between.
2) This ledger database has every entry as permanent as it is an append-only database which cannot be changed or altered. All transactions are fully irreversible with any change in the transaction being recorded as a new transaction.
3) The decentralised network refers to the network which is not controlled by any bank, corporation, or government. A block chain generally uses a chain of blocks, with each block representing the digital information stored in public database ("the chain").
4) A simple analogy for understanding blockchain technology is a Google Doc. When we create a document and share it with a group of people, the document is distributed instead of copied or transferred. This creates a decentralized distribution chain that gives everyone access to the document at the same time.
5) No one is locked out awaiting changes from another party, while all modifications to the document are being recorded in real-time, making changes completely transparent.
6) Working or Steps of any Blockchain transaction.
    1. A transaction like sending money to someone is initated.
    2. Transaction is broadcasted via the network.
    3. The network validates the transaction using cryptography.
    4. The transaction is represented online as a block.
    5. Block is added to the existing block chain.
    6. Transaction is complete.

Question 3

Explain the Applications of Blockchain

Answer:

Some initiatives that are already existing in various fields like financial services, healthcare, government, travel industry, economic forecasts etc. are discussed below:

1) **Financial Services:** Blockchain can be used to provide an automated trade lifecycle in terms of the transaction log of any transaction of asset or property - whether physical or digital such as laptops, smartphones, automobiles, real estate, etc. from one person to another.

2) **Healthcare:** Blockchain provides secure sharing of data in healthcare industry by increasing the privacy, security, and interoperability of the data by eliminating the interference of third party and avoiding the overhead costs.
3) **Government:** At the government front, there are instances where the technical decentralization is necessary but politically should be governed by governments like land registration, vehicle registration and management, e-voting etc. Blockchain improves the transparency and provides a better way to monitor and audit the transactions in these systems.
4) **Travel Industry:** Blockchain can be applied in money transactions and in storing important documents like passports/other identification cards, reservations and managing travel insurance, loyalty, and rewards thus, changing the working of travel and hospitality industry.
5) **Economic Forecasts:** Blockchain makes possible the financial and economic forecasts based on decentralized prediction markets, decentralized voting, and stock trading, thus enabling the organizations to plan and shape their businesses.

Question 4

What are the Risks associated with Blockchain

Answer:

1) **Varied Risk Appetite Among Blockchain Participants:** With the use of blockchain, organizations need to consider risks with a wider perspective as different members of a particular blockchain may have different risk appetite/risk tolerances that may further lead to conflict when monitoring controls are designed for a blockchain. There may be questions about who is responsible for managing risks if no one party is in-charge, and how proper accountability is to be achieved in a blockchain.
2) **Reliability of Financial Transactions:** The reliability of financial transactions is dependent on the underlying technology and if this underlying consensus mechanism has been tampered with, it could render the financial information stored in the ledger to be inaccurate and unreliable.
3) **Lack of Central Authority:** In the absence of any central authority to administer and enforce protocol amendments, there could be a challenge in the development and maintenance of process control activities and in such case, users of public blockchains find difficult to obtain an understanding of the general IT controls implemented and the effectiveness of these controls.
4) **Information Overload and Monitoring Challenges:** As blockchain involves humongous data getting updated frequently, risk related to information overload could potentially challenge the level of monitoring required. Furthermore, to find competent people to design and perform effective monitoring controls may again prove to be difficult.

Question 5

Tokenization to some extent resembles the process of Securitization. Explain the term "Tokenization" and also illustrate the similarities between Tokenization and Securitization.

May 24 (4 Marks), MTP Mar 24 (4 Marks)

Answer:

Tokenization

Tokenization is a process of converting tangible and intangible assets into blockchain tokens. Digitally representing anything has recently acquired a lot of traction. It can be effective in conventional industries like real estate, artwork, etc.

Tokenization and Securitization

Since tokenization of illiquid assets attempts to convert illiquid assets into a product that is liquid and tradable, it resembles the process of securitization. The following are some similarities between tokenization and securitization:

1. **Liquidity:** Both securitization and tokenization inject liquidity into the market for assets that are otherwise illiquid.
2. **Diversification:** Both help investors to diversify their portfolios, thus managing risk and optimizing returns.
3. **Trading:** Both are tradable, which helps generate wealth.
4. **New Opportunities:** Both provide opportunities for financial institutions and related agencies to earn income through the collection of fees.

Question 6

While in securitization the securities issued by SPV are backed by the loans and receivables the CDOs are backed by pool of bonds, asset backed securities, REITs, and other CDOs.

Describe the main types of risk associated with investment in CDOs.

MTP Mar 24 (4 Marks)

Answer:

Types of Risk Associated with Investment in CDOs

The main types of risk associated with investment in Collateralized Debt Obligations (CDOs) are as follows:

1. **Default Risk:**
    - Also called 'credit risk,' it emanates from the default of the underlying party to the instruments. The prime sufferers of this type of risk are the equity or junior tranches in the waterfall.
2. **Interest Rate Risk:**

- Also called basis risk, this arises due to different bases of interest rates. For example, an asset may be based on a floating interest rate, but the liability may be based on fixed interest rates. Though this type of risk is quite difficult to manage fully, commonly used techniques such as swaps, caps, floors, and collars can be used to mitigate interest rate risk.

3. **Liquidity Risk:**
   - Another major type of risk by which CDOs are affected is liquidity risk, as there may be a mismatch in coupon receipts and payments.
4. **Prepayment Risk:**
   - This risk results from the unscheduled or unexpected repayment of the principal amount underlying the security. Generally, this risk arises in cases where assets are subject to a fixed rate of interest and the debtors have a call option. In case of falling interest rates, they may pay back the money.
5. **Reinvestment Risk:**
   - This risk is generic in nature, as the CDO manager may not find adequate opportunities to reinvest the proceeds when allowed for substitutions.
6. **Foreign Exchange Risk:**
   - Sometimes CDOs are comprised of debts and loans from countries other than the country of issue. In such cases, in addition to the above-mentioned risks, CDOs are also subject to foreign exchange rate risk.

CHAPTER 8
MUTUAL FUNDS

Question 1

Mr. S has invested in 3 different Mutual Fund Schemes. The following are the details of the same:

Particulars	Scheme A	Scheme B	Scheme C
Date of Investment	01-06-2022	01-07-2022	01-08-2022
Net Asset Value at Entry Date	₹11.00	₹10.50	₹12.00
Dividend received upto 31-03-23 (₹)	12,500.00	17,000.00	4,000.00
Unit NAV at 31-03-23 (₹)	11.25	11.48	10.80
Increase / (Decrease) in NAV (₹)	22,727.27	93,333.33	(50,000.00)
Effective Rate of Yield per annum	4.2296%	14.6978%	(-) 13.8190%

Ignore Entry/Exit load expenditure.

Assume 365 days in a year. Round off the investment to nearest ₹100.

You are required to calculate:

i. The amount of investments made initially by Mr. S in these schemes.

ii. Number of units invested in the three schemes by Mr. S.

Advise also whether he can continue to hold this investment or can he redeem now.

Nov 23 (8 Marks)

Answer:

(i) Calculation of amount of investment made initially by Mr. S:

	Particulars	Scheme A	Scheme B	Scheme C
(a)	Period of Investment	304 days	274 days	243 days
(b)	Effective Yield p.a.	4.2296%	14.6978%	(-) 13.8190%
(c)	Effective Yield for holding period	3.5227%	11.0334%	(-) 9.2000%
(d)	Dividend Received	₹12,500	₹17,000	₹4000
(e)	Increase /Decrease of NAV	₹22,727.27	₹93,333.33	(₹50,000)
(f)	Total Yield (d+e)	₹35,227.27	₹1,10,333.33	(₹46,000)
(g)	Initial Investment (f/c)	₹10,00,000	₹10,00,000	₹5,00,000
(h)	NAV on date of Investment	₹11.00	₹10.50	₹12.00

(ii) Units invested in three schemes by Mr. S

Particulars	Scheme A	Scheme B	Scheme C
Initial Investment	₹10,00,000	₹10,00,000	₹5,00,000
NAV on date of Investment	₹11.00	₹10.50	₹12.00
Units of Investment	90,909.09	95,238.10	41,666.67

Or	90,909	95,238	41,667

Advise: He should continue to investment in Scheme B and get redeemed both schemes A and C and invest their proceeds in Scheme B.

Question 2

Mr. Kar has invested in three mutual fund schemes as per details below:

	MFX	MFY	MFZ
Amount of investment (₹)	5,50,000	4,20,000	1,00,000
Dividend received up to 31.03.2023 (₹)	10,000	6,000	Nil
NAV as on 31.03.2023 (₹)	11.50	11.00	9.50
Effective yield p.a. as on 31.03.2023	19.345%	22.59%	—36.50%
Holding period	120 days	100 days	50 days

You are required to calculate Net Asset Value (NAV) at the time of purchase assuming 365 days in a year.

May 24 (4 Marks)

Answer:

Formula

The formula to calculate the NAV at the time of purchase is derived from the effective yield formula:

$$\text{Effective Yield} = \left(\frac{\text{Closing NAV} + \text{Dividend Received} - \text{Opening NAV}}{\text{Opening NAV}}\right) \times \left(\frac{365}{\text{Holding Period}}\right) \times 100$$

Rearranging this formula to solve for the Opening NAV gives:

$$\text{Opening NAV} = \frac{\text{Closing NAV} + \text{Dividends Received}}{1 + \left(\frac{\text{Effective Yield}}{100} \text{x} \frac{\text{Holding Period}}{365}\right)}$$

Calculations

1. Mutual Fund MFX

- Amount of Investment: ₹5,50,000
- Dividends Received: ₹10,000
- NAV on 31.03.2023: ₹11.50
- Effective Yield: 19.345%
- Holding Period: 120 days

$$\text{Opening NAV} = \frac{11.50 + \frac{10000}{550000/11.50}}{1 + \left(\frac{19.345}{100} \text{x} \frac{120}{365}\right)}$$

Calculating the dividends per unit:

Dividends per Unit = 10,000 / (5,50,000 / 11.50) = 0.209

NAV at Purchase for MFX = (11.50 + 0.209) / (1 + 0.0635) = 11.01

2. Mutual Fund MFY

- Amount of Investment: ₹4,20,000
- Dividends Received: ₹6,000
- NAV on 31.03.2023: ₹11.00
- Effective Yield: 22.59%
- Holding Period: 100 days

Using the formula:

$$\text{Opening NAV} = \frac{11.00 + \frac{6000}{420000/11.00}}{1 + \left(\frac{22.59}{100} \text{x} \frac{100}{365}\right)}$$

Calculating the dividends per unit:

Dividends per Unit = 6,000 / (4,20,000 / 11.00) = 0.157

Plug in the values:

NAV at Purchase for MFY = (11.00 + 0.157) / (1 + 0.0619) = 10.51

3. Mutual Fund MFZ

- Amount of Investment: ₹1,00,000
- Dividends Received: Nil
- NAV on 31.03.2023: ₹9.50
- Effective Yield: -36.50%
- Holding Period: 50 days

$$\text{Opening NAV} = \frac{9.50}{1 + \left(\frac{-36.50}{100} \text{x} \frac{50}{365}\right)}$$

NAV at Purchase for MFZ = 9.50 / 0.95 = 10.00

Summary

- NAV at Purchase for MFX: ₹11.01

- NAV at Purchase for MFY: ₹10.51

- NAV at Purchase for MFZ: ₹10.00

Question 3

M/S. Promising, an AMC, on 01.04.2018 has floated two schemes viz. Dividend Reinvestment Plan and Bonus Plan. Mr. X, an investor has invested in both the schemes. Mr. X, while submitting the tax papers, returned a capital loss on both the plans. Tax officials, suspicious on the claim of Mr. X, decided to launch an investigation and were able to collect the following details (except the issue price):

Date	Dividend (%)	Bonus Ratio	NAV (₹)	
			Dividend Reinvestment Plan	Bonus Plan

01.04.2018			?	?
31.12.2019		1:5	58	70
31.03.2020	12		60	72
31.03.2021	10		68	75
31.03.2022	15		75	66
31.12.2022*		1:3	70	60
31.03.2023			80	71

* In question paper this row got typed before the row of values of 31.03.2022.

Additional details	Dividend Reinvestment Plan	Bonus Plan
Investment (₹)	₹10,80,000	₹10,00,000
Average Profit (₹)	₹1,21,824	
Average Yield (%)		8.40%

Assume face value of unit as ₹10.

You are required to assist the tax officials to calculate the issue price of both the schemes as on 01.04.2018.

May 23 (8 Marks), Nov 20 (10 Marks), RTP May 23

Answer:

i. Dividend Plan

(a)	Average Annual gain over a period of 5 Years	₹1,21,824
(b)	Total gain over a period of 5 years (a*5)	₹6,09,120
(c)	Initial Investment	₹10,80,000
(d)	Total value of investment (b+c)	₹16,89,120
(e)	NAV as on 31.3.2023	₹80
(f)	Number of units at the end of the period as on 31.03.2022 (d/e)	21114

	1	2	3	4 = (2*3)	5	6 = [1/(4+5)]*4	7
Period	Units Held	Rate	Unit value	Dividend	NAV	New Units*	Balance Units Pre Dividend
31.03.2022	21114	0.15	10	1.50	75	414	20700
31.03.2021	20700	0.10	10	1.00	68	300	20400
31.03.2020	20400	0.12	10	1.20	60	400	20000

Issue Price as on 01.04.2018

Investment 1080000/ Units purchased 20000 (c/i) = ₹54

* Let the units issued be X

X = (Closing Units/NAV + Dividend) × Dividend

Alternatively, it can also be computed as follows:

Dividend Plan

Average Profit = ₹121,824

Total Gain = ₹121,824 × 5 = ₹6,09,120

Cost of Acquisition = ₹10,80,000

Maturity Value = ₹16,89,120 (₹6,09,120 + ₹10,80,000)

On 31.03.23 since the NAV of the Fund is ₹80 the units redeemed are:

$$\frac{16,89,120}{80} = 21114$$

Let X be the NAV on 01.04.18

$$\text{Thus, units acquired on } 01.04.18 = \frac{1080000}{X}$$

$$\text{Units added on } 31.03.2020 = \frac{\left\lfloor \frac{1080000}{X} \times 1.2 \right\rfloor}{60} = \left\lfloor \frac{21600}{X} \right\rfloor$$

$$\text{Units added on } 31.03.2021 = \frac{\left\lfloor \frac{1080000}{X} + \frac{21600}{X} \right\rfloor}{68} = \frac{16200}{X}$$

$$\text{Units added on } 31.03.2022 = \left\lfloor \frac{1080000}{X} + \frac{21600}{X} + \frac{16200}{X} \right\rfloor \times \frac{1.5}{75} = \frac{22356}{X}$$

Thus, total units can be shown as follows:

$$\left\lfloor \frac{1080000}{X} + \frac{21600}{X} + \frac{16200}{X} + \frac{22356}{X} \right\rfloor = 21114$$

X = 54

Thus, the issue Price of units under Dividend Plan shall be ₹54

ii. Bonus Plan

(a)	Average Yield	0.084
(b)	Investment	₹10,00,000
(c)	Gain over a period of 5 years (a*b*5)	₹4,20,000
(d)	Market Value as on 31.03.2023 (b + c)	₹14,20,000
(e)	NAV as on 31.03.2023	71
(f)	Total units as on 31.03.2023 (d/e)	20000
(g)	No of units as on 31.03.2022 Pre bonus = 20000*3/ (3 + 1)	15000
(h)	No of units as on 31.12.2019 Pre bonus = 15000*5/ (5 + 1)	12500
(i)	Issue Price as on 01.04.2019	

Investment ₹10,00,000/ Units purchased 12500 (b/h) ₹80

Alternatively, it can also be computed as follows:

Units on 01.04.2018	X
Units after bonus on 31.12.2019 (1:5)	1.20X

Units after bonus on 31.12.2022 (1:3)	1.60X
Average yield	0.084
Investment	₹10,00,000
Gain for 5 years (10,00,000 × 0.084 × 5)	₹4,20,000
Total Value (₹10,00,000 + ₹4,20,000)	₹14,20,000

Where, 1.6X × ₹71 = ₹14,20,000

Therefore, X = 12,500 units

Issue Price on 01.04.2018 = ₹10,00,000 / 12,500 units = ₹80

Alternatively, it can also be computed as follows:

Average Yield = 8.40%

Investment = ₹10,00,000

Gain over a period of 5 years = ₹10,00,000*0.084*5 = ₹4,20,000

Thus, Maturity Value on 31.03.23 shall be ₹14,20,000

$$\text{No. of units} = \frac{14,20,000}{71} = 20,000$$

Now let B be the NAV on 01.04.18 then

$$\text{Units acquired on } 01.04.18 = \frac{10,00,000}{B}$$

$$\text{Units added on } 31.12.19 = \frac{10,00,000}{B} \times \frac{1}{5} = \frac{2,00,000}{B}$$

$$\text{Units added on } 31.12.21 = \frac{12,00,000}{B} \times \frac{1}{3} = \frac{4,00,000}{B}$$

Thus, total units can be shown as follows:

$$\left[\frac{1000000}{B} + \frac{200000}{B} + \frac{400000}{B}\right] = 20000$$

B = ₹80

Thus, the issue Price of units under Bonus Plan shall be ₹80

Question 4

A mutual fund made an issue of New Fund Offer (NFO) on 01/01/2021 of 10.00 Lakh Units of ₹10 each. No entry load was charged. It made the following investments:

Particulars	(₹)
25,000 Equity Shares of XYZ Ltd., ₹100 each @ ₹320	80,00,000
5% Government Securities	4,00,000
10% NCDs Unlisted	5,00,000
8% Listed Debentures	10,00,000

During the year, dividends of ₹8.00 lakhs were received on equity shares. Interest on all types of debt securities were received. On 31st December 2021 equity shares were appreciated by 15% while listed debentures were quoted at 20% premium.

XYZ Ltd., on 15th December 2021 in its AGM declared the interim dividend of 10% and bonus shares at 1:10 with the record date of 28th December 2021.

i. Find out the NAV per unit as on 31st December given that the operating expenses paid during the year amounting to ₹3,00,000.

ii. Find out the NAV, if the MF had distributed a dividend of, ₹0.50 per unit during the year to the investors.

iii. If you are the investor, find out what is the annualised return you have got

Answer:

i. 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 – ₹99 lakhs)	1,00,000
Dividend Received	8,00,000
Interest on 5% Govt. Securities	20,000
Interest on 10% NCDs	50,000
Interest on 8% Debentures	80,000
Interim Dividend	2,50,000
	13,00,000
(-) Operating expenses	3,00,000
Net cash balance at the end	10,00,000
Calculation of NAV	**₹**
Cash Balance	10,00,000
5% Govt. Securities (at par)	4,00,000
27,500 equity shares @ ₹368 each	1,01,20,000
10% NCDs (Unlisted) at cost	5,00,000
8% Debentures @ 120%	12,00,000
Total Assets	1,32,20,000
No. of Units	10,00,000
NAV per Unit	**₹13.22**

ii. Calculation of NAV, if dividend of ₹0.50 is paid –

Net Assets (₹1,32,20,000 – ₹5,00,000)	₹1,27,20,000
No. of Units	10,00,000
NAV per unit	**₹12.72**

iii. Annualised Return

$$= \frac{13.22 - 10.00}{10.00} \times 100 = 32.20\%$$

Or

$$= \frac{[12.72 - 10.00] + 0.50}{10.00} \times 100 = 32.20\%$$

Question 5

What is Mutual Fund?

Answer:

A mutual fund is a type of investment vehicle that pools money from multiple investors to purchase a diversified portfolio of securities, such as stocks, bonds, or other assets. The pooled funds are managed by professional fund managers who invest the capital according to the fund's investment objectives.

Key Features:

1. **Diversification:** Mutual funds offer investors a diversified portfolio, reducing the risk associated with investing in individual securities.
2. **Professional Management:** Experienced fund managers make investment decisions on behalf of the investors.
3. **Liquidity:** Mutual funds can be bought and sold easily, providing liquidity to investors.
4. **Variety:** There are various types of mutual funds, including equity funds, bond funds, index funds, and balanced funds, catering to different investment goals and risk appetites.

Example:

Let's say you want to invest in the stock market but don't have the time or expertise to select individual stocks. You can invest in a mutual fund that specializes in equities.

Steps:

1. **Selection:** Choose a mutual fund that aligns with your investment goals. For example, an "Equity Growth Fund" that focuses on long-term capital appreciation by investing in growth stocks.
2. **Investment:** You invest ₹10,000 in the selected mutual fund. Your money is pooled with funds from other investors.
3. **Management:** The fund manager uses the pooled capital to purchase a diversified portfolio of stocks in various companies across different industries.
4. **Performance:** As the stocks in the portfolio perform, the value of the mutual fund increases or decreases. The returns generated by the fund are passed on to the investors.
5. **Returns:** You can earn returns in two ways:
    - Capital Gains: If the value of the mutual fund units increases, you can sell them at a profit.
    - Dividends: Some mutual funds distribute dividends from the income generated by the securities in the portfolio.

Benefits:

- **Reduced Risk:** By investing in a diversified portfolio, mutual funds help reduce the risk associated with investing in individual stocks.
- **Ease of Access:** Mutual funds are accessible to retail investors with relatively small amounts of capital.
- **Transparency:** Mutual funds provide regular updates on the performance and holdings of the fund.

Question 6

Write Short Notes on Classification of Mutual Funds Or

Index Funds is one of the Special Funds. What are other funds in Special Funds category?

May 23 (4 Marks)

Answer:

Funds are classified into

- Equity Funds,
- Debt Funds and
- Special Funds.

Equity Funds

1) **Growth Funds:** They seek to provide long term capital appreciation to the investor and are best suited to long term investors.
2) **Aggressive Funds:** They look for super normal returns for which investment is made in startups, IPOs and speculative shares. They are suited best to investors willing to take risks.
3) **Income Funds:** They seek to maximize present income of investors by investing in safe stocks which pay high dividends and in high yield money market instruments. They are best suited to investors seeking current income.

Debt Funds

1) **Bond Funds:** They invest in fixed income securities e.g. government bonds, corporate debentures, convertible debentures, money market instruments etc. Investors seeking tax free income go in for tax-free bonds while those looking for safe, steady income buy government

bonds or high grade corporate bonds. Although there have been past exceptions, bond funds tend to be less volatile than equity mutual funds and often produce regular income.

2) **Gilt Funds:** These Funds invest into Treasury Bills & dated securities issued by the State & Central Govts.

Special Funds

1) **Index Funds:**
   - Track a specific stock market index, such as NIFTY 50, by investing in its component stocks in the same proportion.
   - Low-cost due to passive management and typically deliver returns similar to the index.
2) **International Funds:**
   - Raise money in India and invest globally, offering diversification across international markets.
3) **Offshore Funds:**
   - Located outside India, these funds raise money globally for investment within India.
4) **Sector Funds:**
   - Focus on a specific sector, such as Infrastructure or IT, investing solely in companies within that industry.
5) **Money Market Funds:**
   - Debt-oriented schemes aiming for capital preservation, liquidity, and moderate income by investing in short-term instruments like Treasury Bills and G-Secs.
   - Suitable for parking surplus funds for short durations with lower volatility compared to long-term bonds.
6) **Fund of Funds (FoF):**
   - Invest in units of other mutual fund schemes, either from the same or different fund houses.
   - Useful for investors seeking diversified exposure without choosing individual schemes.
7) **Capital Protection Oriented Funds:**
   - Aim to protect capital by investing primarily in highly rated debt instruments, with a portion in equities for growth.
   - Close-ended and listed on stock exchanges, they are rated by credit agencies to ensure portfolio structure supports capital protection.
8) **Gold Funds:**
   - Track the performance of gold or gold-related instruments, often structured as Exchange Traded Funds (ETFs).
   - Provide exposure to the bullion market without the need for physical gold.
9) **Quant Funds:**

- Use data-driven models for stock selection based on predetermined rules, minimizing human bias.
- While passive in nature, fund manager's design and monitor models to ensure consistency across market conditions.
- Lower expense ratio compared to actively managed funds, but reliant on historical data for strategy effectiveness.

Question 7

Write a short note on Direct and Regular Plans of Mutual Funds. Also explain the difference between both

Answer:

Direct plans are mutual fund schemes that investors purchase directly from the mutual fund company, without the involvement of a distributor or intermediary.

Regular plans are mutual fund schemes purchased through a distributor, broker, or financial advisor who provides guidance and assistance to investors.

Aspect	Direct Plans	Regular Plans
Expense Ratio	Lower, as there are no distributor commissions.	Higher, due to inclusion of distributor commissions.
Returns	Potentially higher due to lower expenses.	Slightly lower due to higher expenses.
Purchase Method	Directly from the mutual fund company.	Through a distributor, broker, or financial advisor.
Investor Suitability	Suitable for experienced investors who prefer self-management.	Ideal for investors seeking guidance and convenience.
Guidance	No intermediary advice; investor must make decisions independently.	Professional advice available from intermediaries.

Question 8

Discuss different types of Diversified Equity Funds

Answer:

A Diversified Equity Fund is a mutual fund that holds a wide range of stocks to minimize concentration risk. The fund manager ensures diversification in its holdings to spread out risk. Key types of diversified equity funds include:

1. **Flexicap Fund:**

- These funds have the flexibility to invest across market capitalizations without restrictions.
- The fund manager can allocate investments in large, mid, or small-cap stocks as needed.
- Offers true diversification and flexibility for fund managers.

2. **Multicap Fund:**
   - Requires a minimum of 25% investment in each of large, mid, and small-cap stocks, with the remaining 25% at the manager's discretion.
   - Provides diversification with discipline by ensuring a spread across market caps.
3. **Contra Fund:**
   - Invests in undervalued or out-of-favor companies that may not be currently recognized.
   - Suitable for investors with an aggressive risk appetite, offering potential for growth and value opportunities in varying market conditions.
4. **Index Fund:**
   - Tracks a benchmark index like BSE Sensex or S&P CNX Nifty.
   - Holds securities in the same proportion as the index, aiming to match the index's performance.
5. **Dividend Yield Fund:**
   - Invests in stocks of companies with high dividend yields.
   - Targets companies with yields higher than benchmark indices like Sensex or Nifty.
   - Offers lower volatility compared to growth stocks and the potential for appreciation.
   - Considered medium-risk, though not always resilient in short-term market corrections.

Question 9

What are the two options for earning Income from Mutual Fund Schemes?

Answer:

1. **Growth/Appreciation or Cumulative Option:** Under this option, the investor doesn't get any intermittent income. The investor gets income only at the time of withdrawal of investment. Till the time of withdrawal, the return gets accumulated & is paid back to the investor at the time of withdrawal in the form of capital gain.
2. **Dividend Option:** At a regular frequency may be monthly/quarterly/half yearly or Annual, the Scheme declares dividend to the unitholders of the Scheme. Dividend option is further divided in two sub-options as under:
   a. **Dividend Payout Option:** Dividends are paid out to the unit holders under this option. However, the NAV of the units falls to the extent of the dividend paid out and applicable statutory levies.

b. **Dividend Re-investment Option:** The dividend that accrues on units under option is reinvested back into the scheme at ex-dividend NAV. Hence, investors receive additional units on their investments in lieu of dividends.

Question 10

Write short notes on Equity Linked Savings Scheme

Answer:

- ✓ ELSS is one of the options for investors to save taxes under Section 80 C of the Income Tax Act.
- ✓ ELSS also offers the perfect way to participate in the growth of the capital market, having a lock-in period of three years.
- ✓ Besides, ELSS has the potential to give better returns than any traditional tax savings instrument.
- ✓ Moreover, by investing in an ELSS through a Systematic Investment Plan (SIP), one can not only avoid the problem of investing a lump sum towards the end of the year but also take advantage of "averaging".
- ✓ Here are some popular Equity Linked Savings Schemes (ELSS) in India:
    1. Axis Long Term Equity Fund
    2. Aditya Birla Sun Life Tax Relief 96 Fund
    3. Mirae Asset Tax Saver Fund
    4. DSP Tax Saver Fund
    5. Franklin India Taxshield Fund
    6. SBI Magnum Taxgain Fund

Question 11

Write short notes on

1. Sector Funds
2. Thematic Funds
3. Arbitrage Funds
4. Hedge Funds
5. Cash Funds

Answer:

1. **Sector Funds :**

These funds are highly focused on a particular sector or industry. The basic objective is to enable investors to take advantage of industry cycles. Since sector funds ride on market cycles, they have the potential to offer good returns if the timing is perfect.

However, they are more vulnerable to downside risk protection as compared to diversified equity funds. Sector funds should constitute only a limited portion of one's portfolio, as they are much riskier than the diversified equity funds.

Besides, sector funds are not suitable for first time investors into Mutual Funds. For example, Real Estate Mutual Funds invest in real estate properties and earn income in the form of rentals and capital appreciation from the developed properties.

Also, some part of the fund corpus is invested in equity shares or debentures of companies engaged in real estate business or developing real estate development projects. REMFs are required to be close-ended in nature and listed on the stock exchange.

2. **Thematic Funds :**

A Thematic fund focuses on trends that are likely to result in the 'out-performance' by certain themes, sectors or companies. The theme could vary from multi-sector, international exposure, commodity exposure etc. Unlike a sector fund, thematic funds have a broader outlook.

However, the downside is that the market may take a longer time to recognize views of the fund house with regards to a particular theme, which forms the basis of launching a fund.

3. **Arbitrage Funds :**

Typically, these funds promise safety of deposits, but better returns, tax benefits and greater liquidity.

The open-ended equity scheme aims to generate low volatility returns by investing in a mix of cash equities, equity derivatives and debt markets. The fund seeks to provide better returns than typical debt instruments and lower volatility in comparison to equity.

Arbitrage fund seeks to capitalize on the price differentials between the spot and the futures market.

4. **Hedge Funds :**

A Hedge Fund is a lightly regulated investment fund that escapes most regulations by being a sort of private investment vehicle being offered to selected clients. The big difference between a hedge fund and a mutual fund is that the former does not reveal anything about its operations publicly and charges a performance fee.

Typically, if it outperforms a benchmark, it takes a cut off the profits. Of course, this is a one-way street; any losses are borne by the investors themselves.

Hedge funds are aggressively managed portfolio of investments which use advanced investment strategies such as leveraged, long, short and derivative positions in both domestic and international markets with the goal of generating high returns (either in an absolute sense or over a specified market benchmark).

It is important to note that hedging is actually the practice of attempting to reduce risk, but the goal of most hedge funds is to maximize return on investment.

5. **Cash Funds :**

Cash Fund is an open-ended liquid scheme that aims to generate returns with lower volatility and higher liquidity through a portfolio of very short dated debt and money market instrument. Cash Funds offer growth and dividend options.

Question 12

Quantitative and Qualitative Parameters can be used to evaluate the performance of any Mutual Fund. Discuss

Answer:

Quantitative Parameters:

1. **Risk-Adjusted Returns:** Measures a mutual fund's returns relative to the risk taken, compared to market and industry standards. Investors prefer funds with lower risk for the same return.
2. **Benchmark Returns:** Compares mutual fund performance to a benchmark index (e.g., Sensex, Nifty 50). A fund that exceeds its benchmark has a positive "Alpha."
3. **Comparison to Peers:** Evaluates the fund's performance against similar funds. Consistent outperformance compared to peers indicates a strong fund.
4. **Comparison Across Market Cycles:** Assesses performance over different economic and market cycles to ensure sustained performance beyond short-term conditions.
5. **Financial Measures:**
   - **Expense Ratio:** Impacts net returns; lower ratios are preferable.
   - **Sharpe Ratio:** Measures performance against total risk.
   - **Treynor Ratio:** Assesses performance relative to systematic risk.
   - **Sortino Ratio:** Similar to Sharpe but focuses on downside risk.

Qualitative Parameters:

1. **Quality of Portfolio:** Evaluates the quality of stocks and securities held. For equity funds, this involves blue-chip and large company investments. For debt funds, it considers credit quality, maturity, and duration.
2. **Fund Manager's Track Record:** Assesses the competence and past performance of the fund manager, whose decisions impact the fund's success.
3. **Credibility of Fund House Team:** Evaluates the team's ability to manage administrative tasks, investor communication, and operational efficiency.

Question 13

Discuss the role of Fund Managers in Mutual Fund

Answer:

1. **Actively Managed Funds:**

- Fund managers aim to outperform the market by using extensive research, judgment, and due diligence.
- Successful stock selection is key to generating positive alpha and delivering superior returns.

2. Passively Managed Funds:

- The fund manager's goal is to replicate the performance of the underlying index with minimal tracking error.
- Focus is on maintaining alignment with the index rather than outperforming it.

Additional Key Roles of a Fund Manager:

a) Compliance:

- Compliance of various Guidelines as laid down by SEBI, AMFI etc.
- Ensuring various reporting such as Expenses Ratio, redemption of funds etc.
- Ensuring that investors are aware of various required details and rules.
- Ensuring that all required documents are furnished on time.

b) Performance Monitoring:

- Continuously evaluate investment performance and make decisions to enter or exit markets to maximize unit holders' wealth.
- Assess performance not only by returns but also by growth above inflation and interest rates.

c) Wealth Creation and Protection:

- Aim for wealth creation through careful risk management and informed investment decisions.
- Conduct thorough research using fundamental and technical analysis to guide investment strategies.

d) Oversight of Outsourced Functions:

- Exercise control over third-party service providers to ensure smooth and error-free operations.

Question 14

Discuss the role of FIIs in Mutual Fund

Answer:

Foreign Institutional Investors (FIIs) are large foreign entities with substantial investable funds, registered abroad with the aim of investing in other countries' financial markets. They focus on equity markets, hedge funds, pension funds, and mutual funds. FIIs have strong research teams that guide their investment decisions based on potential returns in various markets.

Role of FIIs in Mutual Funds:

1. **Market Influence:**

- FIIs fuel bullish markets by investing large sums, leading to a short-term influx of foreign capital and driving equity prices higher.
- They are significant contributors to market liquidity and volatility, especially in developing economies like India.

2. **Investment Channels:**
   - FIIs can invest in domestic mutual funds directly from the issuer or through registered stock brokers on recognized stock exchanges in India.
   - These investments are subject to limits set by the Securities and Exchange Board of India (SEBI).

Impact on the Indian Economy:

1. **Enhanced Corporate Governance:**
   - FIIs conduct thorough due diligence on corporate governance before investing in mutual funds, which encourages companies to improve governance practices.
2. **Improved Market Competition:**
   - FII investments increase competition in the capital market, leading to more efficient pricing and better resource allocation.
3. **Increased Capital Inflow:**
   - FII investments bring significant foreign capital into the economy, enhancing foreign exchange reserves and supporting economic growth.
   - The inflow of funds leads to job creation and boosts overall economic activity.

Conclusion:

FIIs play a vital role in mutual funds and the broader economy by providing capital, enhancing corporate governance, and increasing market competition. Their investments have a profound impact on the financial system, especially in developing countries like India, by fueling economic growth and improving financial market dynamics.

CHAPTER 9
DERIVATIVES ANALYSIS & VALUATION

Question 1

The price of ACC stock on 31 December 2022 was ₹220 and the Futures price on the same stock on the same date, i.e., 31 December 2022 for March 2023 was ₹222.

Other features of the Futures contract and related information are as follows:

Time to expiration:	3 months (0.25 year)
Borrowing rate:	15% p.a.
Annual Dividend on the stock:	25% payable before 31.03.2023
Face Value of the Stock:	₹10

Advise the investor the course of action to be followed by him so as to earn Risk-free income if he can sell the stock short at spot price. Also examine arbitrage opportunities.

RTP May 24, RTP May 18, RTP Nov 19, MTP Sep 23 (8 Marks), MTP March 18 (5 Marks), MTP April 19 (5 Marks), StudyMat

Answer:

Future's Price = Spot + Cost of Carry – Dividend

Futures Price = 220 + (220 × 0.15 × 0.25) - (0.25 × 10)

= 220 + 8.25 - 2.5

= ₹225.75

Thus, as per the 'cost of carry' criteria, the futures price is ₹225.75, which is more than the actual price of ₹222 on 31 March 2023. This creates a riskless arbitrage opportunity of ₹3.75 (i.e., 225.75 - 222).

Advise to the Arbitrager.

1. Short sell one unit of stock at spot price for ₹220.
2. Deposit ₹220 at 15% p.a. for 3 months.
3. Buy a 3-month Futures contract for one unit of stock of ACC at ₹222.

After 3 months

1. Take money out of the Bank.
2. Take delivery by paying ₹222 and return the unit of stock to the party whom short sell was made along.
3. Pay the Dividend amount to the buyer whom short sell was made.

Total Inflow = 220 + (220 × 0.15 x 0.25) = ₹228.25

Total Outflow = 222 + 2.50 = ₹224.50

Net Gain to the Arbitrager = Total Inflow – Total Outflow

= ₹228.25 - ₹224.50

= ₹3.75

Thus, the arbitrager earns ₹3.75 per share without involving any risk.

Question 2

Mr. V is a commodity trader and specialized himself in trading of rice.

He has 24,000 Kg. of rice. The following details are available as on date:

Spot price	₹/Kg. 70
3 month's future is trading at	₹/Kg. 68
Expected Lower price after 3 months	₹/Kg. 64
Contract size	500 Kg./ contract

You are required to advise to Mr. V:

(i) How to mitigate the risk of fall in price.

(ii) How to use the futures market.

(iii) What will be the effective realized price for his sales if, after 3 months, spot price is ₹69/ Kg. and the 3 months future contract price is

a. ₹72/ Kg.

b. ₹67/Kg.

May 23 (8 Marks), May 19 (8 Marks), RTP May 13, MTP May 20 (8 Marks)

Answer:

i. In order to hedge its position Mr. V (trader) should use Future Contracts.

Particulars		
(a)	Quantity of Rice to be hedged	24000 kg.
(b)	Contract Size	500 kg.
(c)	No. of Contracts (a/b)	48
(d)	Future Price	₹68/kg.
(e)	Exposure in the future market (a × d)	₹16,32,000

ii. Mr. V should short 48 Future contracts at the price ₹68/kg and cancel its position after 3 months by buying Future contract at prevailing Future price.

iii. 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	72/kg.	67/kg.
(b)	Amount bought	17,28,000	16,08,000
(c)	Exposure	16,32,000	16,32,000
(d)	Gain/(Loss) on future position (b – c)	(96,000)	24,000

(e)	Spot Price	69/kg	69/kg
(f)	Amount realized by selling in the spot market	16,56,000	16,56,000
(g)	Effective Selling Amount (f + d)	₹15,60,000	₹16,80,000
(h)	Effective Selling Price	₹65/kg.	₹70/kg.

Question 3

The market received some information about ABC Ltd.'s tie up with a Multinational Company. This has induced the market price to move up. If the information is false, the ABC Ltd.'s stock price will probably fall dramatically. To protect from this, an investor has bought the call and put options.

He purchased one 3 month's call with a striking price of ₹45 for ₹3 premium and paid ₹2 per share premium for a 3 month's put with a striking price of ₹42.

Assume 100 shares for call and put option.

You are required:

(i) To determine the investor's position if the tie up offer bids the price of ABC Ltd.'s stock up to ₹44 in 3 months.

(ii) To determine the investor's position if the tie up offer program fails and the price of the stocks falls to ₹34 in 3 months.

(iii) To determine the investor's position if the tie up offer program is successful and the price of the stocks rise up to ₹46 in 3 months.

May 24 (6 Marks)

Answer:

Option Strategy Analysis for ABC Ltd.

The market received some information about ABC Ltd.'s tie-up with a Multinational Company. This has induced the market price to move up. If the information is false, the ABC Ltd.'s stock price will probably fall dramatically. To protect from this, an investor has bought call and put options.

Option Details

- Call Option Premium: ₹3 per share for a 3-month call with a strike price of ₹45
- Put Option Premium: ₹2 per share for a 3-month put with a strike price of ₹42
- Number of Shares: 100

Cost of Call and Put Options

Total Cost of Options:

= (₹3 × 100) + (₹2 × 100) = ₹300 + ₹200 **= ₹500**

(i) Price Increases to ₹44

Since the market price (₹44) is lower than the call strike price (₹45), the investor will not exercise the call option. The put option also will not be exercised since the market price is higher than the put strike price (₹42).

Ending Position: = - ₹500 (cost of options)

Net Loss: = - ₹500

(ii) Price Falls to ₹34

Since the market price (₹34) is lower than the put strike price (₹42), the investor will exercise the put option. The call option will not be exercised since the market price is lower than the call strike price (₹45).

Ending Position:

= (- ₹500 (cost of options)) + ((₹42 - ₹34) × 100 (gain on put)) = - ₹500 + ₹800 = ₹300

Net Gain: = ₹300

(iii) Price Rises to ₹46

Since the market price (₹46) is higher than the call strike price (₹45), the investor will exercise the call option. The put option will not be exercised since the market price is higher than the put strike price (₹42).

Ending Position:

= (- ₹500 (cost of options)) + ((₹46 - ₹45) × 100 (gain on call)) = - ₹500 + ₹100 = - ₹400

Net Loss: = - ₹400

Summary

1. **Price increases to ₹44:** Net Loss: ₹500
2. **Price falls to ₹34:** Net Gain: ₹300
3. **Price rises to ₹46:** Net Loss: ₹400

Question 4

Following is the information available pertaining to shares of Omni Ltd.:

Current Market Price (₹)	₹420.00
Strike Price (₹)	₹450.00
Maximum Price (₹) expected in next 3 months' time	₹525.00
Minimum Price (₹) expected in next 3 months' time	₹378.00
Continuously Compounded Rate of Interest (p.a.) (%)	8.00%
e^{rt}	1.0202

From the above:

i. Calculate the 3 months call option by using Binomial Method and Risk Neutral Method.
Are the calculated values under both the models are same?

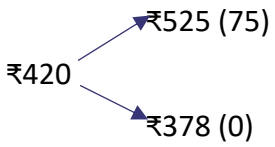
ii. State also clearly the basis of Valuation of options under these models.

Nov 23 (8 Marks), May 11 (5 Marks), RTP May 13, MTP Sep 22 (4 Marks), MTP Oct 18 (6 Marks), StudyMat

Answer:

(i)

a. Call Option value using Binomial Model



$$\Delta = \frac{₹525 - ₹378}{₹75 - 0} = 0.51$$

Initial Investment= 0.51 × 420 = 214.20

Value of Portfolio if Price goes down to ₹378

Value of holding 0.51 × ₹378 = 192.78

Accordingly Let 'P' be the option price, then

₹214.20 - P = ₹192.78/1.0202 = ₹188.96

P = ₹25.24

b. Value of Call Option using Risk Neutral Method

Let ''P' be the probability of Price increase, then

p × 525 + (1 - p) × 378 = 420(1.0202)

147p = 50.48

p = 0.34

Probability of Price increase = 0.34

Probability of Price decrease= 0.66

$$\frac{0\ 34\ \times 75 + 0.66 \times\ 0}{1.0202} = ₹\mathbf{25.24}$$

Yes, the value of option under both Models is same.

(ii) Basis of valuation of options :

- Binomial model uses an approach called "Risk less Hedge Approach" to find the price of the option, by creating a portfolio which will have same value at expiration irrespective of any price. Hedge means to create an equal and opposite position for protecting the value of portfolio.
- In Risk Neutral Model, valuation of options is based on arbitrage and is therefore independent of risk preferences; one should be able to value options assuming any set of risk preferences and get the same.

Question 5

ABC Ltd. is a pharmaceutical company possessing a patent of a drug called 'Aidrex', a medicine for aids patient. Being an approach drug ABC Ltd. holds the right of production of drugs and its marketing. The period of patent is 15 years after which any other pharmaceutical company produce the drug with same

formula. It is estimated that company shall require to incur $ 12.5 million for development and market of the drug. As per a survey conducted the expected present value of cashflows from the sale of drug during the period of 15 years shall be $ 16.7 million. Cash flow from the previous similar type of drug have exhibited a variance of 26.8% of the present value of cashflows. The current yield on Treasury Bonds of similar duration (15 years) is 7.8%.

Determine the value of the patent.

Given

ln(1.336) =0.2897

$e^{1.0005}$ = 0.3677

$e^{-1.17}$ = 0.3104

StudyMat

Answer:

The given solution is like valuation of stock option wherein delay in introduction of drug 'Aidrex' shall cause the loss of cash flow which is like payment of dividend.

To value the patent, we shall use Black Scholes Model for option pricing as follows:

Inputs

S (Spot Price) = The Present Value of Cashflows	= $16.7 million
E (Exercise Price) = Cost of Development Formula	= $ 12.5 million
σ^2(Variance of Cash flow)	= 26.8% i.e. 0.27
R (Risk Free Rate of Return)	= 7.8%
D (Expected cost of Delays)	= 1/15 = 0.0667 = 6.67%

Value call option

$$\mathbf{C = SN(d_1)-Ke^{(-rt)}N(d_2)}$$

$$d_1 = \frac{\ln\left(\frac{s}{k}\right) + \left(r + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$$

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

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 logarithm

$$d_1 = \frac{\ln(16.7/12.5) + (0.078 - 0.0667 + 0.268/2)15}{\sqrt{0.268} \times \sqrt{15}}$$

$$d_1 = \frac{0.2897 + (0.1453) \times 15}{0.5177 \times 3.8730}$$

$$d_1 = \frac{0.2897 + 2.1795}{2.005}$$

$$d_1 = \frac{2.4692}{2.005}$$

d_1 = 1.2315

d_2 =1.2315 - 2.005

d_2 = -0.7735

N(d_1) = 0.8910

N(d_2) = 0.2196

Value of Patent

= $16.7 \times e^{-0.0667x15} \times 0.8910 - 12.5 \times e^{-0.078x15} \times 0.2196$

= $16.7 \times 0.3677 \times 0.8910 - 12.5 \times 0.3104 \times 0.2196$

= 5.471 – 0.852

= 4.619

Thus, the value of patents is $4.619 million

Question 6

IPL already in production of Fertilizer is considering a proposal of building a new plant to produce pesticides. Suppose the PV of proposal is ₹100 crore without the abandonment option. However, if market conditions for pesticide turns out to be favourable the PV of proposal shall increase by 30%. On the other hand, market conditions remain sluggish the PV of the proposal shall be reduced by 40%. In case company is not interested in continuation of the project it can be disposed of for ₹80 crore.

If the risk-free rate of interest is 8% then what will be value of abandonment option.

StudyMat

Answer:

Decision Tree showing pay off

Year 0	Year 1	Pay off
	130	0
100		
	60	80-60=20

First of all we shall calculate probability of high demand (P) using risk neutral method as follows:

8% = p × 30% + (1-p) x (-40%) 0.08

= 0.30p - 0.40 + 0.40p

p = 0.48 / 0.70

= 0.686

The value of abandonment option will be as follows:

Expected Payoff at

Year 1 = p × 0 + [(1-p) × 20]

= 0.686 x 0 + [0.314 × 20]

= ₹6.28 crore

Since expected pay off at year 1 is ₹6.28 crore.

Present value of expected pay off will be: 6.28/1.08 = ₹5.81 crore.

This is the value of abandonment option (Put Option).

Question 7

Suppose MIS Ltd. is considering installation of solar electricity generating plant for light the staff quarters. The plant shall cost ₹2.50 crore and shall lead to saving in electricity expenses at the current tariff by ₹21 lakh per year forever. However, with change in Government in state, the rate of electricity is subject to change. Accordingly, the saving in electricity can be of ₹12 lakh or ₹35 lakh per year and forever. Assuming WACC of MIS Ltd. is 10% and risk-free rate of rate of return is 8%.

StudyMat

Answer:

Decide whether MIS Ltd. should accept the project or wait and see.

Here we shall evaluate NPV in two possible situations:

(1) As on Today

At cost of Capital of 10%, the value of saving forever = ₹21 lakhs / 0.10 = ₹2.1 crore

NPV = ₹2.1 crore - ₹2.5 crore = - ₹0.4 crore

Since NPV is negative, it does not worth to accept the project.

(2) After one Year After one year these are two possible situations, either rate of electricity decreases or increase.

(a) If price of electricity increases

At cost of Capital of 10%, the value of saving forever = 35 lakh / 0.10 = ₹3.50 crore

The position of the NPV will be as follows: = ₹3.50 crore - ₹2.50 crore = ₹1 crore

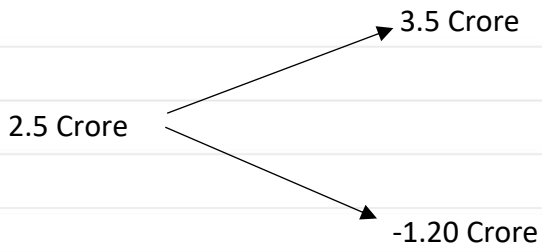
And Rate of Return will be (3.5/2.5) - 1 = 0.40 is 40%

(b) If the price of electricity decreases, then value of saving forever will be lakh

At cost of Capital of 10%, the value of saving forever = 12 / 0.10 = ₹1.20 crore

The position of the NPV will be as follows: = ₹1.20 crore - ₹2.5 crore = - ₹1.3 crore and Rate of Return will be (1.2/2.5) - 1 = -0.52 i.e. – 52.00%

Diagrammatically it can be shown below



Let prob. of price increase be p. Then using Risk Neutral Method, the risk-free rate of return will be equal to expected saving as follows:

p x 0.40 + (1-p) (-0.52) = 0.08

0.40p - 0.52 + 0.52p = 0.08

0.92p = 0.60

p = 0.652

Hence, expected pay off = 0.652 × ₹1 crore + 0.348 × (- ₹1.30 crore) = ₹19.96 lakh.

PV of Pay off after one year = ₹19.96 lakh/ 1.08 = ₹18.48 lakh.

Thus, it shall be advisable to wait and see as NPV may turn out to be positive after one year.

Question 8

Ramesh owns a plot of land on which he intends to construct apartment units for sale. No. of apartment units to be constructed may be either 10 or 15. Total construction costs for these alternatives are estimated to be ₹600 lakhs or ₹1025 lakhs respectively. Current market price for each apartment unit is ₹80 lakhs. The market price after a year for apartment units will depend upon the conditions of market. If the market is buoyant, each apartment unit will be sold for ₹91 lakhs, if it is sluggish, the sale price for the same will be ₹75 lakhs. Determine the current value of vacant plot of land. Should Ramesh start construction now or keep the land vacant? The yearly rental per apartment unit is ₹7 lakhs and the risk free interest rate is 10% p.a.

Assume that the construction cost will remain unchanged.

May 2013 (5 Marks)

Answer:

Presently 10 units apartments shall yield a profit of ₹200 lakh (₹800 lakhs – ₹600 lakhs) and 15 unit apartment will yield a profit of ₹175 lakh (₹1200 lakhs – ₹1025 lakhs). Thus 10 units apartment is the best alternative if Ramesh has to construct now.

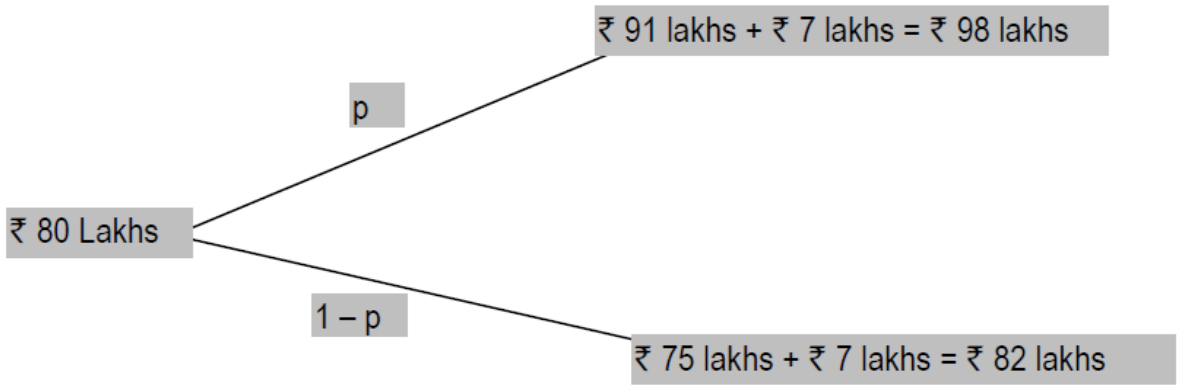
However, Ramesh waits for 1 year his pay-off will be as follows:

		Market Conditions
	Buoyant Market	Sluggish Market

10 units apartments	₹91 lakhs × 10 – ₹600 lakhs= ₹310 lakhs	₹75 lakhs × 10 – ₹600 lakhs = ₹150 lakhs
15 units apartments	₹91 lakhs × 15 – ₹1025 lakhs = ₹340 lakhs	₹75 lakhs × 15 – ₹1025 lakhs = ₹100 lakhs

Thus if market conditions turnout to be buoyant the best alternative is 15 units apartments and net pay-off will be ₹340 lakhs and if market turnout to be sluggish the best alternative is the 10 units apartments and net pay-off shall be ₹150 lakhs.

To determine the value of vacant plot we shall use Binomial Model (Risk Neutral Method) of option valuation as follows:



Alternatively student can calculate these values as follows (Sale Value + Rent):

If market is buoyant then possible outcome = ₹91 lakh + ₹7 lakh = ₹98 lakhs

If market is sluggish then possible outcome = ₹75 lakh + ₹7 lakh = ₹82 lakhs

Let p be the probability of buoyant condition then with the given risk-free rate of interest of 10% the following condition should be satisfied:

$$₹80 \text{ lakhs} = \frac{[(p \times ₹98\text{lakhsX}) + (1-p) \times ₹82\text{lakhs}]}{1.10}$$

$$p = \frac{3}{8} \text{i. e. } 0.375$$

Thus 1-p = 0.625

Expected cash flow next year

0.375 × ₹340 lakhs + 0.625 × ₹150 lakhs = ₹221.25 lakhs

Present Value of expected cash flow:

₹221.25 lakhs (0.909) = ₹201.12 lakhs

Thus the value of vacant plot is ₹201.12 lakhs

Since the current value of vacant land is more than profit from 10 unit's apartments now the land should be kept vacant.

Question 9

Explain different payoffs scenario in option contracts for

1. **Call Buyer**
2. **Call Seller**
3. **Put Buyer**
4. **Put Seller**

Answer:

1. Pay-off for a Call Buyer

Definition:

The call buyer has the right, but not the obligation, to buy the underlying asset at a specified strike price before or on the expiration date.

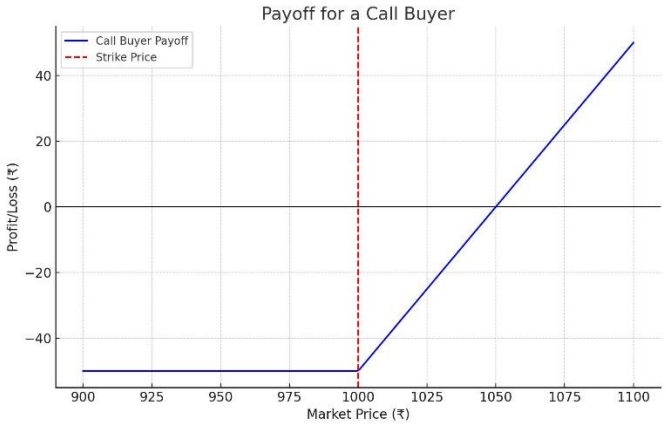
Payoff Scenario:

- **Profit:** Occurs when the market price of the underlying asset exceeds the strike price plus the premium paid.
- **Loss:** Limited to the premium paid if the market price is below the strike price.

Example:

- **Strike Price:** ₹1,000
- **Premium Paid:** ₹50
- **Break-even Price:** ₹1,050 (Strike Price + Premium)

Market Price (₹)	Profit/Loss (₹)	Description
950	-50	Loss equal to premium paid
1,000	-50	Loss equal to premium paid
1,050	0	Break-even point
1,100	50	Profit of ₹50 (Market Price - Break-even)



2. Pay-off for a Call Seller

Definition:

The call seller (or writer) has the obligation to sell the underlying asset at the specified strike price if the buyer exercises the option.

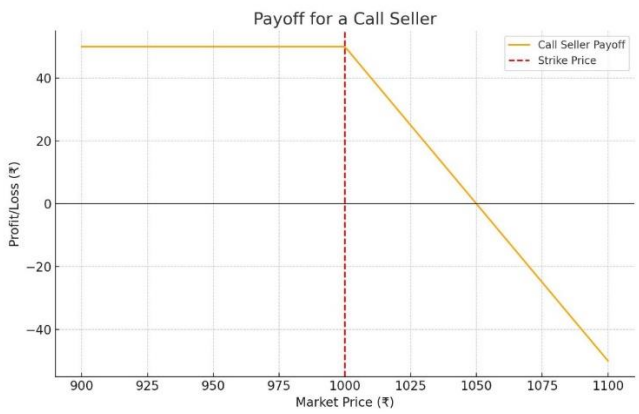
Payoff Scenario:

- **Profit:** Limited to the premium received if the market price is below the strike price.
- **Loss:** Unlimited potential loss if the market price exceeds the strike price.

Example:

- **Strike Price:** ₹1,000
- **Premium Received:** ₹50

Market Price (₹)	Profit/Loss (₹)	Description
950	50	Profit equal to premium received
1,000	50	Profit equal to premium received
1,050	0	Break-even point
1,100	-50	Loss of ₹50 (Market Price - Break-even)



3. Pay-off for a Put Buyer

Definition:

The put buyer has the right, but not the obligation, to sell the underlying asset at a specified strike price before or on the expiration date.

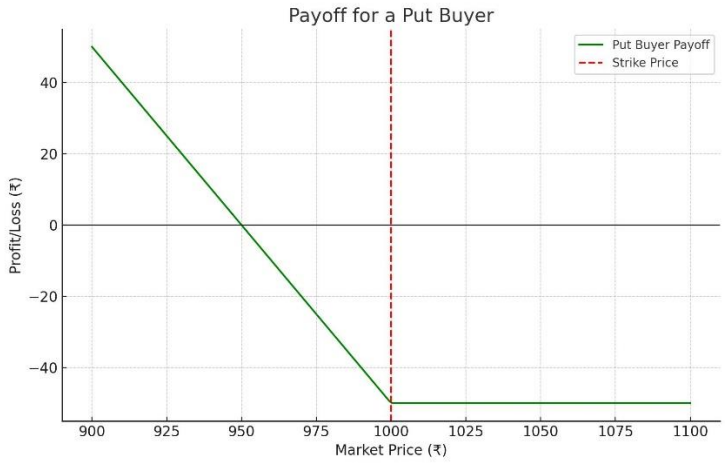
Payoff Scenario:

- **Profit:** Occurs when the market price of the underlying asset is below the strike price minus the premium paid.
- **Loss:** Limited to the premium paid if the market price is above the strike price.

Example:

- **Strike Price:** ₹1,000
- **Premium Paid:** ₹50
- **Break-even Price:** ₹950 (Strike Price - Premium)

Market Price (₹)	Profit/Loss (₹)	Description
900	50	Profit of ₹50 (Break-even - Market Price)
950	0	Break-even point
1,000	-50	Loss equal to premium paid
1,050	-50	Loss equal to premium paid



4. Pay-off for a Put Seller

Definition:

The put seller (or writer) has the obligation to buy the underlying asset at the specified strike price if the buyer exercises the option.

Payoff Scenario:

- **Profit:** Limited to the premium received if the market price is above the strike price.
- **Loss:** Potential loss if the market price falls below the strike price, limited to the strike price minus the premium received.

Example:

- **Strike Price:** ₹1,000
- **Premium Received:** ₹50

Market Price (₹)	Profit/Loss (₹)	Description
900	-50	Loss of ₹50 (Break-even - Market Price)
950	0	Break-even point

Market Price (₹)	Profit/Loss (₹)	Description
1,000	50	Profit equal to premium received
1,050	50	Profit equal to premium received

Question 10

"Investing in Stock Futures differs from investing in Equity Options in several ways". Explain.

MTP Mar 23 (4 Marks)

Answer:

Nature: In options, the buyer of the options has the right but not the obligation to purchase or sell the stock. However while going in for a long futures position, the investor is obligated to square off his position at or before the expiry date of the futures contract.

Movement of the Market: Options traders use a mathematical factor, the delta that measures the relationship between the options premium and the price of the underlying stock. At times, an options contract's value may fluctuate independently of the stock price. In contrast, the future contract will much more closely follow the movement of the underlying stock.

The Price of Investing: When an options investor takes a long position, he or she pays a premium for the contract. The premium is often called a sunk cost. At expiration, unless the options contract is in the money, the contract is worthless and the investor has lost the entire premium. Stock future contracts require an initial margin deposit and a specific maintenance level of cash for mark to market margin.

Question 11

What is European Option and American Option

Answer:

European Option

Definition:

- A European option is a type of options contract that can only be exercised at the expiration date, not before.

Characteristics:

- **Exercise Restriction:** The holder can exercise the option only on the expiration date.
- **Pricing:** European options typically have simpler pricing models due to the fixed exercise date, and they often trade at a lower premium compared to American options because of their limited flexibility.
- **Common Usage:** Often used in index options and some stock options in European markets.

Example:

  - **Underlying Asset:** Stock of Company XYZ
  - **Strike Price:** ₹1,000
  - **Expiration Date:** 30th June
  - **Premium Paid:** ₹50

Suppose the current price of the stock on the expiration date is ₹1,100. The holder of the European call option can exercise the option on 30th June to buy the stock at ₹1,000, gaining a profit of ₹100 - ₹50 (premium) = ₹50 per share.

American Option

Definition:

- An American option is a type of options contract that can be exercised at any time before and including the expiration date.

Characteristics:

- **Exercise Flexibility:** The holder has the flexibility to exercise the option at any time up to the expiration date.
- **Pricing:** American options typically have higher premiums than European options due to their flexibility and potential for early exercise.
- **Common Usage:** Widely used in stock options and some commodity options.

Example:

  - **Underlying Asset:** Stock of Company ABC
  - **Strike Price:** ₹800
  - **Expiration Date:** 30th June
  - **Premium Paid:** ₹30

Suppose the price of the stock falls to ₹750 on 15th June. The holder of the American put option can choose to exercise the option on that day, selling the stock at ₹800, and making a profit of ₹800 - ₹750 - ₹30 (premium) = ₹20 per share.

Comparison:

- **European Options:**

- Can only be exercised at expiration.
- Often used in index options.
- Generally have lower premiums.

- **American Options:**
  - Can be exercised at any time before expiration.
  - Common in stock and commodity markets.
  - Generally have higher premiums due to increased flexibility.

Question 12

What are the Option Valuation Techniques

Answer:

Option valuation is crucial for understanding the fair price of an options contract. Several techniques are used to determine the value of options, with the most prominent being the Black-Scholes model, the Binomial model, and the Monte Carlo simulation. Each method has its unique approach and application.

1. Binomial Model
2. Risk Neutral Method
3. Black Scholes Model

Question 13

Write a short note on Exotic Options

Answer:

- ✓ Exotic options are the classes of option contracts with structure and features different from plain vanilla options i.e. American and European style options.
- ✓ Not only are that Exotic options different from these vanilla options in their expiration dates also. As mentioned earlier an American option allows the option buyer to exercise its right at any time on or before expiration date.
- ✓ On the other hand European option can be exercised only at the expiry of maturity period. Exotic option is some type of hybrid of American and European options and hence falls somewhere in between these options.

Question 14

Difference between Traditional Options and Exotic Options

Answer:

Aspect	Traditional Options	Exotic Options
Definition	Standardized options with basic features	Customized options with complex features and payoffs
Examples	Call and put options	Barrier options, Asian options, binary options, lookback options
Exercise Style	Typically European or American	May have complex exercise styles, including path-dependent
Market	Traded on organized exchanges	Often traded over-the-counter (OTC)
Pricing	Standard models like Black-Scholes used for pricing	Requires complex models, often specific to the option's structure
Settlement	Generally cash or physical settlement	May involve unique settlement conditions
Complexity	Simple and straightforward with clear terms	More complex with intricate terms and conditions
Liquidity	Highly liquid with active secondary markets	Less liquid, often customized for specific needs
Customization	Limited customization available	Highly customizable to meet specific risk management needs
Risk Management	Used for straightforward hedging and speculation	Used for advanced risk management strategies
Use Cases	Commonly used by retail and institutional investors	Typically used by institutional investors and corporates
Cost	Lower transaction costs due to standardization	Higher transaction costs due to customization

Question 15

What are the different types of Exotic Options?

Answer:

a. Chooser Options:

- These options provide the buyer with the right, after a specified period, to decide whether the purchased option will be a call or a put option.
- The decision can be made within a specified period prior to the expiration of the contract.

b. Compound Options:

- Also known as split fee options or "options on options."

- This option provides the right, but not the obligation, to buy another option at a specific price on the expiry of the first maturity date.
- The underlying asset in this option is another option, and the payoff depends on the strike price of the second option.

c. Barrier Options:

- Similar to plain vanilla call and put options but with a unique feature where the contract becomes activated only if the underlying price reaches a certain level during a predetermined period.

d. Binary Options:

- Also known as "Digital Options."
- This option contract guarantees a payoff based on the occurrence of a specific event.
- If the event occurs, the payoff is a pre-decided amount; if not, there is no payoff.

e. Asian Options:

- The payoff of these options is determined by the average price of the underlying asset over a predetermined period during the option's lifetime.

f. Bermuda Options:

- A compromise between European and American options.
- Unlike American options, which can be exercised at any time, the exercise of Bermuda options is restricted to certain dates or on expiration, similar to European options.

g. Basket Options:

- The value of these options depends on the value of a portfolio or a basket of assets rather than a single underlying asset.
- The basket's value is usually computed based on the weighted average of the underlying assets.

h. Spread Options:

- The payoff depends on the difference between the prices of two underlying assets.

i. Lookback Options:

- Unlike other options with pre-decided exercise prices, lookback options allow the holder to choose the most favorable strike price on the maturity date, based on the minimum and maximum prices achieved by the underlying asset during the option's lifetime.

Question 16

Write a short note on Credit Derivatives

Answer:

Credit Derivatives is a summation of two terms: **Credit** and **Derivatives**. As we know, a derivative implies a value deriving from an underlying asset, which can be anything we discussed earlier, such as stock, share, currency, interest, etc.

Initially started in 1996, due to the need of banking institutions to hedge their exposure to lending portfolios, credit derivatives have become one of the popular structured financial products.

Plainly speaking, financial products are subject to the following two types of risks:

1. **Market Risk**: Due to adverse movement of the stock market, interest rates, and foreign exchange rates.
2. **Credit Risk**: Also called counterparty or default risk, this involves the non-fulfillment of obligations by the counterparty.

While financial derivatives can be used to hedge market risk, credit derivatives emerged to mitigate credit risk. Accordingly, a credit derivative is a mechanism whereby the risk is transferred from the risk-averse investor to those who wish to assume the risk.

Although there are a number of credit derivative products, in this chapter, we shall discuss two types of credit derivatives: **Collateralized Debt Obligation** and **Credit Default Swap**.

Question 17

Write a short note on Collateralized Debt Obligation (CDOs). What are the types of CDOs and risk involved in CDOs

Answer:

While in securitization the securities issued by SPV are backed by the loans and receivables the CDOs are backed by pool of bonds, asset backed securities, REITs, and other CDOs. Accordingly, it covers both Collateralized Bond Obligations (CBOs) and Collateralized Loan Obligations (CLOs).

Example

Consider a financial institution, Financial Co., that bundles together a pool of different types of loans, such as mortgages, car loans, and corporate bonds, to create a CDO. This CDO is then divided into different tranches with varying levels of risk and return.

- How it works:
  - The CDO is structured into tranches, ranging from senior (least risky) to junior (most risky).
  - Investors can buy these tranches based on their risk appetite. Senior tranches offer lower returns but are safer, while junior tranches offer higher returns but come with greater risk.
  - The cash flow from the underlying loans is used to pay investors, starting with the senior tranche and moving down to the junior tranche.

Types of CDOs

CDOs can be classified into the following types:

1. **Cash Flow Collateralized Debt Obligations (Cash CDOs):**
    - Backed by cash market debt or securities with low risk weight.
    - Relies on the collateral's risk weight and its ability to generate enough cash to pay off the securities issued by the Special Purpose Vehicle (SPV).
2. **Synthetic Collateralized Debt Obligations:**
    - Similar to Cash CDOs but credit risk is transferred without actual transfer of assets.
    - Resembles hedge funds, with the portfolio's value dependent on collateralized instruments.
    - Economic risk transfer is achieved through Credit Default Swaps (CDS) or Credit Linked Notes (CLN).
    - Primarily used for hedging risk rather than balance sheet funding.
    - Popular in the European market due to less legal documentation requirements.
    - Categorized into:
        - **Unfunded:** Comprised only of CDS.
        - **Fully Funded:** Issued through CLNs.
        - **Partially Funded:** Combination of CLNs and CDS.
3. **Arbitrage CDOs:**
    - Issuer captures the spread between the return on underlying collateral and the cost of borrowing to purchase these collaterals.
    - Involves acquiring high-yielding securities with a large spread from the open market.
    - Issuer collects a management fee for managing the CDOs.

Risk involved in CDOs

The main types of risk associated with investment in CDOs are as follows:

a. **Default Risk: -** Also called 'credit risk', it emanates from the default of underlying party to the instruments. The prime sufferers of these types of risks are equity or junior tranche in the waterfall.

b. **Interest Rate Risk: -** Also called Basis risk and mainly arises due to different basis of interest rates. For example, asset may be based on floating interest rate but the liability may be based on fixed interest rates. Though this type of risk is quite difficult to manage fully but commonly used techniques such as swaps, caps, floors, collars etc. can be used to mitigate the interest rate risk.

c. **Liquidity Risk: -** Another major type of risk by which CDOs are affected is liquidity risks as there may be mismatch in coupon receipts and payments.

d. **Prepayment Risk: -** This risk results from unscheduled or unexpected repayment of principal amount underlying the security. Generally, this risk arises in case assets are subject to fixed rate of interest and the debtors have a call option. Since, in case of falling interest rates they may pay back the money.

e. **Reinvestment Risk: -** This risk is generic in nature as the CDO manager may not find adequate opportunity to reinvest the proceeds when allowed for substitutions.

f. **Foreign Exchange Risk: -** Sometimes CDOs are comprised of debts and loans from countries other than the country of issue. In such a case, in addition to above mentioned risks, CDOs are also subject to the foreign exchange rate risk.

Question 18

Write a short note on Credit Default Swaps (CDS)

Answer:

It is a combination of following 3 words:

Credit: Loan given

Default: Non payment

Swap: Exchange of Liability or Risk Accordingly,

CDS can be defined as an insurance (not in stricter sense) against the risk of default on a debt which may be debentures, bonds etc.

Under this arrangement, one party (called buyer) needing protection against the default pays a periodic premium to another party (called seller), who in turn assumes the default risk. Hence, in case default takes place then there will be settlement and in case no default takes place no cash flow will accrue to the buyer alike option contract and agreement is terminated.

Although it resembles the options but since element of choice is not there it more resembles the swap arrangements. Amount of premium mainly depends on the price of underlying and especially when the credit risk is more.

Question 19

What are the main Features of Credit Default Swaps (CDS)

Answer:

Main Features of Credit Default Swaps (CDS):

1. **Non-Standardized Private Contract:** CDS is a private agreement between the buyer and seller, and it is considered a type of forward contract.
2. **Not Exchange-Traded:** CDS contracts are usually not traded on exchanges and are not subject to regulations by governing bodies.

3. **Guidelines by ISDA:** The International Swap and Derivative Association (ISDA) provides guidelines and general rules for conducting CDS contracts.
4. **Risk Protection:** CDS can be purchased to protect against the default of borrowers. For example, an investor buying bonds can purchase a CDS to safeguard against the company's insolvency.
5. **Investor Confidence:** By purchasing CDS, investors can increase their confidence in bonds, knowing they have protection against potential defaults.
6. **Cost Relationship with Risk:** The cost or premium of a CDS is positively related to the risk associated with the loans. Higher risk leads to higher premiums.
7. **Naked CDS:** When an investor buys a CDS without being exposed to the credit risk of the underlying bond issuer, it is referred to as a "naked CDS."

Question 20

Explain Uses of Credit Default Swaps (CDS)

Answer:

Main Purposes of Credit Default Swaps (CDS):

1. **Hedging:** The main purpose of using CDS is to neutralize or reduce a risk to which CDS is exposed to. Thus, by buying CDS, risk can be passed on to the CDS seller or writer.
2. **Arbitrage:** It involves buying a CDS and entering into an asset swap. For example, a fixed coupon payment of a bond is swapped against a floating interest stream.
3. **Speculation:** CDS can also be used to make a profit by exploiting price changes. For example, a CDS writer who assumed risk of default will gain from the contract if the credit risk does not materialize during the tenure of the contract or if the compensation received exceeds the potential payout.

Question 21

Explain Parties of Credit Default Swaps (CDS)

Answer:

Parties Involved in a Credit Default Swap (CDS):

1. **The Initial Borrowers:** It is also called a 'reference entity', which are owing a loan or bond obligation.
2. **Buyer:** It is also called 'investor' i.e. the buyer of protection. The buyer will make regular payment to the seller for the protection from default or credit event of the reference entity.
3. **Seller:** It is also called 'writer' of the CDS and makes payment to the buyer in the event of a credit event of the reference entity. It receives a regular payoff from the buyer of the CDS.

Example:

Suppose BB Corp. buys a CDS from SS Bank for the bonds amounting to $10 million of Danger Corp. In such a case, BB Corp. will become the buyer, SS Bank becomes the seller, and Danger Corp. becomes the reference entity. BB Corp. will make regular payments to SS Bank of the premium, and if Danger Corp. defaults on its debts, BB Corp. will receive a one-time payment and the CDS contract is terminated.

Question 22

How Credit Default Swaps (CDS) are Settled

Answer:

Broadly, the main ways of settling a CDS are as follows:

1. **Physical Settlement:** This is the traditional method of settlement. It involves the delivery of bonds or debts of the reference entity by the buyer to the seller, and the seller pays the buyer the par value.
    - **Example:** Suppose Danger Corp. defaults. SS Bank will pay ₹80 crore to BB Corp., and BB Corp. will deliver bonds with a face value of ₹80 crore to SS Bank.
2. **Cash Settlement:** Under this arrangement, the seller pays the buyer the difference between the par value and the market price of the debt of the reference entity.
    - **Example:** Continuing the example above, suppose the market value of the bonds is 30%, as the market believes bondholders will receive 30% of the money owed if the company goes into liquidation. SS Bank would pay BB Corp. ₹80 crore - ₹24 crore (30% of ₹80 crore) = ₹56 crore.

To make cash settlements even more transparent, the credit event auction was developed. A credit event auction sets a price for all market participants who choose cash settlement.

Question 23

Discuss Real Options

Answer:

Real Options methodology is an approach to capital budgeting that relies on Option Pricing theory to evaluate projects.

Insights from option-based analysis can improve estimates of project value and, therefore, has potential, in many instances to significantly enhance project management.

However, Real options approach is intended to supplement, and not replace, capital budgeting analyses based on standard Discounted Cash Flow (DCF) methodologies

Question 24

What are the differences between Financial Options and Real Options.

Explain how Real Options are different from Financial Options

Answer:

Basis	Financial Options	Real Options
Underlying	Have underlying assets that are normally traded in the market, i.e., shares, stocks, bonds, commodities, etc.	Have underlying projects that are not traded in the market, such as investment opportunities or business ventures.
Pay-off	In most cases, it is specified in the contracts and hence is fixed.	It is estimated from the project cash flows and hence can vary.
Exercise Period	Mostly the period of these options is short and can go up to 1 year.	The period of these options mostly starts from the end of the 1st year and is longer than financial options.
Approach	Since these options are normally traded in the market, they are "Priced."	Since these options are used to make decisions, they are "Valued."
Purpose	Used primarily for hedging or speculative purposes.	Used for strategic decision-making and assessing future opportunities.
Marketability	Actively traded on exchanges, providing liquidity and transparent pricing.	Not traded on exchanges; values are often subjective and require complex valuation models.
Flexibility	Offers limited flexibility; terms are defined by market conditions and contracts.	Offers flexibility in investment decisions, such as delaying, expanding, or abandoning a project.

Example:

- **Financial Option:** An investor purchases a call option on a stock, giving them the right to buy the stock at a specified price within the next six months. If the stock price rises above the exercise price, the investor can buy the stock at a lower price and sell it at the market price, earning a profit.
- **Real Option:** A mining company holds a real option to expand its operations by opening a new mine. If market conditions become favorable and the price of the commodity rises, the company can exercise its option to invest in the new mine, potentially generating significant future profits. Conversely, if market conditions are unfavorable, the company can delay or abandon the project, minimizing potential losses.

Question 25

What are the different types of Real Options

Answer:

1. **Growth Options**

   Explanation: Growth options allow a company to invest in projects that might initially have a negative or insignificant Net Present Value (NPV) but could provide significant future profitability and value. This type of real option is similar to a European Call Option, where the investment opens up opportunities for future growth.

   Examples:

- **Investment in R&D Activities:** A pharmaceutical company invests in research and development to discover new drugs, even if the immediate returns are uncertain. Successful breakthroughs could lead to profitable new products in the future.
- **Heavy Expenditure on Advertisement:** A startup invests heavily in advertising to build brand recognition and capture market share, with the expectation of future profitability as the brand becomes established.
- **Initial Investment in Foreign Markets:** A manufacturing company enters a foreign market with a small initial investment, laying the groundwork for potential expansion if the market conditions become favorable.
- **Acquiring Making Rights:** A film studio acquires the rights to a novel, with the option to produce a movie in the future if the market demand is high.
- **Acquisition of a Vacant Plot:** A real estate developer purchases a vacant plot of land with the intention to develop it when market conditions are favorable.

Purposes:

- To define the competitive position of the firm, often considered strategic investments.
- To gain insights into the project's potential profitability.
- To provide manufacturing and market flexibility to the firm.

2. **Abandonment Options**

Explanation: Abandonment options allow a firm to terminate a project if the economic conditions change unfavorably, preventing further losses. This option is similar to an American Put Option, where the project is abandoned if the value of the project's assets exceeds the present value of continuing the project.

Example:

- **Manufacturing Plant:** A company invests in building a new manufacturing plant. If economic conditions deteriorate and the cost of production exceeds potential revenue, the company might decide to sell the plant or its assets, recovering some of the investment and avoiding further losses.

3. **Timing Option**

Timing options give a firm the flexibility to delay investment decisions until more information or better ideas are available. This is similar to an American Call Option, where the option to invest is kept open for a future date.

Example:

- **Real Estate Development:** A real estate developer acquires land but delays construction until market conditions improve, such as when demand for housing increases or construction costs decrease. This allows the developer to optimize the timing of the investment for maximum return.

Question 26

What are the advantages of Commodity Markets?

Answer:

1. Most money managers prefer derivatives to tangible commodities;
2. Less hassle (delivery, etc);
3. Allows indirect investment in real assets that could provide an additional hedge against inflation risk.

Question 27

Write a note on Weather Derivatives.

Answer:

Weather derivatives are financial instruments designed to help businesses manage the risk of volumetric losses resulting from adverse weather conditions. Unlike traditional derivatives that hedge against price risk, weather derivatives focus on hedging volume risk caused by changes in weather patterns.

Key Points:

- **Affected Industries:** Companies in industries such as airlines, agriculture, and juice manufacturing are particularly vulnerable to weather changes. For instance, farmers face significant risks due to unpredictable weather patterns, which can affect crop yields and profitability.
- **Hedging Mechanism:** Weather derivatives use weather measures, such as rainfall, temperature, humidity, and wind speed, as their underlying "assets." These measures directly impact the demand and trading volume of goods, and the derivatives are used to mitigate the financial impact of these changes.
- **Market Evolution:** The first weather transaction occurred in 1997 in the OTC market by Aquila Energy Company, and the market expanded rapidly after the warm Midwest/Northeast El Niño winter of 1997-1998. Companies sought protection against earnings declines due to unusual weather patterns.
- **Comparison to Insurance:** Weather derivatives differ from insurance contracts in their coverage. Insurance protects against extreme, low-probability events like earthquakes and hurricanes. In contrast, weather derivatives can hedge against normal, more likely weather conditions that can still lead to significant financial losses for weather-sensitive industries.
- **Contract Structure:** A weather derivative contract involves a buyer and a seller. The seller receives a premium from the buyer and agrees to compensate the buyer if adverse weather conditions lead to financial losses. If no adverse conditions occur, the seller profits from the premium.

Weather derivatives provide an alternative risk management tool for companies seeking to protect themselves against the financial impact of unpredictable weather, complementing traditional insurance by covering a broader range of weather-related risks.

Question 28

What are the challenges faced in Pricing Weather Derivatives

Answer:

Pricing weather derivatives is complex due to several inherent challenges related to the nature of weather and data reliability. Here are the key issues involved:

- **Data Reliability:** The availability and reliability of weather data vary significantly between countries and even among agencies within the same country. This inconsistency poses a challenge in obtaining accurate historical data needed for pricing weather derivatives.
- **Forecasting Weather:** Although various models exist to predict short-term and long-term weather conditions, accurately forecasting future weather behavior is difficult due to its dependence on numerous dynamic factors. Most forecasts address seasonal trends rather than daily temperature fluctuations, which limits their usefulness for precise derivative pricing.
- **Temperature Modeling:** Temperature is a crucial underlying factor for weather derivatives. However, it tends to remain relatively constant across different months within a year, making it difficult to develop a model with perfect accuracy and universal applicability. This variability and the lack of a definitive model complicate the process of determining the fair price of weather derivatives.

These challenges highlight the complexity of pricing weather derivatives, as they require careful consideration of data quality, predictive modeling, and the inherent uncertainties of weather patterns.

Question 29

Write short notes on Electricity Derivatives

Answer:

Electricity derivatives are financial instruments used to hedge against the price volatility of electricity in India, where spot prices can fluctuate due to factors like fuel supply, weather conditions, and transmission congestion. These derivatives help market participants, such as generators, buyers, and distribution companies, manage price risks.

Key Types of Electricity Derivatives:

1. **Electricity Forwards:**
    - **Description:** Custom-tailored contracts obligating the buyer to purchase and the seller to supply a fixed amount of electricity at a specified price and future date.

- **Payoff:** Calculated as the difference between the spot price at maturity and the agreed forward price (ST−F)
- **Characteristics:** Traded over-the-counter (OTC) with less transparency compared to futures, and typically involve larger quantities.

2. **Electricity Futures:**
   - **Description:** Standardized contracts for delivering a specific quantity of electricity at a set price and date, traded on organized exchanges.
   - **Advantages:** Offer price transparency, liquidity, and lower transaction costs due to financial settlement rather than physical delivery. Daily settlements reduce credit risk.
3. **Electricity Swaps:**
   - **Description:** Financial contracts allowing parties to exchange a fixed electricity price for a variable spot price, or vice versa, over the contract period.
   - **Variants:** Include locational basis swaps, which hedge against price differences between two locations.
   - **Use:** Provide price certainty for short-to-medium terms.

Benefits:

- **Price Discovery and Certainty:** Derivatives facilitate future price discovery and offer price certainty, aiding market participants in financial planning.
- **Hedging:** Protect against volatile electricity prices, ensuring stable financial outcomes for generators and consumers.

Electricity derivatives are essential tools for managing price risk, improving market efficiency, and providing stability in the power sector.

Question 30

What lessons can be learned from historical derivative mishaps, and how can organizations apply these lessons to manage financial risks effectively?

Answer:

Derivative mishaps provide critical insights into managing financial risks and ensuring robust control mechanisms. Here are some important lessons learned from case studies of such mishaps:

1. Understand Before You Invest

- **Lesson:** Avoid purchasing derivatives you don't understand.
- **Example:** In the Orange County case, Treasurer Robert Citron speculated on derivatives without a financial background, leading to significant losses. Similarly, BT's case showed how P&G and Gibson Greetings were misled.
- **Solution:** Value instruments in-house to avoid external misguidance and ensure clear understanding.

2. Caution with Treasury as a Profit Center

- **Lesson:** Conduct due diligence before turning the Treasury Department into a profit center.
- **Example:** Orange County's treasurer leveraged positions after initial profits, leading to bankruptcy.
- **Solution:** Avoid linking treasurer's salary to profits to prevent excessive risk-taking.

3. Specify Risk Limits

- **Lesson:** Set and monitor risk limits to prevent overtrading.
- **Example:** Baring Bank's bankruptcy was due to unmonitored and unchecked trading positions.
- **Solution:** Limit trader positions, ensure strict adherence to limits, and regularly review trader positions to prevent loss of control.

4. Separate Front, Middle, and Back Offices

- **Lesson:** Maintain separation between offices to prevent manipulation.
- **Example:** Barings Bank's Nick Leeson manipulated back-office functions to hide losses.
- **Solution:** Clearly define and enforce distinct roles and responsibilities for each office to ensure independence.

5. Ensure Hedgers Don't Become Speculators

- **Lesson:** Prevent hedgers and arbitrageurs from becoming speculators.
- **Example:** Over-leveraging by hedgers/arbitrageurs often leads to risky speculation.
- **Solution:** Define clear risk limits and conduct thorough risk analysis to align trading strategies with the company's risk appetite.

6. Conduct Stress Tests and Scenario Analysis

- **Lesson:** Perform rigorous scenario analysis to anticipate unpredictable situations.
- **Example:** Gibson Greetings faced losses by not anticipating interest rate increases.
- **Solution:** Complement VAR analysis with scenario analysis, using historical data to anticipate rare events, and apply simulation tests to evaluate outcomes under various scenarios.

CHAPTER 10
INTEREST RATE RISK MANAGEMENT

Question 1

A manufacturer of electronic components has taken floating interest rate loan of ₹2 Crore on 1st April, 2023. The rate of interest at the inception of loan is 9% per annum. Interest is to be paid every year on 31st March.

In the month of October 2023, the Central Bank of the country releases the following projections about the interest rates likely to prevail in future.

(i) On 31st March, 2024 — 9.25%
On 31st March, 2025 — 9.50%
On 31st March, 2026 — 10.00%
On 31st March, 2027 — 9.00%
On 31st March, 2028 — 8.25%
You are required to show how the borrower can hedge the risk using Option Cap arising out of expected rise in the rate of interest when he wants to peg his interest cost at 9% per annum.

(ii) Assume that the premium negotiated by both the parties is 0.80% to be paid at once on 1st October, 2023 and the actual rate of interest on the respective due dates happens to be as:
On 31st March, 2024 — 9.50%
On 31st March, 2025 — 11.00%
On 31st March, 2026 — 9.25%
On 31st March, 2027 — 9.00%
On 31st March, 2028 — 8.50%
You are required to show how the settlement will be executed on the perspective interest due dates.

(iii) State whether this option is advantageous when compared to Interest Rate Collar option. Explain.

May 24 (10 Marks)

Answer:

(i) As As borrower does not want to pay more than 9.00% p.a., on this loan where the rate of interest is likely to rise beyond this, hence, he has to hedge the risk by entering into an agreement to buy interest rate caps with the following parameters:

- **Notional Principal:** ₹2,00,00,000
- **Strike Rate:** 9% per annum
- **Reference Rate:** Rate of interest declared by Central Bank. or the rate of interest applicable to this loan.
- **Calculation and Settlement Date:** 31st March every year

- **Duration of the Caps:** Till 31st March 2028
- **Premium for Caps:** Negotiated between both 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 9.00%. 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 9.00% calculated on ₹2,00,00,000. This implies that in none of the cases the cost of this loan will rise above 9.00%. This hedging benefit is received at the respective interest due dates at the cost of premium to be paid only once.

(ii) 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:

Date	Interest Rate	Option	Payment of Interest ₹	Settlement / Compensation Amount ₹	Net Interest ₹
31.03.2024	9.50%	Exercise	19,00,000	1,00,000	18,00,000
31.03.2025	11.00%	Exercise	22,00,000	4,00,000	18,00,000
31.03.2026	9.25%	Exercise	18,50,000	50,000	18,00,000
31.03.2027	9.00%	Lapse*	18,00,000	-----	18,00,000
31.03.2028	8.50%	Lapse*	17,00,000	-----	17,00,000

* Since actual rate of interest ≤ Strike Rate.

Conclusion: From the discussion above it can be said that the overall interest cost for the borrower shall not exceed 9%.

(iii) Comparing to Interest Rate Collar, Cap Option appears to be better because even though Collar may not involve initial outflow of cash on account of Premium but selling Put Option at 9% can lead to cash outflow if interest rate goes below 9%.

Question 2

MPD Ltd. issues a ₹50 Million Floating Rate Loan on July 1, 2018 with resetting of coupon rate every 6 Months equal to LIBOR + 50 bps.

MPD is interested in an Interest rate Collar Strategy of selling a Floor and buying a cap.

MPD buys the 3 years cap and sell 3 years Floor as per the following details on July 1, 2018:

Principal Amount	₹50 Million
Strike Rate	5% for Floor & 8% for Cap
Reference Rate	6 months LIBOR

Premium	NIL, since premium paid for cap = premium received for Floor

The Reset dates & Interest rates p.a., on that dates are:

Reset Date	31/12/2018	30/06/2019	31/12/2019	30/06/2020	31/12/2020	30/06/2021
LIBOR (%)	7.00	8.00	6.00	4.75	4.25	5.25

Using the above data, you are required to determine:

(i) Effective Interest paid out at each six reset dates, (Round off to the nearest rupee)

(ii) Average overall effective rate of interest p.a. (round off to 2 decimals)

May 22 (8 Marks), RTP May 14, RTP May 19, MTP Oct 18 (8 Marks)

Answer:

(i) The pay-off of each leg shall be computed as follows:

Cap Receipt

Max {0, [Notional principal × (LIBOR on Reset date – Cap Strike Rate) × (No. of days in settlement period/ 365)}

Floor Pay-off

Max {0, [Notional principal x (Floor Strike Rate – LIBOR on Reset date) × (No. of days in settlement period/ 365)}

Statement showing effective interest on each payment date

Reset Date	LIBOR (%)	Date of Payment	Days	Interest Payment (₹) LIBOR+0.50%	Cap Receipts (₹)	Floor Pay-off (₹)	Effective Interest
31-12-2018	7.00	30-06-2019	181	18,59,589	0	0	18,59,589
30-06-2019	8.00	31-12-2019	184	21,42,466	0	0	21,42,466
31-12-2019	6.00	30-06-2020	182	16,16,120	0	0	16,16,120
30-06-2020	4.75	31-12-2020	184	13,19,672	0	62,842	13,82,514
31-12-2020	4.25	30-06-2021	181	11,77,740	0	1,85,959	13,63,699
30-06-2021	5.25	31-12-2021	184	14,49,315	0	0	14,49,315
Total			**1096**				**98,13,703**

(ii) Average Annual Effective Interest Rate shall be computed as follows:

$$\frac{98,13,703}{5,00,00,000} \times \frac{365}{1096} \times 100 = 6.54\%$$

Question 3

Suppose a dealer bank quotes for a generic swap "AIC 8%/8.20% vs. 6M LIBOR Flat". Notional principal amount of swap is ₹1 Million, and the same is for a period of three years, reset after every six months. In this context, the following questions:

(1) Interpret the dealer bank quote.

(2) If a firm is buying a swap, what is the nature of cash flows?

(3) If a firm is selling a swap, what is the nature of cash flows?

(4) Calculate semi-annual fixed payment for the buyer of swap at the end of every six months

(5) If the six month period from the effective date of swap to the settlement date comprises of 181 days and that the corresponding LIBOR was 5% on the effective date of swap, then what will be the first floating rate payment for the buyer?

(6) If the settlement is on "Net Basis", how much the buyer of swap has to pay or receive at the end of first six months?

[Assume 30/360 days basis]

Nov 23 (8 Marks)

Answer:

(1) Interpretation of dealer bank quote:

- AIC in the dealer bank quote refers to 'All in cost' i.e. cost of swap all inclusive.
- First part of the quote i.e. '8%/8.20% refers to the fixed leg part and the second part of the quote i. e. '6m LIBOR Flat' refers to the floating leg part.
- The difference in the fixed rates i.e. 20 bps refers to the margin charged by the
- Bank on the fixed leg of transactions.
- The term 'flat' on the floating leg quote, indicates that the Bank does not charge any commission on the floating leg. Therefore, bank charges 20 bps for transacting swap as a whole.

(2) **A buyer of swap pays** 'Fixed' cash flows and receives 'Floating'. As per the quote, the buyer would pay 8.2% (higher of 8%, 8.2%) to the Bank and would receive '6M LIBOR' against it.

(3) **A seller of swap pays** 'floating' cash flows and receives 'fixed'. As per the quote, the seller would pay '6M LIBOR' to the bank and would receive 8% (lower of 8%, 8.2%) against it.

(4) Semi-annual Payment every six-month for buyer of Swap:

$$₹10,00,000 \times 8.20\% \times \frac{1}{2} = ₹41,000$$

(5) Floating Rate Payment

$$= \mathrm{N(LIBOR)}\left(\frac{\mathrm{dt}}{360}\right)$$

$$= 10,00,000 \times 0.05 \times \frac{181}{360}$$

= 10,00,000 × 0.05 (0.503) or 5,00,000 × 0.05 (0.502777)

= 10,00,000 × 0.02515 or 10,00,000 × 0.02514 = ₹25,150 or ₹ 25,140

(6) Net Settlement

₹41,000 - ₹25,150 = ₹15,850 or ₹41,000 - ₹25,140 = ₹15,860

Or ₹41,000 - ₹25,138.89 = **₹15,861.11**

Question 4

IF an Indian firm has its subsidiary in Singapore and SF a Singapore firm has its subsidiary in India and face the following interest rates:

Company	IF	SF
INR Floating Rate	BPLR+0.5%	BPLR+ 1.5%
SGD (fixed rate)	3%	3.50%

SF wishes to borrow Rupee loan at a floating rate and IF wishes to borrow SGD at a fixed rate. The amount of loan required by both the companies is same at the current exchange rate. A Ban arranges a swap and requires 50 basis points as its commission, which is to be shared equally. IF requires a minimum gain of 20 basis points and SF requires a minimum gain of 10 basis points for structuring the deal. The Bank is very keen to structure the deal, even if, it has to forego a part of its commission.

You are required to find out:

(i) Whether there are any advantages available to IF and SF?

(ii) Whether a swap can be arranged which may be beneficial to both the firms?

(iii) What rate of interest will they end up paying? Show detailed working.

May 23 (8 Marks)

Answer:

Though firm IF has an advantage in both the markets but it has comparative more advantage in the INR floating-rate market. Firm SF has a comparative advantage in the SGD fixed interest rate market. However, firm IF wants to borrow in the SGD fixed interest rate market and firm SF wants to borrow in the INR floating-rate market. This gives rise to the swap opportunity.

IF raises INR floating rate at BPLR + 0.50% and SF raises SGD at 3.50%

Total Potential Gain = (INR interest differential) - (SGD rate differential)

= (BPLR + 1.50% - BPLR - 0.50%) + (3% - 3.50%) = 0.50%

Less: Banker's commission (To be shared equally) = *0.20%

Net gain (To be shared as: 0.20% for IF and 0.10% for SF) = 0.30%

*Since, bank's commission is 0.50% which constitutes the entire gain, and it is mentioned that bank will forego a part of its commission to structure the deal. Thus, it will forego the minimum gain required by IF and SF i.e. 0.20% and 0.10% respectively.

(i) Yes, a beneficial swap can be arranged

(ii) Effective cost of borrowing = pays to lenders + pays to other party - receives from other party + banker's commission

IF = BPLR + 0.50% + 2.70%** - (BPLR + 0.50%) + 0.10% = 2.80%

(** has been arrived as 3% - 0.20% - 0.10%)

SF = 3.50% + BPLR + 0.50% - 2.70% + 0.10% = BPLR + 1.40%

Question 5

What are benchmark rates, and how have they evolved from LIBOR to Alternative Reference Rates (ARRs) in managing interest rate risk? Discuss their significance and provide examples from different regions.

Answer:

Definition:

Benchmark rates, also known as reference rates, are interest rates that serve as a foundation for determining other interest rates. These rates are crucial in the economy and banking systems, influencing financial contracts such as loans, mortgages, and derivatives like forwards, futures, options, and swaps.

Role in Financial Transactions:

- **Basis for Contracts:** Benchmark rates form the basis for floating-rate loans and are used in complex financial transactions.
- **Credit Spreads:** Basis points are often added to the benchmark rate based on the credit rating of entities involved in transactions, affecting loans and bond issuances.

Setting Benchmark Rates:

- **Independent Bodies:** Benchmark rates are determined by independent bodies that consider various economic factors.
- **Domestic and International Usage:** These rates are used in both domestic and international financial markets.

Short Form	Full Form	Region
LIBOR	London Interbank Offered Rate	Global
SOFR	Secured Overnight Financing Rate	United States
SONIA	Sterling Overnight Index Average	United Kingdom
€STR	Euro Short-Term Rate	Eurozone
TONAR	Tokyo Overnight Average Rate	Japan
MIBOR	Mumbai Interbank Offered Rate	India
ARR	Alternative Reference Rates	Various Regions

Transition from LIBOR to ARRs:

- **LIBOR Issues:** The London Interbank Offered Rate (LIBOR) was a widely used international benchmark rate. However, due to manipulation scandals, it was decided in 2017 to replace LIBOR with Alternative Reference Rates (ARRs) by 2022.
- **Characteristics of ARRs:**
    - Based on actual overnight transactions, unlike LIBOR, which relied on bank judgments.
    - Considered near risk-free rates with no term premium.
    - Different ARRs exist for different regions and currencies, unlike the single LIBOR rate for multiple currencies.

CHAPTER 11
FOREIGN EXCHANGE EXPOSURE & RISK MANGEMENT

Question 1

a. The following 2-way quotes appear in the foreign exchange market:

	Spot	2-months spread
₹/US $	74.00/74.25	1.00/1.25

(i) You are required to calculate:

a) 2 months forward rates.

b) How many US dollars should the firm sell to get ₹10 lakhs in the spot market and after 2 months?

c) How many Rupees is the firm required to pay to obtain US $80,000 in the spot market and after 2 months?

(ii) Assume the firm has US $27,600 in current account earning no interest. ROI on Rupee investment is 10% p.a. should the firm encash the US $ now or after 2 months?

Nov 22 (8 Marks), MTP Oct 18 (8 Marks), RTP May19, StudyMat

Answer:

(i)

(a) Two Month Forward Rates:

Buying Rate ₹74.00 + ₹1.00 = ₹75.00

Selling Rate ₹74.25 + ₹1.25 = ₹75.50

(b)

(1) To get ₹10 lakh at Spot Market the firm should sell

= ₹10,00,000/ ₹74.00 = US $13,513.51

(2) To get ₹10 lakh after 2 month the firm should sell

= ₹10,00,000/ ₹75.00 = US $13,333.33

(c)

(1) Rupees required to obtain US $ 80,000 in Spot Market:

US $80,000 × ₹74.25 = ₹59,40,000

(2) Rupees required to obtain US $ 80,000 after 2 months:

US $80,000 × ₹75.50 = ₹60,40,000

(ii) If US$ are converted in ₹ now and get invested in India, then fund position after 2 months will be as follows:

US $27,600 × ₹74.00	₹20,42,400
ROI @ 10% p.a. for 2 month	₹34,040
Amount after 2 months	₹20,76,440

If US$ are converted after 2 month, then fund position will be:

$27,600 × ₹75.00 = ₹20,70,000

Thus, it is better to get converted US$ into ₹ now and get them invested in India.

Alternatively, this sub part can also been as follows:

Computation of Annual Premium on US $ = (1.00/74.00) × (12/2) × 100 = 8.108% or 8.11%

Since, the premium on US $ in lesser than ROI on Indian ₹, it is better to convert US $ in Indian ₹ now and get them invested in India.

Question 2

Hopeful Ltd., an Indian MNC is executing a plant in Nepal. It has raised ₹400 Billion. Half of the amount will be required after six months' time. Hopeful Ltd. is looking for an opportunity to invest this amount for a period of six months. It is considering following two options:

Market	UK	Europe
Nature of Investment	Index Fund (GBP)	Treasury Bills (Euro)
Dividend (GBP in Billions)	0.1369	-
Income from stock lending (GBP in Billions)	0.0007	-
Discount on the investment value at the end	2%	-
Interest	-	7.8 percent per annum
Exchange Rate (Spot)	GBP/ INR 0.0099	EUR/INR 0.011
Exchange Rate (6 month Forward)	GBPI INR 0.0100	EUR/INR 0.011

As an investment manager advise the best option to invest.

May 23 (8 Marks), Nov 20 (8 Marks)

Answer:

(i) Investment in UK Market

(in billions)

Particulars	Currency INR	ER	Currency GBP
Available amount	200	0.0099	1.98
Dividend Income			0.1369
Stock Lending Income			0.0007
Investment value at the end after discount @ 2%			1.9404
			2.0780
Amount available at the end of 6- months			
Conversion after 6 months		0.0100	₹207.80
Gain			₹7.80

Investment in Europe

(in billions)

Particulars	Currency INR	ER	EUR
Available amount	200	0.011	2.2000
Interest for 6 months @ 7.80% p.a.			0.0858
Amount available at the end			2.2858
Amount available at the end of 6-months			
Conversion after 6 months		0.011	₹207.80
Gain			₹7.80

The gain amount is same in both the options so Hopeful Ltd. is indifferent. However, Treasury Bills are risk free, so investment in Treasury Bills (Euro) is suggested.

Alternative Solution

If investment is made in Index Fund (GBP)

Initial Investment (₹200 Billion × 0.0099)	GBP 1.9800 billions
Dividend Income	GBP 0.1369 billions
Income from Stock Lending	GBP 0.0007 billions
Discount	(GBP 0.0396 billions)
Value of Investment after 6 months	GBP 2.0780 billions
Value of Investment after 6 months in ₹ @ GBP/ INR	₹207.8000 billions

(ii) If investment is made in Treasury Bills (Europe)

Initial Investment (₹200 Billion × 0.011)	EUR 2.2000 billions
Interest for 6 months @ 7.8% p.a.	EUR 0.0858 billions
Value of Investment after 6 months	EUR 2.2858 billions
Value of Investment after 6 months in ₹ @ EUR/ INR 0.011	₹207.8000 billions

The equivalent amount is same in both the options so Hopeful Ltd. is indifferent. However, Treasury Bills are risk free, so investment in Treasury Bills (EUR) is suggested.

Question 3

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 ₹48.5275

6 months forward ₹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.

StudyMat

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	₹48.5275
Forward Points (6 months)	(–) 0.0700
Forward Rate	₹48.4575
Value of Commitment	₹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.

Question 4

A Japanese company imports hi-tech printer cartridges from US worth $1 million. The chief financial officer of the company wishes to know the best strategy for protection against uncertainty, for the payment that has to be made at the end of 3 months.

Financial team of the company has collected the following options for evaluation:

Table-1: Exchange rates quoted in FOREX Market:

¥/$ Quotations	Bid Price	Offer/Ask Price
Spot Rates	146.03	146.63
3M – Forward Rates	144.03	145.00
6M – Forward Rates	146.35	146.70

Table-2: Options Market rates for European options with 3 months expiry:

Type of Option	Strike Price (X) (¥/$)	Premium (%) for Call & Put Options
Call & Put	145.20	1.6766% (Call) & 1.7414% (Put)
Call & Put	146.00	1.3505% (Call) & 2.1006% (Put)

The expected spot price at expiry is ¥/$: 144.90/145.05

Suggest the best strategy for CFO of the Japanese Company to protect against uncertainty, with respect to the following alternatives:

i. Forward Hedge
ii. Buy 3 months call, X = 145.20
iii. Sell 3 months put, X = 145.20
iv. Buy call & sell put both having X = 146.00 Nov 23 (8 Marks)

Answer:

(ii) Forward Hedge

Amount payable after 3 months	$1000000
3 month applicable buying rate	¥145/$
Amt. payable in Yen	¥145 million

(iii) Buy 3 month call option X = ¥145.20

If expected spot price after 3 month is ¥ 145.05

Then company would not exercise its option. Accordingly the cost of import will be

Buying Yen in spot Market after 3 month	¥145.05 million
Add: Premium Paid ¥145.20 × 1.6766% × $1 million	¥2.43 million
	¥147.48 million

(iv) Selling 3 month Put at X = ¥145.20

If expected spot price after 3 month ¥144.90, then Put Option buyer will exercise his her option. Accordingly the import Bill will be:

Buying Yen in under option after 3 month	¥145.20 million
Less: Premium Receipt ¥145.20 × 1.7414% × $1 million	¥2.53 million
	¥142.67 million

(v) Buying Call and selling Put at X = ¥146

Net Premium receipt

Premium paid on call option = ¥146.00 × 1.3505%	¥1.9717 million
Premium Receipt on Put option = ¥146.00 × 2.1006%	¥3.0669 million
	¥1.0952 million

If expected spot Rate expiry happens to be ¥ 144.90/145.05, then call option will be lapsed and Put option by buyer will be exercised. Accordingly, the import bill will be:

Buying US$ under Put Option	¥146.00 million
Less: Receipt of Net Premium	¥1.09520 million
	¥144.905 million

Decision: Since expected outflow is least in case of selling Put option, the same strategy is recommended.

Question 5

An import customer booked a forward contract with the bank on 10th April for USD 20,000 due on 10th June at ₹49.4000. The bank covered its position in the market at ₹49.2800.

The exchange rate for dollar in the interbank market on 10th June and 20th June were:

	10th June	20th June
Spot	USD 1 = ₹48.8000/8200	48.6800/7200
Spot/ June	48.9200/9500	48.8000/8500
Spot/July	49.0500/0900	48.9300/9900
Spot/August	49.3000/3500	49.1800/2500
Spot/September	49.6000/6600	49.6000/6600
Exchange margin is 0.10%		
Interest on outlay of funds 12%		

Calculate how the bank will react, if the customer requires on 20th June:

i. To cancel the contract.
   a) Exchange difference,
   b) Swap loss,
   c) Interest on outlay of funds and
   d) Cancellation charges
ii. To Execute the contract.
iii. To Extend the contract with due date to fall on 10th August.

Nov 23 (8 Marks)

Answer:

i. Cancellation of Contract

(a) Exchange Difference:

The forward sale contract shall be cancelled at Spot TT Purchase for $ prevailing on the date of cancellation as follows:

$/ ₹Market Buying Rate	₹48.6800

Less: Exchange Margin @ 0.10%	₹0.0487
	₹48.6313

Rounded off to ₹48.6325

Exchange Difference Payable

Bank sells $ 20,000 @ ₹49.4000	₹9,88,000
Bank buys $ 20,000 @ ₹48.6325	₹9,72,650
Amount payable by customer	**₹15,350**

(b) Swap Loss

On 10th June the bank does a swap sale of $ at market buying rate of ₹48.8000 and forward purchase for June at market selling rate of ₹48.9500.

Bank buys at	₹48.9500
Bank sells at	₹48.8000
Amount payable by customer	₹0.1500

Swap Loss for $ 20,000 is = ₹3,000

(c) Interest on Outlay of Funds

On 10th June, the bank receives delivery under cover contract at ₹49.2800 and sell spot at ₹48.8000.

Bank buys at	₹49.2800
Bank sells at	₹48.8000
Amount payable by customer	₹0.4800

Outlay for $ 20,000 is ₹9,600

Interest on ₹9,600 @ 12% for 10 days ₹31.56 or ₹32.00

(d) Cancellation Charges

Particulars	Amount (₹)
Exchange Difference	15,350
Swap Loss	3,000
Interest on Outlay of Funds	32.00
Cancellation Charges payable by Customer	**18,382**

OR

Particulars	Amount (₹)
Exchange Difference	15,350
Swap Loss	3,000

Interest on Outlay of Funds	31.56
Cancellation Charges payable by Customer	**18,381.56**

ii. Execution of Contract

Cancellation charges of ₹18,382 or ₹18,381.56 as computed above will be recovered. The contract will be executed at the spot TT selling rate calculated as follows:

Dollar/₹ interbank spot selling rate	₹48.7200
Add: exchange margin at 0.10%	+ 0.0487
	₹48.7687

iii. Extension of Contract

Cancellation charges of ₹18,382 or ₹18,381.56 as computed above will be recovered.

The contract will be extended at the current rate.

Dollar/₹ market forward selling rate for August	₹49.2500
Add: Exchange margin at 0.10%	+ 0.0492
	₹49.2992

The exchange rate applied for the extended contract is ₹49.3000 or ₹49.2992.

Question 6

Discuss the role of SWIFT in Foreign Exchange

Answer:

Foreign Exchange Dealers/Traders use a network of communication to carry out their business transactions called SWIFT (Society for Worldwide Interbank Financial Telecommunication) which is purely a messaging system.

It was founded in 1973 and headquartered at La Hulpe, Belgium, near Brussels. It is a non-profit organization. It has offices around the world. It employs a dedicated computer network system for communicating fund transfers.

Since each country has their own symbol to communicate their currency, to avoid miscommunication SWIFT has assigned codes to currencies of each country. These codes are 3 lettered codes and are used internationally in cross border communications.

Some of the common codes used in communication are as follows:

Country/Region	Currency	Code
USA	US Dollar	USD
UK	Pound	GBP
China	Chinese Renminbi/Yuan	CNY
Canada	Canadian Dollar	CAD
Australia	Australian Dollar	AUD

Country/Region	Currency	Code
Hong Kong	Hong Kong Dollar	HKD
India	Indian Rupee	INR
Japan	Japanese Yen	JPY
New Zealand	New Zealand Dollar	NZD
Singapore	Singapore Dollar	SGD
Sweden	Swedish Krona	SEK
Switzerland	Swiss Franc	CHF
Europe	Euro	EUR

SWIFT uses common language for financial transactions and uses a centralized data processing system. It is important to note that SWIFT is only a standardized communication system and not a transaction settlement system. The SWIFT connects various financial institutions in more than 200 countries.

The SWIFT plays an important role in Foreign Exchange dealings because of the following reasons:

1. In addition to validation statements and documentation it is a form of quick settlement as messaging takes place within seconds.
2. Because of security and reliability helps to reduce Operational Risk.
3. Since it enables its customers to standardise transaction it brings operational efficiencies and reduced costs.
4. It also ensures full backup and recovery system.
5. Acts as a catalyst that brings financial agencies to work together in a collaborative manner for mutual interest.

Question 7

Write short notes on Payment Gateways

Answer:

A payment gateway is a virtual system that facilitates the secure transfer of payment information during online transactions, functioning as an equivalent to the physical transfer of cash. It acts as an intermediary between customers and banks or e-commerce sites, ensuring that payment details are authenticated and processed in a secure environment.

Key Functions:

- **Secure Channel:** The payment gateway operates as an "encrypted" channel that securely transmits transaction details from the buyer's device (such as a PC, mobile phone, or tablet) to banks for authorization and approval.
- **Data Encryption:** All transaction data is encrypted from the entry point (customer's device) to the point of sale (POS), ensuring that sensitive payment information is protected throughout the process.
- **Authorization and Approval:** After the transaction details are securely transmitted, the payment

gateway communicates with the bank to authorize and approve the payment. This includes verification through a reference number, ensuring that the transaction is legitimate.

- **Transaction Completion:** Once the bank approves the transaction, the payment gateway completes the order and notifies both the buyer and the seller, allowing the transaction to proceed smoothly.

Applications:

Payment gateways are essential for e-commerce transactions, enabling businesses to accept payments online through debit and credit cards, as well as other electronic payment methods, with high security and efficiency.

Question 8

What are the benefits of Payment Gateways?

Answer:

A Payment Gateway provides multiple benefits such as:

1. 24×7×365 convenience.
2. Real time authorisation of credit/debit cards.
3. Rapid, efficient transaction processing.
4. Multiple payment options.
5. Minimising risk by encrypting transactions and verifying other information.
6. Flexible, powerful real-time reports generation.
7. Facility for customer refund.
8. Merchants can get rid of operating complex software and maintaining huge data.
9. CA (Certifying Authority) authenticated secure servers.
10. Collection of bulk data in a cost-efficient manner, with the additional benefit of being checked for card validity.
11. Provision for multiple host interfaces.
12. Comprehensive, simple administrative control.
13. Gaining customers' support and merchants' trust.

Question 9

Explain the Challenges that are hampering the growth of Payment Gateways

Answer:

Despite so many benefits there are some challenges that are hampering the growth of payment gateways such as:

a) Payments may not happen at all simply because the customer may not have an account with the banks supporting the payment gateway.

b) Some payment gateways have only limited number of banks.

c) There are problems of reliability, delivery, and limited payment avenues and general lack of trust among customers, and doubts about the service provider.

Question 10

What do you mean by American Term and European Term

Answer:

American Term Quotes:

- **Definition:** In American terms, the exchange rate is quoted as the amount of U.S. dollars per unit of foreign currency.
- **Example:** If the exchange rate is quoted as USD 0.2 per Indian Rupee (INR), it means that 0.2 U.S. dollars are needed to purchase one unit of Indian Rupee. This is an American term quote.

European Term Quotes:

- **Definition:** In European terms, the exchange rate is quoted as the amount of foreign currency per U.S. dollar.
- **Example:** If the exchange rate is quoted as INR 44.92 per USD, it means that 44.92 Indian Rupees are needed to purchase one U.S. dollar. This is a European term quote.

Common Practice:

- Most foreign currencies are quoted in European terms, meaning they are expressed as the number of units of foreign currency needed to buy one U.S. dollar. This method is widely used in global financial markets.

Question 11

What are the key reasons for the importance of foreign exchange risk management, and how does it benefit businesses?

Answer:

The importance of foreign exchange risk management cannot be overstated, and here are some reasons why:

1. **Protection against volatility:** Exchange rates are highly volatile and can change rapidly, which can result in significant losses for a business. Foreign exchange risk management helps to protect against this volatility by allowing businesses to lock in exchange rates in advance, providing greater stability and certainty in financial planning.
2. **Cost reduction:** Effective foreign exchange risk management can help businesses reduce costs associated with foreign transactions. By minimizing currency exchange rate losses and reducing the need for hedging, businesses can save significant amounts of money in the long run.

3. **Competitive advantage:** Companies that effectively manage their foreign exchange risks can gain a competitive advantage over their competitors. They can offer more competitive prices and more attractive payment terms, which can help to attract and retain customers.
4. **Improved cash flow:** Foreign exchange risk management can also help businesses to improve their cash flow by providing greater visibility and predictability in their international transactions. This can help businesses to better manage their cash flow and ensure that they have sufficient funds to meet their obligations.
5. **Compliance with regulations:** Many countries have regulations in place that require businesses to manage their foreign exchange risks. Failure to comply with these regulations can result in significant fines and penalties. Effective foreign exchange risk management can help businesses to stay in compliance with these regulations and avoid potential legal issues.

Question 12

How do exporters use natural hedging strategies to mitigate transaction exposure risk, and what are the benefits of using short-term foreign currency loans like PCFC and FCNR B Loans?

Answer:

Exporters often use natural hedging strategies to mitigate transaction exposure risk associated with foreign currency transactions. One common approach is to avail short-term foreign currency loans such as Pre-Shipment Credit in Foreign Currency (PCFC) and Foreign Currency Non-Resident Account (FCNR B) Loans. This strategy offers two major benefits:

1. **Lower Interest Rates:**
    - **PCFC:** Exporters can access PCFC loans to finance the export of goods in foreign currencies. These loans are typically available at lower interest rates compared to domestic currency loans, making them a cost-effective option for exporters.
2. **Hedging Against Transaction Risk:**
    - By using PCFC, exporters can effectively hedge foreign currency transaction risk. This is achieved by using the foreign currency from export collections to settle outstanding PCFC loans, thereby aligning the currency of their receivables with their loan repayments.

Conclusion: Natural hedging through instruments like PCFC and FCNR B Loans enables exporters to manage transaction exposure risk by reducing borrowing costs and matching their currency cash flows, enhancing financial stability and predictability.

Question 13

Write a short note on Money Market Hedging. State its Advantages and Disadvantages

Nov 22 (4 Marks)

Answer:

At its simplest, a money market hedge is an agreement to exchange a certain amount of one currency for a fixed amount of another currency, at a particular date. For example, suppose a business owner in India expects to receive 1 Million USD in six months. This Owner could create an agreement now (today) to exchange 1Million USD for INR at roughly the current exchange rate. Thus, if the USD dropped in value by the time the business owner got the payment, he would still be able to exchange the payment for the original quantity of U.S. dollars specified.

Advantages of Money Market Hedging

i. Fixes the future rate, thus eliminating downside risk exposure.
ii. Flexibility with regard to the amount to be covered.
iii. Money market hedges may be feasible as a way of hedging for currencies where forward contracts are not available.

Disadvantages of Money Market Hedging

i. More complicated to organize than a forward contract.
ii. Fixes the future rate - no opportunity to benefit from favorable movements in exchange rates.

CHAPTER 12
INTERNATIONAL FINANCIAL MANAGEMENT

Question 1

Skylark Systems Ltd. is interested to expand its operations in US for which it requires funds of $20 million, net of issue expenses and floatation costs etc., which amounts to 3% of the issue size. To finance this project it proposes to issue GDR.

Following factors are considered in pricing the issue:

i. Expected market price of share at the time of issue of GDR is ₹300 (FV ₹10)
ii. 3 shares shall underlay each GDR and shall be priced at 10% discount to market price.
iii. Expected exchange rate is ₹75/$
iv. 20% Dividend is expected to be paid for next year with growth rate of 15%

You are required to compute the number of GDRs to be issued and cost of GDR to Skylark Systems Ltd.

If the company is able to raise the funds in US at the rate of 4% p.a. and the company is able to repay the loan along with interest from revenues generated from the operations of US, what is your advise to the company?

May 24 (4 Marks), May 2022 (8 Marks)

Answer:

a. Working Notes:

Net Issue Size = $20 million

$$\text{Gross Issue}\frac{20.00}{0.97} = \$\ 20.619\ \text{million}$$

Issue Price per GDR in ₹ (300 × 3 × 90%)	₹810
Issue Price per GDR in $ (₹810/ ₹75)	$10.80
Dividend Per GDR (D1) = ₹2 × 3 =	₹6.00
Net Proceeds Per GDR = ₹810 × 0.97 =	₹785.70

Number of GDR to be issued

$$\frac{\$20.619\ \text{million}}{\$10.80} = 1.9092\ \text{million}$$

Cost of GDR

$$k_e\frac{6.00}{785.70} + 0.15 = 15.76\%$$

If the company receives an offer from US Bank willing to provide an equivalent amount of loan with interest rate of 4%, it should accept the offer.

Question 2

MNO Ltd., a company based in India, manufactures very high quality modern furniture and sells them to a small number of retail outlets in India and Nepal. It is facing tough competition. Recent studies on marketability of product have clearly indicated that the customers are 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 wood in bulk from Nepalese supplier.

The estimate of net India (₹) and Nepalese Currency (NC) cash flow in nominal terms for this proposal is shown below:

	Net cash flow (in Millions)	
Years	NC	India (₹)
0	—38	0
1	1.8	1.9
2	3.2	3.5
3	4.1	4.4
4	5.4	5.8
5	6.5	6.9

The following information is relevant:

(1) MNO Ltd. evaluates all investment by using a discount rate of 11% 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.

(2) Inflation rate in Nepal and India are expected to be 11% and 10% p.a. respectively

(3) The current exchange rate is ₹1 = NC 1.65

You are required to calculate Net Present value of the proposal.

Nov 22 (8 Marks)

Answer:

Working Notes:

(i) Computation of Forward Rates

End of Year	NC	NC/₹
1	$\text{NC } 1.65 \times \left(\frac{(1+0.11)}{(1+0.10)}\right)$	1.665
2	$\text{NC } 1.665 \times \left(\frac{(1+0.11)}{(1+0.10)}\right)$	1.680
3	$\text{NC } 1.680 \times \left(\frac{(1+0.11)}{(1+0.10)}\right)$	1.695
4	$\text{NC } 1.695 \times \left(\frac{(1+0.11)}{(1+0.10)}\right)$	1.710

5	NC 1.710 $\times \left(\frac{(1+0.11)}{(1+0.10)}\right)$	1.726

(ii) NC Cash Flows converted in Indian Rupees

Year	NC (Million)	Conversion Rate	₹ (Million)
0	-38.00	1.650	-23.03
1	1.80	1.665	1.081
2	3.20	1.680	1.905
3	4.10	1.695	2.419
4	5.40	1.710	3.158
5	6.50	1.726	3.766

Net Present Value

Year	Cash Flow in India	Cash Flow in Nepal	Total Cash Flow	PVF @ 11%	PV
0	---	-23.030	-23.030	1.000	-23.030
1	1.900	1.081	2.981	0.901	2.686
2	3.500	1.905	5.405	0.812	4.389
3	4.400	2.419	6.819	0.731	4.985
4	5.800	3.158	8.958	0.659	5.903
5	6.900	3.766	10.666	0.593	6.325
					1.258

Question 3

Mr. Vishwas, a friend of Mr. Pramod who is one of the Directors of Ashirwad Limited, is a citizen of Mauritius. His immediate family members, including his parents born in India, reside in India. He has many friends in different parts of India, leading to frequent visits. Along with Mr. Pramod, he is interested in setting up a business in India and has formally incorporated a company called "Aerious Private Ltd.in" Mumbai.

To start with, he received a business proposal from one of his friends, Nimish, a consultant. It is estimated that the business shall require an initial investment of MUR 100 million and thereafter MUR 2 million each year will be needed as working capital fund. Mr. Vishwas wishes to evaluate whether the business proposal is viable or not.

The information related to exchange rate and inflation rate is as follows:

Parameter	Value
Spot Rate for 1 Mauritian Dollar (MUR)	1.88 Indian Rupee (INR)
Inflation in India	6%
Inflation in Mauritius	5%
Inflation rate expectation	Unchanged for the next 4 years

Additionally:

- INR 8 crore out of the initial investment shall be required for setting up a plant.
- The useful life of the plant is 4 years.
- At the end of the 4th year, the estimated salvage value of the plant shall be INR 80 lakhs.
- Depreciation of the plant shall be charged on the basis of the straight-line method.
- 40% of the investment shall be through debt funds from Mauritius at a post-tax cost of 10%, while the remaining funds shall be arranged by Mr. Vishwas and his friends who expect a 12% return on their funds.

Expected revenues and costs (excluding depreciation) in real terms are as follows:

Year	Revenues (INR Crore)	Costs (INR Crore)
1	6.00	3.00
2	7.00	4.00
3	8.00	4.00
4	8.00	4.00

Assume that the applicable tax rate in India is 30%. Since there is a Double Tax Avoidance Agreement (DTAA) between India and Mauritius, the company is not required to pay tax in Mauritius if tax has been paid in India.

The applicable inflation rates for revenues and costs are as follows:

Year	Revenues Inflation	Costs Inflation
1	10%	12%
2	9%	10%
3	8%	9%
4	7%	8%

Mr. Vishwas seeks an expert opinion on whether the investment in this project is a viable option or not.

Note:

1. Round off calculations up to 4 decimal points.
2. Show INR calculations in Crore and MUR calculations in Million.

RTP May 24

Answer:

To evaluate whether investment in same project is a viable option or not, we shall compute the NPV of the project.

Working Note:

1. **Expected Exchange Rates**

End of Year	Calculation for Exchange Rate (INR/MUR)	Exchange Rate (INR/MUR)
1	INR 1.88 x (1 + 0.06) / (1 + 0.05)	1.8979
2	INR 1.8979 x (1 + 0.06) / (1 + 0.05)	1.9160
3	INR 1.9160 x (1 + 0.06) / (1 + 0.05)	1.9342
4	INR 1.9342 x (1 + 0.06) / (1 + 0.05)	1.9526

2. Initial Investment = MUR 100 Million × INR 1.88 = INR 18.80 crore
   Working Capital (Year 1) = MUR 2 Million × 1.8979 = INR 0.3796 crore
   Working Capital (Year 2) = MUR 2 Million × 1.9160 = INR 0.3832 crore
   Working Capital (Year 3) = MUR 2 Million × 1.9342 = INR 0.3868 crore
   Working Capital (Year 4) = MUR 2 Million × 1.9526 = INR 0.3905 crore
3. WACC = 40% x 10% + 60% x 12% = 11.20%
4. **Inflation adjusted Revenue**

Year	Revenue (₹)	Revenue (Inflation Adjusted) (₹)
1	6.00 crore	6.60 crore
2	7.00 crore	8.393 crore
3	8.00 crore	10.3594 crore
4	8.00 crore	11.0845 crore

5. **Inflation adjusted Cost**

Year	Cost (₹)	Cost (Inflation Adjusted) (₹)
1	3.00 crore	3.3600 crore
2	4.00 crore	4.9280 crore
3	4.00 crore	5.3715 crore
4	4.00 crore	5.8012 crore

6. **Annual cash flows** **(₹ Crore)**

	Year 1	Year 2	Year 3	Year 4
Revenue (₹ crore)	6.6	8.393	10.3594	11.0845
Less: Cost (₹ crore)	3.36	4.928	5.3715	5.8012
Less: Depreciation (₹ crore)	1.8	1.8	1.8	1.8
Profit before Tax (PBT) (₹ crore)	1.44	1.665	3.1879	3.4833

Tax @ 30% (₹ crore)	0.432	0.4995	0.9564	1.045
Profit after Tax (₹ crore)	1.008	1.1655	2.2315	2.4383
Add: Depreciation (₹ crore)	1.8	1.8	1.8	1.8
Cash Flows (₹ crore)	2.808	2.9655	4.0315	4.2383

NPV of the Project

	Year 0	Year 1	Year 2	Year 3	Year 4
Initial Investment (₹ Crore)	(18.8)				
Working Capital (₹ Crore)		(0.3796)	(0.3832)	(0.3868)	(0.3905)
Scrap Value (₹ Crore)	0.8				
W.C Recovered (₹ Crore)	1.5401				
Annual Cash Flows (₹ Crore)		2.808	2.9655	4.0315	4.2383
Net Cash Flow (₹ Crore)	(18.8)	2.4284	2.5823	3.6447	6.1879
Exchange Rate	1.88	1.8979	1.916	1.9342	1.9526
Cash Flows (in Million MUR)	(100)	12.7952	13.4776	18.8434	31.6906
PVF@11.20%	1	0.8993	0.8087	0.7273	0.654
Present value (in Million MUR)	(100)	11.5067	10.8993	13.7048	20.7257

Net Present Value = - MUR 43.1635 Million

Advise: Since NPV of the project is negative the proposal is not a viable option for investment.

Question 4

What are the Disadvantages of Foreign Currency Convertible Bonds (FCCBs)?

Answer:

1. **Exchange Rate Risk:** FCCBs expose the issuing company to exchange rate fluctuations. If the local currency depreciates significantly against the foreign currency in which the FCCBs are denominated, the cost of servicing the bonds can increase substantially.
2. **Dilution of Equity:** If FCCBs are converted into equity shares, it can lead to dilution of existing shareholders' equity. This can affect earnings per share (EPS) and potentially impact shareholder value.
3. **Interest Rate Risk:** FCCBs are subject to changes in interest rates. Rising interest rates in the foreign market can make the fixed return on FCCBs less attractive, affecting the demand and marketability of the bonds.
4. **Complexity and Cost:** Issuing FCCBs involves complex structuring, legal compliance, and higher issuance costs compared to traditional debt instruments. This includes costs related to legal, accounting, and underwriting services.

5. **Regulatory Challenges:** FCCBs are subject to various regulatory approvals and compliance requirements in both the issuing country and the international market, which can delay the issuance process and increase administrative burdens.
6. **Market Volatility:** The conversion price of FCCBs is influenced by the issuer's stock price. If the stock price falls below the conversion price, bondholders may not convert their bonds into equity, leading to redemption pressure on the issuer.

Question 5

What do you mean by International Financial Centre (Gift City)? What are the benefits of IFC?

May 24 (4 Marks)

Answer:

International Financial Centre (IFC) is the financial center that caters to the needs of the customers outside their own jurisdiction. Broadly, speaking IFC is a hub that deals with flow of funds, financial products and financial services even though in own land but with different set of regulations and laws. Thus, these centers provide flexibility in currency trading, insurance, banking and other financial services. This flexible regime attracts foreign investors which is of potential benefit not only to the stakeholders but as well as for the country hosting IFC itself.

Benefits of Setting up an International Financial Centre (IFC)

There are numerous direct and indirect benefits of establishing an International Financial Centre (IFC). Some of the major benefits are as follows:

1. **Opportunity for Qualified Professionals:** Establishing an IFC creates opportunities for qualified professionals working outside India to come back and practice their professions locally.
2. **Global Platform for Talent:** It provides a platform for talented professionals to pursue global opportunities without having to leave their homeland.
3. **Prevention of Brain Drain:** An IFC helps in stopping the brain drain by retaining skilled professionals within the country.
4. **Repatriation of Financial Services:** It facilitates bringing back financial services transactions currently carried out abroad by overseas financial institutions or branches/subsidiaries of Indian financial markets.
5. **Trading of Complex Financial Derivatives:** An IFC enables the trading of complex financial derivatives from India, enhancing the country's financial market capabilities.

Question 6

What are the key constituents of an International Financial Center (IFC)

Answer:

Although there are many constituents for IFC but some of the important constituents are as follows:

1. **Highly developed Infrastructure:** - A leading edge infrastructure is a prerequisite for creating a platform to offer internationally competitive financial services.
2. **Stable Political Environment:** - Destabilized political environment brings country risk for investment by foreign nationals. Hence, to accelerate foreign participation in growth of financial center, stable political environment is a prerequisite.
3. **Strategic Location: -** The geographical location of the finance center should be strategic such as near to airport, seaport and should have friendly weather.
4. **Quality Life: -** The quality of life at the center should be good as center retains highly paid professionals from own country as well from outside.
5. **Rationale Regulatory Framework: -** Rationale legal regulatory framework is another prerequisite of international finance center as it should be fair and transparent.
6. **Sustainable Economy: -** The economy should be sustainable and should possess capacity to absorb all the shocks as it will boost investors' confidence.

Question 7

Write short notes on GIFT City

Answer:

GIFT City - India's International Financial Services Centre

To compete with financial services centers in Dubai, Hong Kong, and other global hubs, India initiated the establishment of an International Financial Center (IFC) in 2007. The primary aim was to retain financial services businesses within India that were moving abroad.

Objective: GIFT City, located at GIFT Multi Services SEZ, was operationalized in April 2015 to provide a business-friendly environment with relaxed tax and regulatory laws, making it an attractive jurisdiction for foreign investors hesitant to register in India.

Key Developments:

- **International Exchange:** India's first International Exchange, India INX, a subsidiary of the Bombay Stock Exchange (BSE), was inaugurated by the Prime Minister on January 9, 2017. It facilitates trading in index, currency, commodity, and equity derivatives.
- **National Stock Exchange (NSE):** On June 5, 2017, NSE launched its trading operations at GIFT, offering derivative products in equity, currency, interest rate futures, and commodities.

Advantages:

- **Competitive Cost and Tax Regime:** GIFT IFSC offers low operational costs and a competitive tax regime, providing incentives for financial institutions.
- **Ease of Business:** The center provides single-window clearance, relaxed company law provisions, and access to an international arbitration center, enhancing the ease of doing business.

- **Unified Regulatory Framework:** GIFT IFSC is moving towards a unified regulatory mechanism, simplifying compliance and operations for businesses.

Internationalization:

- **No Exchange Controls:** The Foreign Exchange Management Act (FEMA) does not apply in GIFT City, enabling financial institutions to conduct business without exchange controls.
- **Special Economic Zone Benefits:** Institutions benefit from reduced taxes applicable to special economic zones and can offer foreign currency loans to Indian companies and foreign firms.

GIFT City positions itself as a new Financial & Technology Gateway of India for the World, attracting financial institutions to set up business units by providing a favorable regulatory and operational environment.

Question 8

Write short notes on Sovereign Wealth Funds (SWFs)

Answer:

A Sovereign Wealth Fund (SWF) is a state-owned investment fund comprised of money generated by the government, typically from surplus reserves. SWFs aim to benefit a country's economy and its citizens, with legal bases varying by government.

Sources of Funding:

1. Surplus reserves from state-owned natural resource revenues and trade surpluses,
2. Bank reserves that may accumulate from budgeting excesses,
3. Foreign currency operations,
4. Money from privatizations, and
5. Governmental transfer payments.

Objectives of a sovereign wealth fund

1. Protection & Stabilization of the budget and economy from excess volatility in revenues/exports
2. Diversify from non-renewable commodity exports
3. Earn better returns than returns on foreign exchange reserves
4. Assist monetary authorities dissipate unwanted liquidity
5. Increase savings for future generations
6. Fund social and economic development
7. Ensuring Sustainable long term capital growth for target countries
8. Political strategy

Risk Management and Investment Strategy: SWFs vary in objectives, risk tolerance, and liquidity preferences, with strategies ranging from conservative to aggressive, depending on goals and asset classes.

Types of SWFs:

1. Stabilization funds
2. Savings or future generation funds
3. Public benefit pension reserve funds
4. Reserve investment funds
5. Strategic Development Sovereign Wealth Funds (SDSWF)

Types of Sovereign Investment Vehicles:

- Sovereign Wealth Funds (SWFs)
- Public Pension Funds
- State-Owned Enterprises
- Sovereign Wealth Enterprises (SWEs)

SWFs play a crucial role in the financial strategy of a nation, helping to manage resources effectively and achieve various economic, social, and strategic objectives.

CHAPTER 13
BUSINESS VALUATION

Question 1

The valuation of Hansel Limited has been done by an investment analyst. Based on an expected free cash flow of ₹54 lakhs for the following year and an expected growth rate of 9 percent, the analyst has estimated the value of Hansel Limited to be ₹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?

StudyMat

Answer:

Cost of capital by applying Free Cash Flow to Firm (FCFF) Model is as follows:-

$$\textbf{Value of Firm } = V_0 = \frac{FCFF_1}{K_c - g_n}$$

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.**

Question 2

Mantra Ltd. is planning to buy Alay Ltd. Following information is given in respect of Alay Ltd. which is expected to grow at a rate of 18% p.a. for the next three years, after which the growth rate will stabilize at 8% p.a. normal level, in perpetuity:

Particulars	For the year ended March 31, 2022
Revenues	₹6,800 Crores
Cost Of Goods Sold (COGS)	₹2,800 Crores

Operating Expenses	₹2,100 Crores
Capital Expenditure	₹750 Crores
Depreciation (included in Operating Exp.)	₹600 Crores

During high growth period, Revenues & Earnings Before Interest & Tax (EBIT) will grow at 18% p.a. and capital expenditure net of depreciation will grow at 12% p.a. From 4th year 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.

Corporate Income Tax rate is 30%.

The Weighted Average Cost of Capital (WACC) for both the companies is 15%

You are required to estimate the value of Alay Ltd. using Free Cash Flows to Firm (FCFF) & WACC methodology.

The PVIF for the three years are as below:

Year	t1	t2	t3
PVIF @ 15%	0.870	0.756	0.756

Nov 22 (8 Marks), May 14 (8 Marks), RTP Nov 20, MTP Mar 24 (8 Marks), StudyMat

Answer:

Determination of forecasted Free Cash Flow of the Firm (FCFF) **(₹in crores)**

	Yr. 1	Yr. 2	Yr. 3	Terminal Year
Revenue	8,024.00	9,468.32	11,172.62	12,066.43
COGS	3,304.00	3,898.72	4,600.49	4,968.53
Operating Expenses* (*Excluding Depreciation)	1,770.00	2,088.60	2,464.55	2,661.71
Depreciation	708.00	835.44	985.82	1,064.68
EBIT	2,242.00	2,645.56	3,121.76	3,371.51
Tax @30%	672.60	793.67	936.53	1,011.45
EAT	1,569.40	1,851.89	2,185.23	2,360.06
Capital Exp. – Dep.	168.00	188.16	210.74	-----
Δ Working Capital	306.00	306.00	426.07	223.45
Free Cash Flow (FCF)	1,095.40	1,302.65	1,548.42	1,548.42

Terminal value is:

$$\frac{2136.61}{0.15\ 0.08} = ₹30{,}523\ \text{Crore}$$

Present Value (PV) of FCFF:

FCFF (₹in crores)	PVF @ 15%	PV (₹in crores)
1,095.40	0.870	953.00
1,302.65	0.756	984.80
1,548.42	0.658	1,018.86
30,523	0.658	20,084.13
		23,040.79

The value of the firm is ₹23,040.79 Crores

Note: The may vary due to rounding off difference

Question 3

The following information is given for three companies that are identical in size, activities and operations, except for their capital structure:

Particulars	A	B	C
Total Capital Invested	10,00,000	10,00,000	10,00,000
Debt/ Assets Ratio	0.75	0.60	0.25
Shares Outstanding	8,960	13,300	30,100
Pre-tax cost of debt	12%	10%	14%
Operating Income (EBIT)	2,50,000	2,50,000	2,50,000
Beta Values	1.25	1.00	0.875

The tax rate is uniform 30% in all cases. Risk free interest rate is 6% and Market Risk premium is 16%.

You are required to compute:

i. Weighted average cost of capital for each company.
ii. Economic Value Added (EVA) for each company.
iii. Based on EVA which company would be considered for best investment? Give reasons.
iv. If the industry PE ratio is 12x, estimate the market price and Market Capitalization for each of the companies.

Nov 23 (8 Marks)

Answer:

iv. Weighted Average Cost of Capital

(1) Cost of Debt

	A	B	C
Pre-tax Cost of debt	12%	10%	14%
Post-tax Cost of debt	8.40%	7.00%	9.80%

(2) Cost of Equity

	R_f	Beta	k_e
A	6%	1.25	6% +1.25 x 16% = 26%
B	6%	1.00	6% +1.00 x 16% = 22%
C	6%	0.875	6% +0.875 x 16% = 20%

WACC

A: (8.40 × 0.75) + (26 × 0.25) = 12.80%

B: (7.00 × 0.60) + (22 × 0.40) = 13.00%

C: (9.80 × 0.25) + (20 × 0.75) = 17.45%

v. **EVA**

	A	B	C
WACC	12.80%	13.00%	17.45%
EVA [EBIT (1-T)-(WACC x Invested Capital)]	47,000	45,000	500

vi. **Based on EVA Company A would be best for investment.**

vii. **Market Price and Market Capitalization**

	A	B	C
EBIT	₹ 2,50,000	₹2,50,000	₹ 2,50,000
Less: Interest on Debt	90,000	60,000	35,000
EBT	₹ 1,60,000	₹ 1,90,000	₹ 2,15,000
Tax @ 30%	₹ 48,000	₹ 57,000	₹ 64,500
EAT	₹ 1,12,000	₹ 1,33,000	₹ 1,50,500
No. Shares O/S	8,960	13,300	30,100
EPS	₹ 12.50	₹ 10.00	₹ 5.00
PE Multiple	12	12	12
Market Price Per Share	₹ 150	₹120	₹60
Market Capitalization	₹ 13,44,000	₹ 15,96,000	₹ 18,06,000

Question 4

What is the difference between Going Concern and Non-Going Concern Valuation, and how does each approach affect the valuation of a business entity?

Answer:

Going Concern Valuation

Definition:

Going concern valuation assumes that a business will continue its operations for the foreseeable future. Under this assumption, the enterprise has neither the intention nor the need to liquidate or significantly curtail its operations.

Valuation Method:

- Assets are typically valued using historical costing, as the business is expected to operate and earn profits over time.
- The valuation considers the firm's future profitability, intangible assets, and goodwill, contributing to its total value.

Impact:

- The going concern value is generally higher than the liquidation value, as it includes the potential for future earnings and the firm's ongoing operations.
- The acquired firm can charge a premium due to its operational prospects and intangible assets.

Non-Going Concern Valuation

Definition:

Non-going concern valuation, also known as liquidation valuation, applies when a business is not expected to continue operations. It reflects the net value realized from selling all assets and settling all liabilities.

Valuation Method:

- Focuses on the immediate realizable value of assets in a liquidation scenario.
- Does not account for future profitability or intangible assets, leading to a lower valuation.

Impact:

- Typically lower than the going concern value due to the absence of future earnings potential and the negative implications of liquidation.
- The process may involve laying off employees and could damage the firm's reputation among potential investors.

Conclusion:

Non-going concern valuation should only be used when investors believe the firm no longer holds value as an ongoing entity. In contrast, going concern valuation is preferred when the business is expected to continue its operations and generate future profits.

Question 5

What are the challenges involved in valuing distressed companies, and why are conventional valuation methods like Discounted Cash Flow (DCF) not suitable for such firms?

Answer:

Valuing distressed companies poses unique challenges that make conventional valuation methods like Discounted Cash Flow (DCF) less effective. Here are the key reasons why DCF and other traditional methods are not well-suited for valuing distressed firms:

Challenges in Valuing Distressed Companies

1. **Nature of Distress:**
    - Distress in companies can arise from excessive debt, inability to meet operating expenses, or economic downturns affecting revenue. This distress can lead to difficulties in meeting financial obligations, ultimately affecting the company's operations.
2. **Financial and Operational Distress:**
    - Distressed companies often face high fixed costs, illiquid assets, and revenues sensitive to economic fluctuations, leading to a situation where they may default on their debts. However, these companies may still hold some value in their assets or operations.

Limitations of Conventional Valuation Methods

1. **Discounted Cash Flow (DCF) Limitations:**

- **Terminal Value Calculation:** DCF relies on the assumption of perpetual and ever-growing cash flows, which may not apply to distressed firms experiencing negative cash flows.
- **Negative and Declining Revenues:** Distressed firms often have declining revenues and expect to incur losses, making cash flow estimation challenging. DCF requires projecting positive cash flows, which may not be feasible for such firms.
- **High Risk of Bankruptcy:** For firms at risk of failure, DCF's assumption of the firm as a going concern is problematic. If projections do not show positive cash flows, DCF yields negative values, misrepresenting the firm's potential value.

2. **Discount Rates:**
   - Conventional methods use discount rates suited for financially stable companies. These rates need adjustment to account for the higher probability of failure in distressed companies, reflecting the additional risk.

Question 6

What are the steps of valuation of distressed firm?

Answer:

(i) Value the business as a going concern by looking at the expected cashflows it will have if it follows the path back to financial health.

(ii) Determine the probability of distress over the lifetime of the DCF analysis.

(iii) Estimate the distress sale value as a percentage of book value or as a percentage of DCF value of equity estimated as a going concern.

(iv) Accordingly following formula can be used to calculate the value of equity of a distressed firm. Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)

Question 7

Why do traditional valuation methods such as the income approach, asset approach, and market approach often fail when applied to new-age startups, and what are the specific challenges associated with each method?

Answer:

Income Approach: A vast majority of startups operate under the assumption of not generating positive cash flows in the foreseeable future. Off late, this business model has been accepted and normalized by the investor community as well. Since there are no or minimal positive cash flows, it isn't easy to value the business correctly.

Asset Approach: There are two reasons why this approach does not work for new-age startups:

(i) Startups have negligible assets because a large chunk of their assets are in the form of intellectual property and other intangible assets. Valuing them correctly is a challenge and arriving at a consensus with investors is even more difficult.

(ii) Startups are new, but usually operate under the going concern assumption; hence their value should not be limited to the realizable value of assets today.

Market Approach: New-age startups are disruptors. They generally function in a market without established competitors. Their competition is from other startups working in the same genre. The lack of established competitors indicates that their numbers may be skewed and not be comparable enough to form a base. However, out of the three traditional approaches, we have seen a few elements of the market approach being used for valuing new-age startups, especially during advanced funding rounds.

Question 8

What are the Key Drivers in Valuation of Start-ups?

Answer:

1. **Product:** The uniqueness and readiness of a startup's product or service significantly impact its valuation. Startups with fully functional products or prototypes, along with positive market testing and customer responses, are valued higher than those with mere ideas.
2. **Management:** The educational background and experience of the founders influence investor perceptions. Startups with founders from elite institutions like IIT or IIM, or those with a balanced management team comprising various skill sets, are viewed more favorably.
3. **Traction:** Evidence of demand for a product or service boosts a startup's valuation. The better the traction, the more valuable the startup is considered.
4. **Revenue:** Multiple revenue streams enhance a startup's value. Although not mandatory, existing revenues indicate viability better than mere traction.
5. **Industry Attractiveness:** The industry's appeal affects startup valuation. Factors like logistics, distribution channels, and the customer base determine scalability and value. For instance, startups in industries affected by lockdowns may be less valuable.
6. **Demand-Supply:** High investor demand for attractive industries increases the value of individual companies within those industries.
7. **Competitiveness:** Fewer competitors increase a startup's value, as first-mover advantage plays a crucial role. Startups need to differentiate themselves in competitive markets to maintain value

Question 9

What are the Methods of Valuing Startups?

Answer:

1. Berkus Approach

2. Cost-to-Duplicate Approach
3. Comparable Transactions Method
4. Scorecard Valuation Method
5. First Chicago Method
6. Venture Capital Method

Question 10

Write short notes on Berkus Approach of Valuing Startups?

Answer:

The Berkus Approach, developed by venture capitalist Dave Berkus, is a method used to value startups based on a qualitative assessment of five key success factors. Each factor is given a specific monetary value that reflects its contribution to the overall potential of the startup. This approach is particularly useful for early-stage startups that may not have significant revenues or profits yet.

Five Key Success Factors:

1. **Technology:** The startup's core technology or idea, and its readiness and potential for success in the market.
2. **Execution:** The ability of the startup team to execute the business plan and deliver results.
3. **Strategic Relationships:** Key partnerships and relationships that can help the startup gain market access and grow.
4. **Core Market:** The size and attractiveness of the market in which the startup operates.
5. **Production and Sales:** The ability to produce and sell the product effectively, indicating readiness for market entry.

Each of these factors is assessed, and a value is assigned based on the startup's current status and potential impact.

Example of Berkus Approach (in INR)

Let's say a startup is being evaluated using the Berkus Approach. Each success factor is assessed and assigned a value up to a certain limit (e.g., ₹40,00,000), depending on the startup's progress and potential.

1. **Technology:** The startup has developed a working prototype that shows promise. It is assigned a value of ₹32,00,000.
2. **Execution:** The founding team has a strong track record in the industry, giving confidence in their ability to execute the business plan. This is valued at ₹24,00,000.
3. **Strategic Relationships:** The startup has secured partnerships with key players in its industry, adding significant value. This factor is valued at ₹16,00,000.
4. **Core Market:** The market is large and growing, providing ample opportunity for the startup's product. This is valued at ₹20,00,000.

5. **Production and Sales:** The startup has a clear plan for production and distribution but has yet to enter the market. This factor is valued at ₹12,00,000.

Total Valuation:

The sum of these values gives the total valuation of the startup based on the Berkus Approach:

- Technology: ₹32,00,000
- Execution: ₹24,00,000
- Strategic Relationships: ₹16,00,000
- Core Market: ₹20,00,000
- Production and Sales: ₹12,00,000

Total Valuation: ₹1,04,00,000

In this example, the startup is valued at ₹1.04 crore using the Berkus Approach, reflecting the strengths and readiness in each of the five key success factors.

Conclusion

The Berkus Approach allows investors and entrepreneurs to assess the potential of a startup by evaluating non-financial metrics that are critical to its success. By assigning monetary values to these qualitative factors, the Berkus Approach provides a structured way to estimate the value of early-stage startups that may not yet have substantial financial data.

Question 11

Write short notes on Cost-to-Duplicate Approach of Valuing Startups?

Answer:

The Cost-to-Duplicate Approach values a startup by calculating the total cost required to replicate or duplicate the business and its assets. This method focuses on the historical costs incurred in building the startup, rather than future revenue potential or intangible assets like brand value or goodwill. It involves summing up all expenses related to product development, acquisition of physical assets, and any other costs that would be necessary to recreate the business from scratch.

Criticism:

- **Lack of Future Focus:** This approach does not account for the startup's future revenue potential, market growth, or competitive advantages.
- **Intangible Assets:** It ignores the value of intangible assets, such as intellectual property, brand recognition, or customer relationships, which can be significant for startups.

Example of Cost-to-Duplicate Approach

Let's consider a tech startup that has developed a software product. The valuation using the Cost-to-Duplicate Approach would involve calculating the following costs:

1. **Development Costs:** The total expenses incurred in developing the software, including salaries of developers, designers, and project managers.

2. **Infrastructure Costs:** Costs related to purchasing servers, computers, and other necessary hardware.
3. **Operational Costs:** Expenses related to rent, utilities, and other overheads during the development phase.
4. **Marketing and Launch Costs:** Initial expenses for marketing the product and launching it in the market.

Assume the following costs have been incurred:

- **Development Costs:** ₹50,00,000
- **Infrastructure Costs:** ₹10,00,000
- **Operational Costs:** ₹20,00,000
- **Marketing and Launch Costs:** ₹5,00,000

Total Cost to Duplicate:

To determine the startup's fair market value using this approach, we sum these costs:

- Development Costs: ₹50,00,000
- Infrastructure Costs: ₹10,00,000
- Operational Costs: ₹20,00,000
- Marketing and Launch Costs: ₹5,00,000

Total Valuation: ₹85,00,000

In this example, the startup is valued at ₹85 lakh based on the cost to duplicate its product and operations. This valuation reflects the actual costs incurred to build the startup but does not consider the potential future earnings or intangible value.

Conclusion

The Cost-to-Duplicate Approach is useful for understanding the baseline cost of creating a startup but has limitations due to its focus on past expenses rather than future potential. Investors often use it as a starting point or supplement it with other valuation methods to get a comprehensive picture of a startup's worth.

Question 12

Write short notes on Comparable Transactions Method of Valuing Startups?

Answer:

The Comparable Transactions Method is a valuation technique that estimates a startup's value based on the valuation metrics of similar companies involved in recent transactions. This approach relies on precedent and market data to determine what investors have previously paid for comparable companies, providing a market-based assessment.

Key Elements:

- **Precedent Transactions:** Identifying recent transactions involving similar companies.

- **Valuation Multiples:** Using metrics such as price per user, revenue multiples, or other relevant ratios to estimate the value.
- **Adjustments:** Factoring in differences such as proprietary technologies, intangible assets, market penetration, or location advantages to refine the valuation.

Example of Comparable Transactions Method

Let's consider an example involving two logistics startups:

1. **XYZ Ltd.:** Recently acquired for ₹560 crores with 24 crore active users. The valuation per user is:

$$\text{Valuation per User} = \frac{560 \text{ Crores}}{24 \text{ Crores}} = ₹23 \text{ Per user}$$

2. **ABC Ltd.:** Another logistics startup with 1.75 crore users. Using the same valuation per user as XYZ Ltd., ABC Ltd. would be valued at:

Valuation of ABC Ltd = 1.75 Crores × ₹23 = ₹40.25 crores

Thus, ABC Ltd. is estimated to be worth about ₹40 crores under this method.

Considerations for Adjustment:

- **Proprietary Technologies:** If ABC Ltd. has unique technology not possessed by XYZ Ltd., a higher multiplier might be justified.
- **Market Penetration:** If ABC Ltd. has deeper market penetration or higher growth prospects, this might increase its valuation.
- **Intangibles and Location:** Factors such as brand value or strategic location could also affect the multiplier used.

Conclusion

The Comparable Transactions Method offers a practical way to value startups by examining similar transactions in the industry. However, adjustments are essential to account for differences between companies, ensuring that the valuation reflects unique factors that can impact the startup's future success. This method provides a benchmark that is grounded in actual market activity, making it appealing to investors looking for evidence-based valuations.

Question 13

Write short notes on Scorecard Valuation Method of Valuing Startups?

Answer:

The Scorecard Valuation Method is used to evaluate pre-revenue startups by comparing them against other funded startups using specific criteria. This method provides a structured approach to estimate a startup's value based on qualitative factors.

Steps in the Scorecard Method:

1. **Find the Average Pre-Money Valuation:** Determine the average pre-money valuation of comparable companies in the same industry.

2. **Evaluate the Startup Based on Key Qualities:** Assess the startup's performance across several criteria, assigning a percentage to each based on how it compares to industry peers. The criteria typically include:
    - **Strength of the Team:** 0-30%
    - **Size of the Opportunity:** 0-25%
    - **Product or Service:** 0-15%
    - **Competitive Environment:** 0-10%
    - **Marketing, Sales Channels, and Partnerships:** 0-10%
    - **Need for Additional Investment:** 0-5%
    - **Others:** 0-5%
3. **Assign Comparison Percentages:** For each criterion, assign a percentage based on whether the startup is on par (100%), below average (<100%), or above average (>100%) compared to competitors.
4. **Calculate the Weighted Score:** Multiply each criterion's weight by its comparison percentage to get a weighted score.
5. **Calculate Pre-Revenue Valuation:** Sum the weighted scores and multiply by the average pre-money valuation to estimate the startup's pre-revenue valuation.

Example of Scorecard Valuation Method

Assume we are valuing a pre-revenue tech startup. The average pre-money valuation for similar startups in the industry is ₹50 crores.

Evaluation:

1. **Strength of the Team:** The startup has a strong founding team with industry veterans. Assigned a score of 120%.
   Calculation: 30% × 120% = 0.36
2. **Size of the Opportunity:** The market opportunity is large and expanding. Assigned a score of 110%.
   Calculation: 25% × 110% = 0.275
3. **Product or Service:** The product is innovative but still in development. Assigned a score of 90%.
   Calculation: 15% × 90% = 0.135
4. **Competitive Environment:** The startup has few direct competitors. Assigned a score of 130%.
   Calculation: 10% × 130% = 0.13
5. **Marketing, Sales Channels, and Partnerships:** The startup has developed strong initial partnerships. Assigned a score of 150%.
   Calculation: 10% × 150% = 0.15
6. **Need for Additional Investment:** The startup requires additional investment for scaling. Assigned a score of 80%.

Calculation: 5% × 80% = 0.04

7. **Others:** Other factors (e.g., intellectual property) contribute positively. Assigned a score of 100%.
   Calculation: 5% × 100% = 0.05

Total Weighted Score:

Total Weighted Score = 0.36 + 0.275 + 0.135 + 0.13 + 0.15 + 0.04 + 0.05 = 1.14

Pre-Revenue Valuation:

Pre-Revenue Valuation=1.14 × ₹50 crores=₹57 crores

In this example, the startup is valued at ₹57 crores using the Scorecard Valuation Method, reflecting how it compares to peers across various qualitative factors.

Conclusion

The Scorecard Valuation Method provides a comprehensive way to evaluate pre-revenue startups by considering key factors that impact their potential success. This approach helps quantify qualitative aspects, making it easier for investors to assess and compare startups in a structured manner.

Question 14

Write short notes on First Chicago Method of Valuing Startups?

Answer:

The First Chicago Method is a valuation approach that combines both the Discounted Cash Flow (DCF) method and market-based evaluation to estimate a startup's value. This method accounts for various potential outcomes by considering different scenarios and assigning probabilities to each.

Key Components:

1. **Worst-Case Scenario:** Considers the most pessimistic outcome for the startup, where it underperforms or faces significant challenges.
2. **Normal-Case Scenario:** Represents the expected or average outcome based on current market conditions and business performance.
3. **Best-Case Scenario:** Envisions the most optimistic outcome, where the startup exceeds expectations and achieves strong growth.

Process:

1. **Valuation for Each Scenario:** Calculate the startup's valuation for each of the three scenarios using the DCF method or market multiples.
2. **Assign Probability Factors:** Assign a probability to each scenario based on its likelihood of occurring.
3. **Weighted Average Valuation:** Multiply each scenario's valuation by its probability factor and sum the results to arrive at the weighted average value.

Example of First Chicago Method

Let's consider a tech startup with the following scenarios:

1. **Worst-Case Scenario:**
    - Valuation: ₹10 crores
    - Probability: 20%
2. **Normal-Case Scenario:**
    - Valuation: ₹50 crores
    - Probability: 50%
3. **Best-Case Scenario:**
    - Valuation: ₹100 crores
    - Probability: 30%

Weighted Average Valuation Calculation:

1. **Worst-Case Contribution:** = ₹10 crores × 0.20 = ₹2 crores
2. **Normal-Case Contribution:** = ₹50 crores × 0.50 = ₹25 crores
3. **Best-Case Contribution:** = ₹100 crores × 0.30 = ₹30 crores

Total Weighted Average Valuation:

Weighted Average Valuation = ₹2 crores + ₹25 crores + ₹30 crores = ₹57 crores

Conclusion

The First Chicago Method provides a comprehensive way to evaluate a startup by considering multiple potential outcomes and their probabilities. It offers a balanced view by incorporating both optimistic and pessimistic scenarios, helping investors assess the risks and opportunities associated with the startup. This method is particularly useful for startups with uncertain futures, as it captures a range of possible outcomes.

Question 15

Write short notes on Venture Capital Method of Valuing Startups?

Answer:

The Venture Capital (VC) Method is a widely used approach for valuing early-stage startups. It is particularly favored by venture capital firms because it focuses on the potential return on investment (ROI) and the perceived risk of the venture.

Key Components:

1. **Target Return on Investment:** Venture capitalists seek a significant return on their initial investment, often aiming for multiples like 10x, 20x, or more, depending on the perceived risk and growth potential of the startup.
2. **Post-Money Valuation:** The value of the company after receiving the venture capital investment.
3. **Pre-Money Valuation:** The value of the company before the investment is made.
4. **Exit Valuation:** The expected value of the company at the time of exit (e.g., acquisition or IPO).

5. **Discount Rate:** The rate representing the investor's required rate of return, adjusted for the risk of the venture.

Process:

1. **Determine the Expected Exit Valuation:** Estimate the company's value at the time of exit based on market conditions, industry trends, and growth potential.
2. **Calculate the Target Multiple:** Determine the multiple of the initial investment that the investor seeks to achieve.
3. **Estimate the Required Investment:** Calculate the amount the investor needs to invest to achieve the target return.
4. **Calculate the Pre-Money and Post-Money Valuations:** Use the target multiple and exit valuation to determine the current value of the company.

Example of Venture Capital Method

Let's consider a startup in the tech industry:

1. **Expected Exit Valuation:** ₹500 crores (projected company value at exit)
2. **Target Multiple:** 10x (the investor seeks to make 10 times their initial investment)
3. **Time Frame:** 5 years (expected time until exit)
4. **Required Rate of Return:** 25% (discount rate reflecting perceived risk)

Steps:

1. **Calculate the Required Investment:**

   Required Investment = Exit ValuationTarget Multiple = ₹500 crores10 = ₹50 crores

2. **Calculate the Post-Money Valuation:**

$$\text{Post} - \text{Money Valuation} = \text{Exit Valuation} \times \frac{1}{(1 + \text{Discount Rate})^{\text{time frame}}}$$

$$\text{Post} - \text{Money Valuation} = 500 \text{ Crores} \times \frac{1}{(1 + 0.25)^5} = 163 \text{ Crores}$$

3. **Calculate the Pre-Money Valuation:**

   Pre-Money Valuation = Post Money Valuation − Required Investment

   = ₹163 crores − ₹50 crores

   = ₹113 crores

Conclusion

The Venture Capital Method focuses on achieving a target return by calculating the required investment and valuations based on exit projections. This method helps investors determine whether a startup aligns with their risk and return expectations. It highlights the importance of understanding a startup's future potential and the narrative surrounding its growth trajectory, making it a popular choice for valuing disruptive and innovative ventures.

Question 16

What are Digital Platforms, and how can they be categorized based on the services they provide? Additionally, explain the key considerations in the valuation of digital platforms.

Answer:

Digital Platforms Overview:

A digital platform is an online software-based infrastructure designed to facilitate interactions and transactions between users. These platforms are principally built to support many-to-many interactions, enabling a broad range of activities. The valuation of digital platforms follows similar principles to other types of companies, with certain nuances specific to the digital platform industry.

Categories of Digital Platforms:

Category	Description	Examples
Marketplace	Platforms that match multiple buyers with multiple suppliers.	**Booking.com, Uber, Amazon**
Search Engine	Platforms that match information seekers with multiple sources of information.	**Google, Bing, Baidu**
Repository	Platforms where multiple suppliers deposit materials for users to retrieve later.	**Spotify, YouTube, GitHub**
Digital Communication	Platforms allowing users to send messages, documents, or interact in real-time via voice and video.	**WhatsApp, Microsoft Teams, Telegram, Slack**
Digital Community	Platforms where people connect virtually over extended periods, often building personal or professional networks.	**Facebook, LinkedIn**
Payments Platform	Platforms that facilitate transactions between those owing money and those wanting to be paid.	**Paytm, GPay**

Valuation Considerations for Digital Platforms:

The valuation of digital platforms is similar to other companies but includes certain specific nuances related to the digital platform industry:

- **User Base and Engagement:** The number of active users and their level of engagement can significantly impact the platform's value, as these factors drive revenue potential and market share.
- **Network Effects:** The value of a platform often increases with the number of users, as more participants can lead to enhanced functionality and attractiveness, creating a competitive advantage.
- **Revenue Streams:** Digital platforms may have diverse revenue streams, such as subscription fees, advertising, and transaction commissions, which need to be evaluated in the valuation process.

- **Scalability and Growth Potential:** The ability of the platform to scale and grow, both in terms of user base and geographical reach, can affect its future profitability and overall valuation.
- **Technology and Innovation:** The quality of the platform's technology and its capacity for innovation can influence its valuation, as they determine the platform's ability to adapt to changing market conditions and maintain competitiveness.

Question 17

What are some examples of drivers of revenue for different types of digital platforms

Answer:

Category of Digital Platform	Drivers of Revenue
Marketplace	- Number of bookings made - Number of registered users - Volume of transactions
Payment Platform	- Number of active subscribers - Number of merchants registered on the platform - Compatibility and speed of the operating system - Security - Ease of use
Community Platform	- Number of users - Subscription fees - Providing a platform for professionals
Communication Platform	- Number of users - Sponsored links - Advertising revenue
Repository Platform	- Number of readers and contributors - Authenticity of data - Duration of use - Quality and variety of data
Search Engine	- Number of users - Relevant search results - Time taken per search

Question 18

Write short notes on VALUATION OF PROFESSIONAL/ CONSULTANCY FIRMS

Answer:

Definition: Professional services firms provide customized, knowledge-based services to clients, including fields such as accounting, law, and management consultancy. Each firm may vary significantly in services provided, leading to different valuation approaches.

Key Considerations in Valuation:

1. **Industry Trends:** Understanding present and projected industry trends is crucial in determining accurate valuations. Industry Key Performance Indicators (KPIs) and benchmarks play a significant role.
2. **Historical Data and Comparisons:** Experts often compare a firm's historical data against industry standards and competitors. Audited annual statements and income tax returns are primary sources of information.
3. **Projected Growth and Terminal Value:** While historical data is important, projected growth and terminal value also impact overall valuation. Conversations with management help in planning future growth, though inherent risks in projections must be factored into valuations.
4. **Normalization of Net Income and Cash Flows:** Normalizing financial statements allows for comparisons on equal footing. This process includes adding back non-cash items and adjusting specific items that might not apply to a new firm.
5. **Chosen Valuation Method:** Normalized cash flows are applied to the chosen valuation method to calculate overall value. Common methods include the income approach, which looks at both historical performance and future potential.
6. **Analysis of KPIs:** Different types of professional services firms have varying KPIs, so it's important to align with the acquirer firm's goals. Key indicators vary greatly, reflecting the diverse nature of professional services.

Conclusion: To accurately value a professional services firm, it is essential to consider multiple pieces of information, including historical data, projected growth, industry trends, and specific KPIs. Each element contributes importantly to determining an accurate valuation, helping ensure that the valuation reflects the firm's true potential and market position.

Understanding these aspects allows valuation experts to provide a comprehensive analysis, ultimately leading to more informed investment and acquisition decisions.

Question 19

What is the ESG framework, and what are its key components? How does ESG impact a company's strategy and value creation?

Answer:

ESG Framework Overview:

The Environmental, Social, and Governance (ESG) framework is a strategic approach embedded into an organization's operations to generate value for all stakeholders, including employees, customers, suppliers, and financiers. ESG considers various factors across three main categories that influence sustainable business practices and long-term value creation.

Key Components of ESG:

1. **Environmental Factors:** These involve considerations related to a company's impact on the natural environment. Key aspects include:
    - **Climate Change:** Assessing the company's strategies for reducing carbon footprint and mitigating climate risks.
    - **Natural Resource Management:** Evaluating the sustainable use of resources like water and biodiversity conservation.
    - **Waste and Emissions:** Monitoring waste generation and emissions reduction initiatives.
2. **Social Factors:** These relate to the company's relationships with stakeholders and the broader community. Important social considerations include:
    - **Employee Development:** Fostering workforce skills and opportunities for growth.
    - **Diversity and Inclusion:** Promoting diverse and inclusive workplaces.
    - **Community Development:** Engaging in initiatives that support community well-being.
    - **Health & Safety:** Ensuring the safety and well-being of employees and customers.
3. **Governance Factors:** These pertain to the company's leadership, decision-making processes, and ethical conduct. Key governance elements include:
    - **Board Independence and Diversity:** Ensuring diverse and independent board composition.
    - **Executive Compensation:** Aligning executive pay with company performance and ethical standards.
    - **Tax Transparency and Anti-Corruption:** Maintaining transparency in tax practices and preventing bribery and corruption.

Impact of ESG on Strategy and Value Creation:

ESG has become a significant focus for investors and companies alike, as it highlights potential risks and opportunities for sustainable value creation. By integrating ESG considerations into their strategies, companies can:

- **Identify Risks and Opportunities:** ESG analysis helps uncover risks related to environmental and social issues, as well as governance practices that could impact the company's performance.
- **Enhance Reputation and Trust:** Companies that prioritize ESG issues often enjoy greater trust and loyalty from stakeholders, including customers, employees, and investors.
- **Drive Long-Term Success:** Focusing on ESG can lead to more resilient business models that align with changing societal expectations and regulatory requirements, supporting long-term growth and profitability.

Overall, ESG is a comprehensive framework that encourages companies to consider the broader impact of their actions and prioritize sustainable practices for the benefit of all stakeholders.

Question 20

What are the recent developments in ESG, and how can ESG factors be incorporated into business valuation? Explain the impact of environmental, social, and governance factors on expected cash flows.

Answer:

Recent Developments in ESG:

1. **Investment in ESG Funds:** ESG funds attracted over $50 billion in 2020, with total ESG-focused assets exceeding $35 trillion.
2. **Green Bonds:** The green bond market reached a milestone of $1 trillion in 2020, highlighting significant focus on sustainable financing.
3. **Sustainability Taxonomy:** Key regions like the European Union (EU) have defined sustainability taxonomies, with several countries working on similar frameworks.
4. **Convergence of ESG Framework:** The International Financial Reporting Standards (IFRS) initiated work to develop a single global reporting standard for ESG.
5. **SEBI's Regulatory Framework:** In February 2023, SEBI proposed a regulatory framework for ESG disclosures by listed entities in India.

These developments underscore the growing importance of ESG considerations in investment decisions and financing options. Companies with a strong ESG focus can benefit from preferential financing terms and access to specialized financial products like Green, Social, and Sustainability-linked Bonds.

Incorporating ESG Factors into Business Valuation:

The integration of ESG factors into business valuation is increasingly essential for assessing risks and opportunities related to environmental, social, and governance considerations. The most common valuation technique involves discounting future cash flows. ESG factors can be incorporated either into the discount rate or the expected cash flows.

- **Adjusting the Discount Rate:** Management and investors may adjust the discount rate by including a risk premium to account for ESG factors. While this approach is practical, it may not explicitly capture the impact of ESG risks.
- **Adjusting Expected Cash Flows:** A more explicit method involves adjusting expected cash flows to reflect ESG risks.

Impact of ESG Factors on Expected Cash Flows:

1. **Environmental (E) Factors:** The risk can be incorporated through scenario analysis, such as a 2-degree temperature increase in a plant. Adjustments in cash flows can also be made by considering carbon points and other environmental impacts.
2. **Social (S) Factors:** The impact of social measures, such as improved labor conditions, corporate social responsibility (CSR) initiatives, and stakeholder welfare measures, can be reflected in cash flow adjustments.

3. **Governance (G) Factors:** The effect of poor governance can be factored in by adjusting for potential penalties, fines, and taxes that could impact revenue.

CHAPTER 14
MERGERS, ACQUISITIONS & CORPORATE RESTRUCTURING

Question 1

Alfa Ltd. wants to acquire Beta Ltd. and has offered a swap ratio of 1:2 (0.5 shares for every one share of Beta Ltd.). Following information is provided:

	Alfa Ltd.	Beta 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

(i) You are required to determine:

a. The number of equity shares to be issued by Alfa Ltd. for acquisition of Beta Ltd.

b. The EPS of Alfa Ltd. after the acquisition.

c. The equivalent earnings per share of Beta Ltd.

d. The expected market price per share of Alfa Ltd.* after the acquisition, if PE increases to 12 times.

e. The market value of the merged firm.

(ii) If you are the shareholder of Beta Ltd and holding 100 shares, will you be interested to sell your stake? Why?

Nov 22 (8 Marks)

Answer:

(i)

(a) The number of shares to be issued by Alfa Ltd.:

The Exchange ratio is 0.5

So, new Shares = 1,80,000 × 0.5 = 90,000 shares.

(b) EPS of Alfa Ltd. after 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

(c) Equivalent EPS of Beta Ltd.:

No. of new Shares	0.5
EPS	₹3.13
Equivalent EPS (₹3.13 × 0.5)	₹1.57 or ₹1.56

(d) New Market Price of Alfa Ltd. (P/E = 12):

Revised P/E Ratio of Alfa Ltd.	12 times
Expected EPS after merger	₹3.13
Expected Market Price (₹3.13 × 12)	₹37.56

(e) Market Value of merged firm:

Total number of Shares	6,90,000
Expected Market Price	₹37.56
Total value (6,90,000×37.56)	₹2,59,16,400

(ii)

Present market Value of share of Beta Ltd. (100 × ₹14)	₹1,400
Revised market price of each share of Alfa Ltd. after Merger	₹37.56
Equivalent No. of Alfa Ltd. share in exchange of Beta Ltd. (0.50 × 100)	50
Equivalent Value of Alfa Ltd. share in exchange of Beta Ltd. (100 × 0.50 × ₹37.56)	₹1,878
Increase in Market Value (₹1,878 - ₹1,400)	₹478

No, I am not agreed to sell the stake as there is increase in market value.

Question 2

Big Ltd. (BL), a listed company, is enjoying a price earnings ratio (PER) of 15 on an Earnings Per Share (EPS) of ₹5. The Total number of outstanding shares are 2,00,000.

BL is proposing to acquire Small Pvt. Ltd. (SPL) an unlisted company by issuing shares in the ratio 4:5 i.e. for 5 shares of SPL 4 shares of BL will be issued. The outstanding shares of SPL are 50,000. SPL will be listed before the actual merger to discover its value. The EPS of the merged entity will be 5.5.

No other information is available for SPL.

You are required to calculate:

(i) Pre-merger EPS of SPL.

(ii) Expected Market Price per Share of SPL at the time of listing, if it expects a PER of 10 and,

(iii) Number of shares of BL to be issued to SPL if pre-merger EPS of BL is to be maintained.

May 23 (8 Marks)

Answer:

(a)

(i) Pre Merger EPS

No. of shares to be issued by BL to SPL (50,000 × 4/5)	40,000
Existing number of shares of BL	2,00,000

Total no. of shares Post Merger	2,40,000
EPS (Post Merger)	₹5.50
Post-Merger (Total Earning)	₹13,20,000
Less: Pre-Merger Earning of BL (2,00,000 × 5)	₹10,00,000
Pre-Merger Earning of SPL	₹3,20,000
Number of shares of SPL (Existing)	50,000
EPS (₹3,20,000/50,000)	₹6.40

(ii) Expected Market Price of SPL share at the day of listing

EPS × PE Ratio (6.40 × 10) = ₹64.00

(iii) Number of shares to be issued to SPL to maintain Pre-Merger EPS

5.00 = 13,20,000/(2,00,000 + X)

10,00,000 + 5X = 13,20,000

X = 64,000

Thus, 64,000 shares to be issued by BL to SPL to maintain pre-merger EPS.

Alternatively, it can also be computed as follows:

Swap Ratio if EPS before merger is maintained by BL

Then, Swap Ratio =6.4 / 5 = 1.28

Number of shares of BL is to be issued to SPL is 50000 shares × 1.28 = 64000 shares

Question 3

M/s. Vasavi Ltd. is considering the takeover of M/s. SKPD Ltd. by the exchange of five new shares in M/s. Vasavi Ltd. for every eight shares in M/s. SKPD Ltd. The relevant financial details of the two companies prior to merger announcement are as follows:

Particulars	M/s. Vasavi Ltd.	M/s. SKPD Ltd.
Profit before tax (₹crore)	18	20.8
No. of shares (in crore)	20	18
P/E ratio	11	8

Corporate tax rate 30%

You are required to determine:

a. Market value of both the companies
b. Value of original share holders
c. Price per share after merger
d. Effect on share price of both the companies. If the directors of Vasavi Ltd expect their own pre-merger P/E ratio to be applied to the combined earnings.

May 22 (8 Marks), StudyMat

Answer:

	M/s Vasavi Ltd.	M/s SKPD Ltd.
Profit before Tax (₹in crore)	18.00	20.80
Tax 30% (₹in crore)	5.40	6.24
Profit after Tax (₹ in crore)	12.60	14.56
Earnings per Share	$\frac{12.60}{20} = \text{Rs. } 0.63$	$\frac{14.56}{18} = \text{Rs. } 0.81$
Price per Share before Merger (EPS × P/E Ratio)	₹0.63×11 = ₹6.93	₹0.81×8 = ₹6.48

a. Market Value of company

M/s Vasavi Ltd. = ₹6.93 × 20 Crore = ₹138.60 crore

M/s SKPD Ltd. = ₹6.48 × 18 Crore = ₹116.64 crore

b. Value of Original Shareholders

After Merger

	M/s Vasavi Ltd.	M/s SKPD Ltd.
No. of Shares	20 crores	$18 \times \frac{5}{8} = 11.25\text{crores}$
Combined	31.25 crores	
% of Combined Equity Owned	$\frac{20}{31.25} \times 100 = 64.00\%$	$\frac{11.25}{31.25} \times 100 = 36.00\%$
Value of Original Shareholders	₹255.24 crore × 64.00% = ₹163.35 crores	₹255.24 crore × 36% = ₹91.89 crores

c. Price per Share after Merger

$$\textbf{EPS} = \frac{₹27.16\text{crore}}{31.25\text{crore}} = ₹0.87 \text{ per share}$$

P/E Ratio = 11

Market Value Per Share = ₹0.87 X 11 = ₹9.57

d. Effect on Share Price

M/s Vasavi Ltd

Gain/loss (-) per share = ₹9.57 – ₹6.93 = ₹2.64

$$\text{i.e} \frac{9.57 - 6.93}{6.93} \times 100 = 0.381 \text{ or } 38.10\%$$

∴ Share price would increase by 38.10%

M/s SKPD Ltd

$$9.57 \times \frac{5}{8} = ₹5.98$$

Gain/loss (-) per share = ₹5.97 – ₹6.48 = (₹0.51)

$$\text{i.e} \frac{5.97 - 6.48}{6.48} \times 100 = (0.0787) \text{ or } (-7.87\%)$$

∴ Share price would decrease by 7.87%

Question 4

High Growth Ltd. (HGL) was having an excellent growth over a number of years. The Board of Directors is considering a proposal to reward its shareholders by buying back 20% shares at a premium. The premium is to be paid by raising a loan from the Bank. The interest on loan is to be serviced by internal accruals as supported by the financials of HGL. The company has a market capitalization of ₹15,000 crore and the current Earnings Per Share (EPS) is ₹600 with a Price Earnings Ratio (PER) of 25. The Board expects a post buy back Market Price per Share (MPS) of ₹10,000. The PER, post buy back, will remain the same. The loan can be availed at an interest rate of 16 % p.a.

Applicable corporate tax rate is 30%.

You are required to calculate:

i. The interest amount which can be paid for availing the bank loan.
ii. The loan amount to be raised.
iii. Buy back premium per share.

May 23 (10 Marks)

Answer:

(i) The interest amount which can be paid for availing the bank loan

Current Market Price per Share = ₹600 × 25 = ₹15,000

$$\text{No. of Shares before Buyback} = \frac{\text{Market capitalisation}}{\text{Market price of share}}$$

$$= \frac{15{,}000 \text{ crore}}{15{,}000} = 1 \text{ crore}$$

No. of Shares proposed to Buyback = 20% of 1 crore = 20 lakh

Total No. of Share after Buyback = 1 crore – 20 lakh = 80 lakh

Post Buy back Market Price per Share = ₹10,000

PE Ratio = 25

$$\text{Post Buyback EPS} = \frac{10000}{25} = ₹400$$

EAT before Buyback = ₹600 × 1 crore = ₹600 crore

$$\text{EBT before Buyback} = \frac{600}{(1 - 0.30)} = ₹857.1429 \text{ crore}$$

EAT after Buyback = ₹400.00 × 80 lakh = ₹320 crore

$$\text{EBT after Buyback} = \frac{320}{(1 - 0.30)} = ₹457.1429 \text{ crore}$$

Interest which can be paid for availing bank loan:

EBT before Buyback	₹857.1429 crore
(-) EBT after Buyback	₹457.1429 crore

₹400.0000 crore

Alternatively, it can also be computed as follows:

Pre Buy back Market Capitalization (A)	₹15000 crore
Pre Buy back EPS (B)	₹600
Pre Buy back PER (C)	25
Pre Buy back Market Price Per Share (₹600×5) D = B×C	₹15000
Pre Buy back No. of Shares (A)/ (D)	1 Crore
Post Buy back EPS (A) (₹10000/ 25)	₹400
Post Buy back No. of shares (B)	80 Lakh
Post Buy back Earning (C) = (A) × (B)	₹320 crore
Pre Buy back Earning 1 Crore × ₹600 (D)	₹600 crore
Post Tax Earning available for interest payment (D) – (C)	₹280 Crore
$\text{Pre} - \text{ Tax amount of Interest } \frac{280\text{crore}}{1\ 0.30}$	₹400 Crore

(ii)

$$\text{Loan Amount raised } = \frac{400 \text{ crore}}{0.16} = \text{ ₹2500 crore}$$

(iii) Buyback Premium per Share

Amount of Loan for Buyback of 20 % Shares = ₹2500 crore

No. of Shares Buyback = 20 Lakh

Buyback price per Share = ₹2500 Crore/ 20 Lakh = ₹12500

Market Price after Buyback = ₹10000

Buyback Premium Per Share = ₹12500 – ₹10000 = ₹2500

Alternatively, it can also be computed as follows:

Amount of Loan (A)	₹2500 crore
No. of Shares to be bought back (B)	20 Lakh
Price Per Share to be paid (C) = (A)/ (B)	₹12,500
Post Buy back Share Price (D)	₹10,000
Buy Back Premium per share (C) – (D)	₹2,500

Question 5

The following information is provided relating to the acquiring Company R Ltd. And the target Company K Ltd.:

Particulars	R Ltd.	K Ltd.

Promoter Holding	50%	60%
Share Capital (₹in lakh)	100	50
Free Reserves & Surplus (₹in lakh)	400	250
Paid up value per share (₹)	100	10
Free Float Market Capitalization (₹ in lakh)	200	64
P/E Ratio (times)	20	8

For deciding the swap ratio, weights are assigned to different parameters by the Board of Directors of both the companies as follows:

Book value	20%
EPS	60%
Market Price	20%

You are required to calculate:

i. Swap ratio based on above weights.
ii. Book Value per share, EPS and expected market price of R Ltd. after acquisition of K Ltd. (Assuming PE multiple of K Ltd. remains unchanged and all assets and liabilities of K Ltd. are taken over at book value)
iii. Revised promoter's holding (%) in R Ltd. after acquisition.
iv. Post-acquisition Free Float Market Capitalization.

Nov 23 (8 Marks), May 11 (8 Marks)

Answer:

iii. Swap Ratio

	R Ltd.	K Ltd.
Share Capital	100 Lakh	50 Lakh
Free Reserves	400 Lakh	250 Lakh
Total	500 Lakh	300 Lakh
No. of Shares	1 Lakh	5 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	200 Lakh	64 Lakh
Hence Total market Cap.	400 Lakh	160 Lakh
No. of Shares	1 Lakh	5 Lakh
Market Price	₹400	₹32
P/E Ratio	20	8
EPS	20	4
Profits (₹1 lakh × 20)	₹20 lakh	-
(₹4 lakh × 5)	-	₹20 lakh

Calculation of Swap Ratio			
Book Value	1 : 0.12 i.e.	0.12 × 20%	0.024
EPS	1 : 0.2	0.20 × 60%	0.120
Market Price	1 : 0.08	0.08 × 20%	0.016
		Total	0.160

Swap ratio is for every one share of K Ltd., to issue 0.16 shares of R Ltd. Hence, total no. of shares to be issued.

5 Lakh × 0.16 = 0.80 lakh shares

iv. Book Value, EPS & Market Price

Total No of Shares	1 Lakh + 0.80 Lakh = 1.80 Lakh
Total Capital	₹100 Lakh + ₹80 Lakh = ₹180 Lakh
Reserves	₹400 Lakh + ₹220 Lakh = ₹620 Lakh
Book Value	$\frac{₹180\ Lakh + ₹620\ Lakh}{1.80\ Lakh} = ₹\ 444.44\ per\ share$

$$EPS \frac{Total\ Profit}{No.\ of\ Share} = \frac{20\ Lakh + 20\ Lakh}{1.80\ Lakh} = ₹22.22$$

Expected Market Price EPS (₹22.22) × P/E Ratio (8 = ₹177.76)

v. Revised Promoter's holding

Promoter's Revised R Ltd. 50% i.e.	0.50 Lakh
Holding K Ltd. 60% i.e.	0.48 Lakh
Total	0.98 Lakh

Promoter's % = 0.98/1.80 × 100 = 54.44%

vi. Post-Acquisition Free Float Market Capitalization

Free Float Market Capitalization = (1.80 Lakh – 0.98 Lakh) × ₹177.76 = ₹145.76 Lakh

Question 6

Define

1. **Mergers**
2. **Acquisitions**
3. **Corporate Restructuring**

Answer:

1. Mergers: A merger is a strategic decision that combines two or more companies into a single entity, with the aim of achieving synergies, expanding market reach, and enhancing competitive advantage.

In a merger, the companies involved agree to unite and operate as one, often with the goal of creating a more efficient and profitable organization.

Example:

The merger of Vodafone India and Idea Cellular in 2018 is a notable example. This merger created Vodafone Idea Limited, which became the largest telecom operator in India, combining their resources to better compete in the highly competitive telecommunications market.

2. Acquisitions: An acquisition occurs when one company purchases another company or its assets. This process allows the acquiring company to gain control and ownership of the target company. Acquisitions are often undertaken to achieve growth, diversify offerings, or gain access to new markets and technologies.

Example:

The acquisition of Flipkart by Walmart in 2018 is a significant example. Walmart acquired a 77% stake in the Indian e-commerce giant for $16 billion, marking the largest-ever acquisition by a foreign company in India. This move allowed Walmart to enter the rapidly growing Indian online retail market.

3. Corporate Restructuring: Corporate restructuring involves reorganizing a company's structure, operations, or finances to improve efficiency, competitiveness, and financial health. Restructuring can take various forms, including divestitures, spin-offs, mergers, and acquisitions, and is often pursued to address challenges or capitalize on opportunities.

Example:

The corporate restructuring of Tata Motors in 2017 is an example. Tata Motors undertook a restructuring plan to turn around its passenger vehicle business, focusing on cost reduction, improving operational efficiency, and launching new products. This restructuring helped Tata Motors strengthen its position in the Indian automotive market.

Question 7

Difference between Mergers, Acquisitions and Corporate Restructuring

Answer:

Aspect	Mergers	Acquisitions	Corporate Restructuring
Definition	Combining two or more companies into a single entity.	One company purchases another company or its assets.	Reorganizing a company's structure, operations, or finances to improve efficiency and competitiveness.
Objective	Achieving synergies, expanding market reach, and enhancing competitive advantage.	Gaining control, accessing new markets, and achieving growth.	Improving efficiency, addressing challenges, and capitalizing on opportunities.

Aspect	Mergers	Acquisitions	Corporate Restructuring
Ownership Structure	Typically results in a new entity or one of the existing entities absorbing the others.	The acquiring company gains control and ownership of the target company.	May involve changes in ownership, divestitures, or other structural adjustments.
Control	Both companies agree to unite and operate as a single entity, often sharing control.	The acquiring company has control over the acquired company or its assets.	Control remains with the original entity, but structural and operational changes are made.
Process	Involves mutual agreement and integration of companies.	Involves purchase and transfer of ownership or assets.	Can involve various strategies, including mergers, acquisitions, spin-offs, or divestitures.
Outcome	Creation of a new or expanded entity with combined resources and capabilities.	The acquired company becomes part of the acquiring company.	Streamlined operations, improved financial health, or strategic repositioning.
Examples	Vodafone India and Idea Cellular merger.	Walmart's acquisition of Flipkart.	Tata Motors' restructuring to improve efficiency and competitiveness.

Question 8

What are the common reasons for mergers and acquisitions (M&A), and how do they create value for the combined entity? Provide examples of synergies and other factors that drive M&A.

Answer:

Rationale for Mergers and Acquisitions (M&A):

Mergers and acquisitions (M&A) are strategic decisions made by companies to enhance their value and competitive position. The most common reasons for M&A include:

1. **Synergistic Operating Economics:** Synergy occurs when the combined value of two firms is greater than their individual values, expressed as V (AB) > V (A) + V (B). Synergy leads to improved performance due to complementary services, economies of scale, or both. Examples of synergy include:
    - **Complementary Activities:** A company with a strong branch network merging with a company having an efficient production system can lead to a more efficient combined entity.
    - **Economies of Scale:** Large-scale production results in lower average production costs, such as reduced overheads through shared central services like accounting, legal, and sales promotion.

- **Real and Pecuniary Economies:** Real economies arise from reduced input per output unit, while pecuniary economies are realized from lower input prices due to bulk transactions.

2. **Diversification:**
   Merging unrelated companies can reduce business risk by combining statistically independent or negatively correlated income streams, leading to increased market value due to a lower required rate of return.
3. **Taxation:**
   M&A allows for the set-off and carry-forward of losses, reducing tax liability. The acquiring company can offset the target company's losses against its profits, resulting in tax savings.
4. **Growth:**
   M&A enables faster growth compared to organic growth by shortening the 'Time to Market.' The acquiring company avoids delays associated with building and setting up operations.
5. **Consolidation of Production Capacities and Market Power:** M&A increases production capacity and market power by reducing competition and combining multiple plants.

Question 9

Explain how mergers, acquisitions, and business restructuring can unlock value for companies.

Answer:

Mergers, acquisitions, and business restructuring unlock value for companies through several strategic actions:

- **Horizontal Growth:** Achieves optimum size, increases market share, reduces competition, and utilizes unused capacity.
- **Vertical Combination:** Economizes costs and eliminates unnecessary taxes/duties.
- **Diversification:** Broadens business scope and mitigates risks.
- **Financial Resource Mobilization:** Utilizes idle funds for business expansion, as seen in the nationalization of banks merging with industrial companies.
- **Cash Flow Enhancement:** Increases cash flow by merging export, investment, or trading companies with industrial companies, or merging subsidiaries with holding companies.
- **Acquisition of Shell Companies:** Acquires companies with necessary licenses but inactive promoters.
- **Nourishing Sick Units:** Merges with struggling units to maintain group image.

Business restructuring helps companies become more competitive, survive adverse economic conditions, and reposition in new directions.

Question 10

What are the key considerations and strategies involved in FINANCING AN ACQUISITION, and how do companies decide between using cash, stock, or a combination of both?

Answer:

Financing an Acquisition:

Once the Definitive Agreement for an acquisition is signed, the focus shifts to arranging finance for the acquisition. This involves several key considerations and strategic decisions:

1. **Payment Method:**
    - **Cash, Stock, or Both:** One of the most critical decisions is whether to pay for the acquisition in cash, stock, or a combination of both. This decision is typically outlined in the Definitive Agreement.
    - **All Equity Deal:** If the acquisition is an all-equity deal, it simplifies the financing process, allowing the CFO to focus less on raising funds.
2. **Strategic Considerations:**
    - **Cash Reserves:** Even if the acquirer has sufficient funds, they might not pay the entire purchase consideration in cash. This strategy keeps a "war chest" ready for future acquisitions.
    - **Stock Considerations:** Paying with shares might be preferred if the acquirer believes their company's shares are "overpriced" in the market.
3. **Financing Challenges:**
    - **Leveraged Buyouts (LBO):** Financing can be particularly challenging in an LBO, where the acquisition is funded significantly by borrowed money.
    - **Bridge Financing:** Immediate funding needs can be met through bridge financing, providing temporary funds until long-term financing is secured.
4. **Long-Term Funding:**
    - **Post-Takeover Planning:** Strong companies often plan to strengthen their long-term funds following a takeover to ensure sustained financial health.

Overall, the decision on how to finance an acquisition involves weighing the pros and cons of various payment methods and aligning them with the acquirer's strategic goals and market conditions.

Question 11

What are the considerations and challenges in business valuation regarding premiums and discounts, and how do timing and market conditions affect valuation?

Answer:

In business valuation, **premiums and discounts** are often applied based on the specific situation. These can include:

- **Market Share Premium:** Added value for a business with a significant share in the market.
- **Controlling Stake Premium:** Extra value attributed to a controlling interest in a business.
- **Brand Value Premium:** Premium for businesses with strong brand recognition and reputation.

- **Small Player Discount:** Reduced value for smaller companies with less market influence.
- **Unlisted Company Discount:** Discount applied to companies not publicly traded due to lower liquidity.

Timing of Divestment:

- **Economic Cycles:** Valuation depends on the timing relative to economic cycles, such as GDP growth rates.
- **Stock Market Conditions:** Market multiples are influenced by stock market situations, affecting valuation.
- **Global Situations:** Events like wars or terrorist attacks can significantly impact valuation expectations.

Buyer-Seller Expectations:

- During bullish markets, valuations can differ widely between buyers and sellers, affecting the number of buyers and sellers in the market.

Synergy and Risk in M&A:

- Mergers and acquisitions (M&A) are often based on expected future synergies. However, realizing this synergy value involves risks due to corporate, market, or economic reasons and inaccurate estimations of benefits.

Valuation Methods:

- Using multiple valuation methods helps determine a range of values for a transaction. Some methods, such as Net Asset Value or past Earnings-Based methods, may be inadequate for growing businesses or those with significant intangible assets.
- An example includes the high valuations of internet companies, such as the acquisition of India World by Satyam Infoway in 2000, which highlights the importance of accurate valuation in varying market conditions.

Understanding these factors helps derive a comprehensive valuation range and informs strategic decisions in M&A and business transactions.

Question 12

What are the five principal steps in a successful M&A programme?

Answer:

There are five principal steps in a successful M&A programme.

1) Manage the pre-acquisition phase.
2) Screening candidates.
3) Eliminate those who do not meet the criteria and value the rest.
4) Negotiate.
5) Post-merger integration.

Question 13

What are the major factors that motivate multinational companies to engage in cross-border M&A?

Answer:

Major factors that motivate multinational companies to engage in cross-border M&A in Asia include the following:

- Globalization of production and distribution of products and services.
- Integration of global economies.
- Expansion of trade and investment relationships on international level.
- Many countries are reforming their economic and legal systems and providing generous investment and tax incentives to attract foreign investment.
- Privatization of state-owned enterprises and consolidation of the banking industry.

CHAPTER 15
STARTUP FINANCE

Question 1

NIYA Healthcare is a proprietary concern engaged in the manufacture and development of Pharmaceutical products since last five years. To scale up the business operations and increase the present turnover which is hovering around 500 Million, the proprietor decides to convert his existing business into a Private Limited Company. He also wants to get access to various tax benefits, easier compliances under the startup India initiative and get recognized as a startup company.

Advise whether NIYA Healthcare can be recognized as a startup company in view of the criteria considered eligible for the startup recognition initiated by the Government of India? **OR**

Nov 23 (4 Marks)

Answer:

As per Government of India notification an entity can be considered as a Startup:

1. If it is incorporated as a private limited company or registered as a partnership firm or a limited liability partnership in India **upto a period of 10 years** from date of incorporation or registration.
2. Turnover of the entity for any of the financial years since incorporation/ registration has **not exceeded one hundred crore rupees.**
3. Entity is working towards **innovation, development or improvement of products or processes or services**, or if it is a scalable business model with a high potential of employment generation or wealth creation.
4. Provided that an entity formed by splitting up or reconstruction of an existing business shall not be considered a 'Startup'.

Advise: In the present scenario, NIYA healthcare is converted into a private limited company. In other words there is a reconstruction of an exiting propriety business into a private limited company. In view of the above the company cannot be recognised as a startup company

Question 2

What do you mean by the term Unicorn? State the features a Start-up should possess to be referred as a Unicorn MTP Mar 24

(4 Marks)

Answer:

A Unicorn is a privately held start-up company which has achieved a valuation of US$ 1 billion. This term was coined by venture capitalist Aileen Lee for the first time in 2013. The unicorn, a mythical animal, represents the statistical rarity of successful ventures.

A start-up is referred to as a Unicorn if it has the following features:

1. **Privately Held:** The start-up must be privately held.

2. **Valuation:** The valuation of the start-up must reach US$ 1 billion.
3. **Rarity of Success:** Emphasis is on the rarity of the success of such a start-up.
4. **Other Common Features:** These include new ideas, disruptive innovation, consumer focus, high technology, etc.

However, it is important to note that if the valuation of any start-up slips below US$ 1 billion, it can lose its status as a 'Unicorn.' Hence, a start-up may be a Unicorn at one point in time and may not be at another point in time.

Question 3

"In Deal Structuring, in many structures to facilitate the exit, the Venture Capital may put a tag-along clause". What do you mean by that clause? Explain Deal Structuring and Exit Plan to Venture Capital Investment Process.

Nov 23 (4 Marks)

Answer:

Tag-alone clause means VC is put by condition that promoter must sell a part of his/ her stake along with the VC.

Deal Structuring: Once the case passes through the due diligence it would now go through the deal structuring. The deal is structured in such a way that both parties win. In many cases, the convertible structure is brought in to ensure that the promoter retains the right to buy back the share.

Exit plan: At the time of investing, the VC would ask the promoter or company to spell out in detail the exit plan. Mainly, exit happens in two ways:

(a) **One way is 'sell to third party(ies)'**. This sale can be in the form of IPO or Private Placement to other VCs.

(b) **The second way to exit is that promoter would give a buy back** commitment at a pre agreed rate (generally between IRR of 18% to 25%). In case the exit is not happening in the form of IPO or third-party sell, the promoter would buy back. In many deals, the promoter buyback is the first refusal method adopted i.e. the promoter would get the first right of buyback.

Question 4

Apart from the support from government, there are quite a few other reasons why India became a sustainable environment for start-up to thrive in.

What are the other reasons?

May 24 (4 Marks)

Answer:

Reasons for India's Thriving Startup Environment:

1. **Pool of Talent:** India has a large pool of talented graduates from colleges and B-schools, many of whom are now starting their own ventures instead of joining big companies.

2. **Cost-Effective Workforce:** With over 10 million people entering the workforce annually, India offers a cost-effective workforce, making business setup and operations more affordable compared to other countries.
3. **Increasing Internet Use:** Affordable telecom services have significantly increased internet usage across India, including rural areas, providing startups with a vast user base to leverage.
4. **Technology Advancements:** Developments in software and hardware have made business processes efficient. Indian startups are innovating in artificial intelligence and blockchain, driving business growth.
5. **Variety of Funding Options:** Beyond traditional bank loans and personal loans, startups now have access to angel investors, venture capitalists, and seed funding. Eased Foreign Direct Investment (FDI) norms have also boosted foreign funding opportunities in the Indian startup ecosystem.

Question 5

What do you mean by Succession Planning?

Answer:

- **Definition:** Succession planning is the process of identifying the critical positions within an organization and developing action plans for individuals to assume those positions.
- **Purpose:** A succession plan identifies future need of people with the skills and potential to perform leadership roles.
- **Holistic Approach:** Taking a holistic view of current and future goals, this type of preparation ensures that the right people are available for the right jobs today and in the years to come.
- **Ownership Transfer:** It can also provide a liquidity event, which enables the transfer of ownership in a going concern to rising employees.

Question 6

Succession planning is a good way for companies to ensure that businesses are fully prepared to promote and advance all employees—not just those who are at the management or executive levels. Explain the above statement.

RTP May 24

Answer:

Succession planning is the process of identifying the critical positions within an organization and developing action plans for individuals to assume those positions. A succession plan identifies future need of people with the skills and potential to perform leadership roles.

Taking a holistic view of current and future goals, this type of preparation ensures that the right people are available for the right jobs today and in the years to come. It can also provide a liquidity event, which enables the transfer of ownership in a going concern to rising employees.

Need for succession planning can be explained below:

1. **Risk mitigation –** If existing leader quits, then searches can take six-nine months for suitable candidate to close. Keeping an organization without leader can invite disruption, uncertainty, conflict and endangers future competitiveness.
2. **Cause removal –** If the existing leader is culpable of gross negligence, fraud, willful misconduct, or material breach while discharging duties and has been barred from undertaking further activities by court, arbitral tribunal, management, stakeholders or any other agency.
3. **Talent pipeline –** Succession planning keep employees motivated and determined as it can help them obtaining more visibility around career paths expected, which would help in retaining the knowledge bank created by company over a period of time and leverage upon the same.
4. **Conflict Resolution Mechanism –** This planning is very helpful in promoting open and transparent communication and settlement of conflicts.
5. **Aligning –** In family owned business succession planning helps to align with the culture, vision, direction and values of the business.

Question 7

What are the four steps involved in creating a business succession strategy, and how does each step contribute to ensuring the successful transition of leadership within an organization, particularly in a family-owned business?

Answer:

Step 1 – Evaluate key leadership positions: - To evaluate which roles are critical, risk or impact assessment can be performed. Generally, these are such positions which would bring transformation to the entire business or create strategic direction for the organization.

Step 2 – Map competencies required for above positions: - In this step, one needs to identify qualifications, behavioral and technical competencies required to perform the role successfully.

Step 3 – Identify competencies of current workforce: - Identifying what are possible internal options that can deliver results as expected in Step-2, and also if there is a need for training and development of certain skills required. The organization should also place weight on whether is there a need to search outside the organization.

Step 4 – Bridge Leader: - In family owned business appointment of an outsider as 'bridge leaders' will help to develop the business and prepare young family members for leadership role.

Question 8

What are the key challenges faced by startups in implementing succession planning, and how do factors such as founder mindset, early growth stages, and the central role of founders contribute to these challenges? OR

What challenges do startups face in succession planning related to founder mindset, early growth stages, and the founders' central roles?

Study Mat

Answer:

Following challenges are faced in implementing Succession Planning.

1. **Founder mindset might be different than the corporate mindset** – The way founder's brains are wired is different from the way that a traditional corporate manager thinks, and this puts off seasoned corporate leaders from joining even matured start-ups.
2. **Premature for startups to implement business succession** - Certain startups are at early growth stage and too much of processes would lead to growth slow-down and hence they are not in a current stage for implementing business succession planning.
3. **Founders are the face of startups** – One cannot imagine a startup without a founder who initiated the idea and executed it and in his/ her absence succession planning can become difficult.