Paper – 14 – ADVANCED FINANCIAL MANAGEMENT

The following table lists the learning objectives and the verbs that appear in the syllabus learning aims and examination questions:

	Learning objectives	Verbs used	Definition
LEVEL C	KNOWLEDGE What you are expected to know	List	Make a list of
		State	Express, fully or clearly, the details/facts
		Define	Give the exact meaning of
	COMPREHENSION What you are expected to understand	Describe	Communicate the key features of
		Distinguish	Highlight the differences between
		Explain	Make clear or intelligible/ state the meaning or purpose of
		Identity	Recognize, establish or select after consideration
		Illustrate	Use an example to describe or explain something
	APPLICATION How you are expected to apply your knowledge	Apply	Put to practical use
		Calculate	Ascertain or reckon mathematically
		Demonstrate	Prove with certainty or exhibit by practical means
		Prepare	Make or get ready for use
		Reconcile	Make or prove consistent/ compatible
		Solve	Find an answer to
		Tabulate	Arrange in a table
	ANALYSIS How you are expected to analyse the detail of what you have learned	Analyse	Examine in detail the structure of
		Categorise	Place into a defined class or division
		Compare and contrast	Show the similarities and/or differences between
		Construct	Build up or compile
		Priorities	Place in order of priority or sequence for action
		Produce	Create or bring into existence
	SYNTHESIS How you are expected to utilize the information gathered to reach an optimum conclusion by a process of reasoning	Discuss	Examine in detail my argument
		Interpret	Translate into intelligible or familiar terms
		Decide	To solve or conclude
	EVALUATION How you are expected to use your learning to evaluate, make decisions or recommendations	Advise	Counsel, inform or notify
		Evaluate	Appraise or asses the value of
		Recommend	Propose a course of action

Paper – 14 – ADVANCED FINANCIAL MANAGEMENT

Time Allowed: 3 hours **Full Marks: 100**

This paper contains 5 questions. All questions are compulsory, subject to instruction provided against each question. All workings must form part of your answer. Assumptions, if any, must be clearly indicated.

Question No. 1 (Answer **all** questions. Each question carries **2 marks)**

1. (a) MN Ltd. has earnings before interest and taxes of ₹36 crores. The company has 7% debentures of ₹72 crores. Cost of equity is 12.5%. Ignore taxes. Calculate the overall cost of Capital. [2]

Answer:

Market value of Equity	= [EBIT -I]/K_e
	= [36 - 5.04] Cr. /0.125
	= 30.96 /0.125 = ₹ 247.68 Cr.
Total value of firm (v)	= 247.68 + 72.00 = 319.68 cr.
So, K_o = EBIT/V	= [36/319.68] x 100 =11.26%.

(b) Mr. Khan purchased 300 units of a MUTUAL FUND at a price of ₹25 per unit at the beginning of the year. He paid a front-end load of 5%. The expense ratio of the fund is 2%. The growth rate in fund's security is 15 % during the year. Calculate the rate of Return of the fund if security sold at the end of the year. [2]

Answer:

Market Value of Investment	: 300 × 25 = ₹7,500
Purchase rate of Unit	: 25 × 1.05 = ₹ 26.25
Total Purchase Consideration	: 26.25 × 300 = ₹7,875
Increase in value	: 300 × 25 × 0.15 = ₹1,125
Expense	: 0.02 × 300 × 25 = ₹150
Rate of Returns	: $\frac{1,125-150}{7,875} \times 100 = 12.38\%$

(c) Ms. Susmita, a prospective investor has collected the following information pertaining to two securities A and B:

Particulars	Security A	Security B
Expected Return %	**15**	**18**
Standard deviation of Returns %	**18**	**22**
Beta	**0.90**	**1.40**

Variance of Returns on the market Index is 225 (%)². The correlation coefficient between the returns on securities A and B is 0.75. Find out the Systematic Risk of a portfolio consisting of these two securities in equal proportions. [2]

Answer:

The beta of the Portfolio consisting of two securities given that money is allotted equally between the two assets:
$0.90 \times 0.50 + 1.4 \times 0.5 = 1.15$
The Systematic risk of a Portfolio = $\beta^2 \sigma^2 m$
Substituting the value of β^2 and $\sigma^2 m$, we get.
$(1.15)^2 \times 225 = 297.56\ (\%)^2$.

(d) The current market price of an equity share of THOMAS LTD. is ₹500. Within a period of 3 months, the maximum and minimum price of it is expected to be ₹600 and ₹300 respectively. What should be the value of a 3 months call option under "Risk Neutral" method at the strike rate of ₹550, if the risk free rate of interest be 8% p.a.?
[Given $e^{-0.02} = 1.0202$] **[2]**

Answer:

Let the probability of attaining the maximum price be p
$\therefore (600 - 500) \times p + (300 - 500) \times (1 - p) = 500\ (e^{-0.02} - 1)$
or $100\ p - 200 + 200\ p = 500\ (1.0202-1) = 500\ (0.0202)$
or $300\ p = 200 + 10.10 = 210.10$
or $p = \frac{210.10}{300} = 0.70$

Value of call option = $\frac{0.70(600 - 550)}{1.0202} = \frac{35}{1.0202} =$ ₹ 34.31

(e) Distinguish between the primary market and the secondary market. **[2]**

Answer:

In the primary market, securities are offered to public for subscription for the purpose of raising capital or fund. Secondary market is an equity trading avenue in which already existing/pre-issued securities are traded amongst investors. Secondary market could be either auction or dealer market. While stock exchange is the part of an auction market, Over-the-Counter (OTC) is a part of the dealer market.

(f) MAYANK Ltd. employs 12% as nominal required rate of return to evaluate its new investment projects. In the recent meeting of the Board of Directors, it has been decided to protect the interest of shareholders against purchasing power loss due to inflation. The expected inflation rate in the economy is 5%. Calculate the real discount rate. **[2]**

Answer:

Real rate = $[(1+n) / (1 + i)] -1$
= $[(1+0.12) / (1+ 0.05)] -1$
= $0.06667 = 6.67\%$.

(g) State the Banking Financial Institutions. [2]

Answer:

Banking institutions are those institutions, which participate in the economy's payment system, i.e., they provide transaction services. Their deposits liabilities constitute a major part of the national money supply and they can, as a whole, create deposits or credit, which is money.

(h) Ms. Priyanka buys 10,000 shares of RUDSON LTD. at ₹50 and obtains a complete hedge of shorting 400 Nifties, at ₹2,200 each. She closes out her position at the closing price of the next day at which point the share of Rudson Ltd. has dropped 2% and the Nifty future has dropped 1.5%. Calculate the overall Profit/(Loss) of this set of transactions. [2]

Answer:

	Value of bought Shares	Value of Short future
To-day's Valuation	50 × 10000 = ₹ 5.00 lakh	400 × 2200 = ₹8.800 lakh
Next day's Valuation	49 × 10000 = ₹ 4.90 lakh	400 × 2167 = ₹ 8.668 lakh
Profit/ (Loss)	(2% dropped) = (₹ 0.10 lakh)	(1.5% dropped) = ₹ 0.132 lakh

Net Profit = ₹ (0.132 - 0.10) lakh = ₹3,200

I. List the advantages of Book Value Weights. [2]

Answer:

Advantages of Book Value weights**:**

1. The capital structure targets are usually fixed in terms of book value.
2. It is easy to know the book value.
3. Investors are interested in knowing the debt-equity ratio on the basis of book values.
4. It is easier to evaluate the performance of a management in procuring funds by comparing on the basis of book values.

(j) The Portfolio composition of Mr. Satendra is given below:

	(Amount in ₹ lakh)
Equity	**120**
Cash/Cash equivalent	**40**
Total	**160**

The beta of Equity portion of the Portfolio is 0.85 and the Current Nifty futures is at 4261.5. The multiple attached to Nifty future is 100. If Mr. Satendra purchases 23 future contracts, find out his portfolio Beta. [2]

Answer:

120 Lakh × 0.85 + 4261.5 × 100 × 23 = 160 lakh × Beta of Portfolio.
or 102 lakh + 98.0145 lakh = 160 lakh × Beta of Portfolio
or Beta of Portfolio = 1.25

Question No. 2. (Answer **any three** questions. Each question carries **8 marks**)

2. (a) (i) Mr. S. K. Sinha had purchased 500 units of a scheme of Temple MF at the rate of ₹ 60 per unit. He held the units for 2 years and got a dividend of 15% and 20% in the first year, and second year respectively on the face value of ₹ 10 per unit.
At the end of the second year, the units are sold at the rate of ₹ 75 per unit. Determine the effective rate of return per year which Mr. Sinha has earned on this MF scheme. **[5]**

Answer:

Total investment made by Mr. Sinha = 500 × 60 = ₹ 30,000
Dividends received – First Year = ₹ 1.5 × 500 = ₹ 750
Dividends received – Second Year = ₹ 2 × 500 = ₹ 1,000
Proceeds of Sale for Mr. Sinha = 500 × 75 = ₹ 37,500

Total Absolute Return = $\frac{(37500 - 30000) + 1000 + 750}{30000}$ = 30.833%

Effective rate of return is the Compounded Annual Rate, which is 'r' in the following equation: $39250 = 30000\ (1+r)^2$

r = Effective rate = $\sqrt{\frac{39250}{30000}} - 1$ = 14.38% per annum.

2. (a) (ii) List the objectives of the takeout finance scheme. **[3]**

Answer:

Objectives of the Takeout Finance Scheme:

(a) To boost the availability of longer tenor debt finance for infrastructure projects.
(b) To address sectoral/group/entity exposure issues and asset-liability mismatch concerns of Lenders, who are providing debt financing to infrastructure projects.
(c) To expand sources of finance for infrastructure projects by facilitating participation of new entities i.e., medium/small sized banks, insurance companies and pension funds.

2. (b) (i) State the Trade Credit. Explain the advantages of trade credit. **[2+3]**

Answer:

Trade credit refers to credit that a buyer firm gets from the suppliers of goods in the normal course of its operations. It is a dominant part of accounts payable. It appears as 'sundry creditors' on the Indian firms' balance sheets. Trade credit is a cheaper source of short term finance than the institutional agencies. It is because suppliers, having better information and control over buyer than the institutional agencies offer better terms in extending the trade credit.

The advantages of trade credit are as follows:

- **Easy availability:** In most of the cases (except financially distressed firms), trade credit is automatic and does not required any negotiations.

- **Flexibility:** As mentioned earlier, the amount of trade credit is positively associated with the level of firm's operations. It increases (decreases) with the increase (decline) in firm's sales.
- **Informality:** Trade credit is a spontaneous source of finance, does not require any formal agreement.

Trade credit seems to be cost free as it does not involve any explicit interest charges. But it involves implicit cost. Extending trade credit is nothing but financing buyer purchases; it involves costs to the supplier. Such costs of trade credit may be transferred to the buyer firm by increased price of goods / services. However, the extent of such a transfer depends on the bargaining power of supplier and buyer in the market.

2. (b) (ii) Distinguish between Merchant Banks and Development Banks. [3]

Answer:

Differences between Merchant Banks and Development Banks

Development Banks are specialised financial institutions that act as financial intermediaries when credit is not available through normal channels. The funding offered is essentially for industrial and agricultural development in the nature of medium or long term loans.

They seek to mobilize scarce resources such as capital, technology, entrepreneurial and managerial talents and channelise them into industrial activities in accordance with plan priorities. Its objectives are to develop the specific sectors and to improve the economy in general.

The services offered by development banks and their objectives are different from those of merchant banks. In India, development banks are usually statutory corporations while merchant banks are essentially corporate form of organisation.

2. (c) The annualized yield is 3% for 91-day commercial paper and 3.5% for 182 days commercial paper. Calculate the expected 91-day commercial paper rate 91 days from now, assuming that we get the same maturity value after 182 days. [8]

Answer:

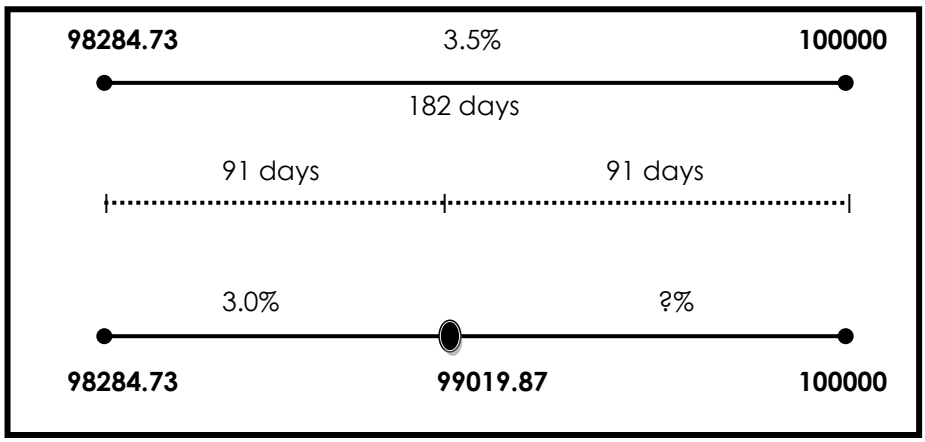
Assuming the difference is just due to higher future interest rates, an investor should be able to earn the same return over 182 days using either 182 day paper or a 91 day paper by rolling over to 91 day paper again after investing in 91 day paper.

Assume that the 182-day paper has a face value of ₹ 1,00,000. The current price can be found using:

$Y = \frac{(F-P)}{P} \times \frac{365}{M} \times 100$, Where Y = 3.5, F = 1,00,000, M = 182.

P = ₹ 98,284.73

Had we invested the same amount in 91-day paper, by substituting P = ₹ 98,284.73, M = 91 & Y = 3 we get F = ₹ 99,019.87. That is, such an investment should payoff ₹ 99,019.87 after 91 days.



Now, invest ₹ 99,019.87 in 91-day paper again. It is expected to give a final value of ₹ 1,00,000 (just like the 182 –day paper). When we substitute in the above formula, F = ₹ 1,00,000 & P = ₹ 99,019.87 and M = 91, we get the 91-day rate in 91-days as 3.97%.

2. (d) (i) Shailesh invested ₹ 50,000 in debt-oriented fund when the NAV was ₹ 16.10, and sold the units allotted when the NAV was ₹ 17.10 after one year. Assume that there existed an entry load of 2% and no exit load. He received ₹ 2 per unit as dividend which is taxable at 30% during the year. There is no capital gains tax. Calculate the after tax rupee return from this investment. [4]

Answer:

Shailesh invested ₹ 50,000, when NAV was ₹ 16.10 and the sale price was = 16.10 × 1.02 = ₹ 16.4220. At this price he was issued 3044.70 (50,000/16.422) units. On this he received dividend = 3044.7 × 2 = ₹ 6,089.40. However, dividends are taxable at 30%. His post tax receipt = 4,262.58. Now if he sells after a year when the NAV is ₹ 17.10, he gets full value as there is no exit load.

Rupee return in value
= [Post Tax Div. + (Repurchase Price – Sale Price) × No. of Units]
= 4262.58 + (17.10 – 16.422) × 3044.7
= 6326.89
Rupee return in %
= 6326.89/50000
= 12.65%.

2. (d) (ii) Explain the important development and regulatory steps taken by Forward Market Commission. [4]

Answer:

Important development and regulatory steps taken by FMC

The Forward Markets Commission is committed towards the development of institutional capability of the commodity market. The Commission has taken several steps in this direction, which include sensitizing policy makers and all other co-traders improving the efficiency of all the participants in the marketing chain

by organizing awareness programs, workshops, subject specific consultancies, study tours, lectures, etc., members.

FMC has set itself an ambitious target for reaching out to various market segments and grass roots level participants. FMC solicits active collaboration with Universities, Educational Institutions and other organizations desiring to spread awareness about Futures Trading in Commodities.

The developmental measures also include the price dissemination among the farmers through APMCs (spot market regulators).

Question No. 3. (Answer **any two** questions. Each question carries **10 marks**)

3. (a) Fill up the blanks in the following "Break Even Price" table – [10]

Case	Option	Party	Exercise Price	Premium	Market Price
1	Call	Buyer	?	20	160
2	?	Seller	2000	300	1700
3	?	Buyer	50	10	40
4	?	Seller	80	10	90
5	Put	Buyer	?	50	250
6	?	Seller	320	50	370
7	Call	Buyer	680	100	?
8	Call	Seller	?	80	580
9	Put	Buyer	1200	?	1020
10	Put	Seller	?	330	1870

Answer:

Case	Option	Party	Exercise Price	Premium	Market Price	Reason / Computation
1	Call	Buyer	140	20	160	Call → MP = EP + Premium, for Pay Off to be "0". → 160 – 20 = ₹ 140
2	Put	Seller	2000	300	1700	2000 – 300 = ₹ 1700 → MP = EP – Premium. Therefore, it is a Put Option
3	Put	Buyer	50	10	40	50 – 10 = ₹ 40 → MP = EP – Premium. Therefore, it is a Put Option.
4	Call	Seller	80	10	90	80 + 10 = ₹ 90 → MP = EP + Premium. Therefore, it is a Call Option.
5	Put	Buyer	300	50	250	Put Option → MP = EP – Premium. → EP = MP + Premium = 250 – 50 = ₹ 300
6	Call	Seller	320	50	370	320 + 50 = ₹ 370 → MP = EP + Premium. Therefore, it is a Call Option.
7	Call	Buyer	680	100	780	Call → MP = EP + Premium, for Pay Off to be "0". 680 + 100 = ₹ 780
8	Call	Seller	500	80	580	Call → MP = EP + Premium, for Pay Off to be "0". → EP = MP – Premium → 580 – 80 = ₹ 500.

9	Put	Buyer	1200	180	1020	Put → MP = EP – Premium, for Pay Off to be "0". → Premium = EP – MP → 1200 – 1020 = ₹ 180.
10	Put	Seller	2200	330	1870	Put → MP = EP – Premium, for Pay Off to be "0". → EP = MP + Premium → 1870 – 330 = ₹ 2,200.

3. (b) Following information relates to RS Ltd, which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.

Cost and Sales information –

Particulars	Japan	USA	Europe
Variable Cost per Unit	**₹ 225**	**₹ 395**	**₹ 510**
Export sale price per unit	**Yen 650**	**US$10.23**	**Euro 11.99**
Receipts from sale due in 90 Days	**Yen 78,00,000**	**US$1,02,300**	**Euro 95,920**

Foreign exchange rate information

Particulars	Yen/₹	US$/₹	Euro/₹
Sopt Market	**2.417 – 2.437**	**0.0214 – 0.0217**	**0.0177 – 0.0180**
3-Months Forward	**2.397 – 2.427**	**0.0213 – 0.0216**	**0.0176 – 0.0178**
3 months spot	**2.423 – 2.459**	**0.02144 – 0.02156**	**0.0177 – 0.0179**

Advice RS Ltd by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not. [10]

Answer:

1. Computation of Exchange Rate (Direct Quotes)

Particulars	₹/Yen		₹/USD		₹/Euro	
	Bid Rate	**Ask Rate**	**Bid Rate**	**Ask Rate**	**Bid Rate**	**Ask Rate**
Spot Market	0.410 (1/2.437)	0.414 (1/2.417)	46.08 (1/0.0217)	46.73 (1/0.0214	55.56 (1/0.0180)	56.50 (1/0.0177)
3-Months Forward	0.412 (1/2.427)	0.417 (1/2.397)	46.30 (1/0.0216)	46.95 (1/0.0213)	56.18 (1/0.0178)	56.82 (1/0.0176)
3 months spot	0.407 (1/2.459)	0.413 (1/2.423)	46.38 (1/0.02156)	46.64 (1/0.02144)	55.87 (1/0.0179)	56.50 (1/0.0177)
Higher of 3-Months forward rate and spot rate [Bid]	0.412		46.38		56.18	
	[Forward]		[Spot]		[Forward]	

Bid rate is relevant since the export will be selling Foreign Currency and buying Indian Rupees:

2. Computation of Contribution per Unit in Foreign Currency [Based on 3-months Rate]

[3-Months Forward vs. 3-Months' Spot]

Particulars		Japan		USA		Europe	
		Spot	Forward	Bid Rate	Ask Rate	Bid Rate	Ask Rate
(a)	Variable Cost per Unit	₹225.00	₹225.00	₹395.00	₹395.00	₹510.00	₹510.00
(b)	Export sale price per Unit [Foreign Currency]	Yen 650	Yen 650	USD 10.23	USD 10.23	Euro 11.99	Euro 11.99
(c)	Relevant Bid Rate	₹0.407	₹0.412	₹46.38	₹46.30	₹55.87	₹56.18
(d)	Export Sale Proceeds p.u. [(b)×(c)]	₹264.55	₹267.80	₹474.47	₹473.65	₹669.88	₹673.60
(e)	Contribution per Unit [(d)–(a)]	₹39.55	₹42.80	₹79.47	₹78.65	₹159.88	₹163.60
(f)	Contribution Ratio [(e)÷(d)]	15.0%	16.0%	16.7%	16.6%	23.9%	24.3%
(g)	Advice	Hedge using Forward Market Cover		Do Not Hedge		Hedge using Forward Market Cover	

Recommendation: The Company should hedge is foreign currency risk / exposure in Japanese Yen and Euro, since by hedging, the Company stands to gain a higher Contribution to Sales Ratio and therefore, higher profit margin. However, for sale to USA, the Company need not hedge its exposure in Dollars, since moment in Spot Market is more beneficial than hedging through Forward Market Cover.

3. (c) (i) Given the following information of securities of R Ltd.–

BSE Index	**5000**
Value of Portfolio	**₹ 10,10,000**
Risk Free Interest Rate	**9% p.a.**
Dividend Yield on Index	**6% p.a.**
Beta of Portfolio	**1.5**

We assume that a Futures Contract on the BSE Index with 4 months Maturity is used to Hedge the value of Portfolio over next 3 months. One Future Contract is for delivery of 50 times the Index. Based on the information, Calculate – (I) Price of Future Contract, (II) The Gain on Short Futures Position if Index turns out to be 4,500 in 3 months. [2+(2+2)]

Answer:

I. Computation of Price of Futures Contract

Securities	R Ltd.
Spot Price [S_x]	₹ 5,000
Dividend Yield Expected [y]	6% or 0.06
Tenor / Time Period [t] in Years	4 Months or 0.3333 Year
Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP_x] $TFP_x = S_x \times e^{(r-y)\times t}$	= ₹ 5,000 × $e^{(0.09 - 0.06)\times 0.3333}$ = ₹ 5,000 × $e^{0.03 \times 0.3333}$ = ₹ 5,000 × $e^{0.01}$ = ₹ 5,000 × 1.0101 = ₹ 5,050

Therefore, price of the Futures Contract is ₹ 5,050.

II. Gain on Short Futures Position

(a) Computation of No. of Contracts to be entered into:

$$\text{No of Contracts} = \frac{\text{Portfolio Index} \times \text{Beta of Portfolio}}{\text{Value per Future Contract}} = \frac{10,10,000 \times 1.5}{5,050 \times 50} = 6 \text{ Contracts}$$

(b) Computation of Gain on Short-Futures Position (SELL Position)

Total Gain = (Contracted Sale Price – Actual Price) × No. of Contracts

⇨ = (5,050 – 4,500) × 50 units × 6 Contracts

⇨ = 1,65,000.

3. (c) (ii) XYZ Ltd. borrows £20 million of 6 months LIBOR + 0.25% for a period of two years. T, Treasury Manager of XYZ, anticipates a rise in LIBOR, hence proposed to buy a Cap Option from ABC Bank at Strike Rate of 7%. The lump sum premium is 1% for the whole of the three resets period and the Fixed Rate of Interest is 6% p.a. The actual position of LIBOR during the forthcoming reset period is as follows –

Reset Period	LIBOR
1	8.00%
2	8.50%
3	9.00%

You are required to show how far Interest Rate Risk is hedged through Cap Option. [1+3]

Answer:

1. Computation of Premium Payable

$$\text{Premium Payable} = \frac{A}{\frac{1}{R \times T} - \frac{1}{R \times T \times (1+R \times T)^{Y}}} \times \text{Underlying Principal}$$

Where A = Premium Rate = 1% or 0.01

R = Fixed Interest Rate for the Period under Consideration = 6% or 0.06

T = Reset period i.e., frequency of changing the Floating Rates = 6 months or 0.5 Years

Y = Total Number of Reset Periods for the Period under Consideration = 4 Times (2 Years/Reset Period 0.5)

$$= \frac{0.01}{\frac{1}{0.03} - \frac{1}{0.03 \times 1.03)^{4}}} \times £\ 2,00,000 = £\ 53.805$$

2. Effectiveness of Hedge Using Interest Rate Cap

Reset Period	Addl. Int. Rate (Actual Less Cap)	Add. Int. Amt. = Recd. From Bank (Int. Rate × Principal)	Premium paid to bank	Net Amount received from bank
1	8.25% - 7% = 1.25%	200L × 1.25% = £ 2,50,000	£ 53,805	£ 1,96,195
2	8.75% - 7% = 1.75%	200L × 1.75% = £ 3,50,000	£ 53,805	£ 2,96,195
3	9.25% - 7% = 2.25%	200L × 2.25% = £ 4,50,000	£ 53,805	£ 3,96,195
Total		**£ 10,50,000**	**£ 1,61,415**	**£ 8,88,585**

Interest Rate Cap has reduced the additional interest cost from £10,50,000 to £ 8,88,585.

Question No. 4. (Answer **any two** questions. Each question carries **8 marks**)

4. (a) Suppose that all stocks have a rate of return with a standard deviation of 40% and that the correlation between rates of returns for all pairs of stocks is 0.25. Calculate the standard deviation of returns of a portfolio which has

I. Equal holdings in 10 stocks; and

II. 38% each invested in two stocks, 3% invested in each of 8 stocks. [4+4]

Answer:

I. The variance of N = 10 stock portfolios would comprise of 10 variance terms +10 (10-1) covariance/correlation terms.

$$= \left[N \times w_1^2 \sigma_i^2 + \sum_{i=1}^{N} \sum_{i=1}^{N} wiwj\sigma i\sigma j\rho_{ij} \right]^{1/2}$$

Since weights, standard deviation and correlation coefficient are same for all the ten stocks,

$$= \left[10 \times w_{i_1^2}^2 \sigma_i^2 + 10(10-1)wi^2\sigma i^2\rho_{ij} \right]^{1/2}$$

$= [10 \times (1/10)^2 (0.4)^2 + 10(10 - 1)(1/10)^2 (0.40)^2 (0.6)]^{1/2}$

$= 22.80\%$

II. The variance of N = 10 stock portfolios would comprise of 10 variance terms + 10 (10 - 1) covariance/correlation terms, i.e. 10 + 90 = 100 terms. Of the 10 variance terms, we now have two variance term of (0.38^2) (0.4^2) and 8 variance terms of (0.03^2) (0.4^2). Of the 10 (10 – 1) = 90 covariance/correlation terms, we have two parts. Consider 2 stocks, whose weights are 38%. We have $2^2 - 2 = 2$ covariance/ correlation terms equal to $(0.38^2)(0.4^2)(0.25)$. Consider 8 stocks, whose weights are 3%. We have $8^2 - 8 = 56$ covariance/correlation terms equal to $(0.03^2)(0.4^2)(0.25)$. However, we still need to consider the covariance/correlation between each of these stocks. There are remaining 32 [100 – 10 – 2 – 56 = 32 or 2 (8) (2) = 32 terms] of these covariance/correlation terms, all equal to $(0.38)(0.03)(0.4^2)(0.25)$, so we have portfolio risk as:

$= [2 \times (0.38)^2 (0.4)^2 + 8 \times (0.03)^2 (0.4)^2 + 2 \times (0.38)^2 (0.4)^2 (0.25) + 56 \times (0.03)^2 (0.4)^2 (0.25) + 32 \times (0.38) (0.03) (0.4)^2 (0.5)]^{½}$

$= 27.48\%$.

4. (b) You are thinking about investing your money in the stock market. You have the following two stocks in mind: stock A and stock B. You know that the economy can either go in recession or it will boom. Being an optimistic investor, you believe the likelihood of observing an economic boom is two times as high as observing an economic depression.

State of the Economy	Probability	R_A	R_B
Boom		10%	-2%
Recession		6%	40%

You also know the following about your two stocks:

I. Calculate the expected return for stock A and stock B

II. Calculate the total risk (variance and standard deviation) for stock A and for stock B

III. Calculate the expected return on a portfolio consisting of equal proportions in both stocks.
IV. Calculate the expected return on a portfolio consisting of 10% invested in stock A and the reminder in stock B.
V. Calculate the covariance between stock A and stock B.
VI. Calculate the correlation coefficient between stock A and stock B.
VII. Calculate the variance of the portfolio with equal proportions in both stocks using the covariance from answer (V).
VIII. Calculate the variance of the portfolio with equal proportions in both stocks using the portfolio returns and expected portfolio returns from answer (III). [1×8]

Answer:

I. P(boom)=2/3 and p(recession)= 1/3 (Note that probabilities always add up to 1)
$E(R_A) = 2/3 \times 0.10 + 1/3 \times 0.06 = 0.0867$ (8.67%)
$E(R_B) = 2/3 \times - 0.02 + 1/3 \times 0.40 = 0.12$ (12%)

II. $SD(R_A) = [2/3 \times (0.10 – 0.0867)^2 + 1/3 \times (0.06 – 0.0867)^2]^{0.5} = 0.018856$ (1.886%)
$SD(R_B) = [2/3 \times (- 0.02 – 0.12)^2 + 1/3 \times (0.40 – 0.12)^2]^{0.5} = 0.19799$ (19.799%)

III. Portfolio weights: $W_A = 0.5$ and $W_B = 0.5$:
$E(R_P) = 0.5 \times 0.0867 + 0.5 \times 0.12 = 0.10335$ (10.335%)

IV. Portfolio weights: $W_A = 0.1$ and $W_B = 0.9$:
$E(R_P) = 0.1 \times 0.0867 + 0.9 \times 0.12 = 0.11667$ (11.667%)

V. $COV(R_A, R_B) =$
$2/3 \times (0.10–0.0867) \times (- 0.02–0.12) + 1/3 \times (0.06-0.0867) \times (0.40–0.12) = - 0.0037333$

VI. $CORR(R_A, R_B) = - 0.0037333 / (0.018856 \times 0.19799) = -1$ (Rounding! Remember the correlation coefficient cannot be less than -1)

VII. $VAR(R_P) = 0.5^2 \times 0.018856^2 + 0.5^2 \times 0.19799^2 + 2 \times 0.5 \times 0.5 \times - 0.0037333 = - 0.008022$
$SD(R_P) = 8.957\%$

VIII. $E(R_P$ Boom$) = 0.5 \times 0.10 + 0.5 \times -0.02 = 0.04$ (4%)
$E(R_P$ Recession$) = 0.5 \times 0.06 + 0.5 \times 0.40 = 0.23$ (23%)
Hence, $E(R_P) = 2/3 \times 0.04 + 1/3 \times 0.23 = 0.10335$ (10.335%)
And, $SD(R_P) = 2/3 \times (0.04 – 0.10335)^2 + 1/3 \times (0.23 – 0.10335)^2]^{0.5} = 0.08957$ (8.957%).

4. (c) (i) An investor is holding 1000 shares of Fatlass Company. Presently the rate of dividend being paid by the company is ₹ 2 per share and the share is being sold at ₹ 25 per share in the market. However, several factors are likely to change during the course of the year as indicated below:

	Existing	Received
Risk Free Rate	**12%**	**10%**
Market Risk Premium	**6%**	**4%**
Beta Value	**1.4**	**1.25**
Expected Growth Rate	**5%**	**9%**

In view of the above factors whether the investor should buy, hold or sell the shares? And why? [5]

Answer:

The expected return on Fatlass Co., as per existing data, is given by
$R_{Fatlass} = R_f + \beta(R_m - R_f)$
Substituting, we get $R_{Fatlass} = 0.12 + 1.4 \times 0.06 = 20.4\%$
Substituting, this for K_e in the dividend discount model formula $P = \frac{D_0(1+g)}{K_e - g}$.
We get,
$P = (2 \times 1.05) / (0.204 - 0.05) = ₹ 13.63$
Since the share is selling at ₹ 25 it is overpriced. He should sell his shares now.

As per the revised data, we would have
$R_{Faltass} = 0.10 + 1.25 \times 0.04 = 15\%$
Substituting, this for K_e in the dividend discount model formula $P = \frac{D_0(1+g)}{K_e - g}$
We get,
$P = (2 \times 1.09) / (0.15 - 0.09) = ₹ 36.33$
Since the share is selling at ₹ 25 it is under priced, on the basis of the revised data he should hold the shares.

4. (c) (ii) Explain the two techniques used in Industry Analysis. [3]

Answer:

Techniques used in Industry Analysis:

I. **Regression Analysis:** Investor diagnoses the factors determining the demand for output of the industry through product demand analysis. The following factors affecting demand are to be considered – GNP, disposable income, per capita consumption / income, price elasticity of demand. These factors are then used to forecast demand using statistical techniques such as regression analysis and correlation.

II. **Input-Output Analysis:** It reflects the flow of goods and services through the economy, intermediate steps in production process as goods proceed from raw material stage through final consumption. This is carried out to detect changing patterns/trends indicating growth/decline of industries.

Question No. 5. (Answer **any two** questions. Each question carries **10 marks**)

5. (a) (i) Beeta Ltd. has furnished the following information:

Earnings per share (EPS)	**₹ 4**
Dividend Payout Ratio	**25%**
Market Price per share	**₹ 40**
Rate of Tax	**30%**
Growth Rate of Dividend	**8%**

The company wants to raise additional capital of ₹ 10 lakhs including beta of ₹ 4 lakhs. The cost of debt (before tax) is 10% upto ₹ 2 lakhs and 15% beyond that.

Compute the after tax cost of equity and debt and the weighted average cost of capital. [1½+1½+2]

Answer:

I. Cost of Equity Share Capital (K_e)

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

DPS = 25% of ₹ 4 = ₹ 1.00

$K_e = \frac{₹1}{₹40} + 0.08 = 10.5\%$

II. Cost of Debt (K_d)

K_d (After tax) = $\frac{I(1-t)}{NP}$

Interest on ₹ 2,00,000 @ 10% = ₹ 20,000
Interest on ₹ 2,00,000 @ 15% = ₹ 30,000
₹ 50,000

$(K_d) = \frac{₹50,000}{₹4,00,000} \times (1 - 0.3) = 8.75\%$

III. Weighted Average cost of capital (WACC)

Source	Amount in (₹)	Weight	Cost of Capital	Weighted Average Cost
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity	6,00,000	0.6	10.5%	6.30%
Debt	4,00,000	0.4	8.75%	3.50%
	10,00,000	1.0		9.80%

[**Note:** K_e can be computed alternatively taking growth rate into consideration ($D_0(1+g)/P_0 + g$). The values of K_e and WACC then would change accordingly as 10.7% and 9.92% respectively.

5. (a) (ii) X Ltd. a widely held company is considering a major expansion of its production facilities and the following alternatives are available: (₹ in lakhs)

Particulars	A	B	C
Share Capital	**50**	**20**	**10**
14% Debentures	**--**	**20**	**15**
Loan from a Financial Institution @ 18% p.a. Rate of Interest	**--**	**10**	**25**

Expected rate of return before tax is 25%. The rate of dividend of the company is not less than 20%. Corporate taxation rate is 50%. Which of the alternatives you would choose? Decide by computing rate of return on share capital. [5]

Answer:

Statement Showing Computation of Rate of return on share capital

(₹ in lakhs)

Particulars	A	B	C
Return on ₹ 50 lakhs @ 25%	12.50	12.50	12.50
Less: Interest on 14% Debentures	--	(2.80)	(2.10)
Less: Interest on 18% loan from Financial Institution	--	(1.80)	(4.50)
EBT/Taxable Profits	12.50	7.90	5.90
Less: Income tax 50%	(6.25)	(3.95)	(2.95)
Profit After Tax available to shareholders	6.25	3.95	2.95

Share Capital	50	20	10
Rate of return on Share Capital	12.5%	19.75%	29.5%

Comment: From the shareholders point of view Alternative C (highest) is to be chosen.

5. (b) Khan Limited is thinking of replacing its existing machine by a new machine which would cost ₹ 60 lakhs. The company's current production is 80,000 units, and is expected to increase to 1,00,000 units, if the new machine is bought. The selling price of the product would remain unchanged at ₹ 200 per unit. The following is the cost of producing one unit of product using both the existing and new machine:

	Existing Machine (80,000 units)	New machine (1,00,000 units)	Unit Cost (₹) Difference
Materials	**75.00**	**63.75**	**(11.25)**
Wages & Salaries	**51.25**	**37.50**	**(13.75)**
Supervision	**20.00**	**25.00**	**5.00**
Repairs and Maintenance	**11.25**	**7.50**	**(3.75)**
Power and Fuel	**15.50**	**14.25**	**(1.25)**
Depreciation	**0.25**	**5.00**	**4.75**
Allocated Corporate Overheads	**10.00**	**12.50**	**2.50**
	183.25	**165.50**	**(17.75)**

The existing machine has an account book value of ₹ 1,00,000, and it has been fully depreciated for tax purpose. It is estimated that machine will be useful for 5 years. The supplier of the new machine has offered to accept the old machine for ₹ 2,50,000. However, the market price of old machine today is ₹ 1,50,000 and it is expected to be ₹ 35,000 after 5 year. The new machine has a life of 5 years and a salvage value of ₹ 2,50,000 at the end of its economic life. Assume corporate Income tax rate at 40% and depreciation is charged on straight line basis for Income tax purposes. Further assume that book profit is treated as ordinary income for tax purpose. [7+2+1]

The opportunity cost of capital of the Company is 15%. Required:

I. Estimate Net present Value of the Replacement Decision.

II. Estimate the Internal Rate of Return of the Replacement Decision.

III. Should Company go ahead with the Replacement Decision? Suggest.

Year (t)	1	2	3	4	5
$PVIF_{0.15,t}$	**0.8696**	**0.7561**	**0.6575**	**0.5718**	**0.4972**
$PVIF_{0.20,t}$	**0.8333**	**0.6944**	**0.5787**	**0.4823**	**0.4019**
$PVIF_{0.25,t}$	**0.8000**	**0.6400**	**0.5120**	**0.4096**	**0.3277**
$PVIF_{0.30,t}$	**0.7692**	**0.5917**	**0.4552**	**0.3501**	**0.2693**
$PVIF_{0.35,t}$	**0.7407**	**0.5487**	**0.4064**	**0.3011**	**0.2230**

Answer:

I. Statement showing Evaluation of Replacement Proposal

Particulars	Time	P. V. Factor	Amount	P. V.
Cash Outflows:				
Cost of Machine			60,00,000	
Less: Scrap value of Old Machine				
S. P. ₹ 2,50,000				
Less: WDV ---				
Capital Gain ₹ 2,50,000				

Less: Tax (40%) ₹(1,00,000)			(1,50,000)	
Net Cost of Replacement	0	1	58,50,000	58,50,000
PVCO (A)				**58,50,000**
Cash Inflows:				
Incremental CFAT (See WN1)	1-5	3.3522	22,84,000	76,56,425
Incremental Salvage Value [₹ 2,50,000 – ₹ 21,000#]	5	0.4972	2,29,000	1,13,859
PVCI (B)				**77,70,284**
NPV (B) – (A)				**19,20,284**

= (₹ 35,000) (1 – 0.4) = ₹ 21,000
Note: Allocated Corporate Overheads are ignored as are irrelevant.

W. N. 1 Computation of Incremental CFAT

	Amount in (₹)
	1 – 5
(i) Incremental CFBT [See Note (i)]	30,40,000
Less: Depreciation Incremental $\left[\frac{₹60,00,000 - ₹2,50,000}{5 \text{ years}}\right]$ - 0	(11,50,000)
Incremental PBT	18,90,000
Less: Tax (40%) ---------- (2)	(7,56,000)
Incremental CFAT	**22,84,000**

Note: (i) Include [Material + Wages & Salaries + Supervision + Repairs and maintenance + Power]

New Machine Expenses = ₹ 148 per unit

Old Machine expenses = ₹ 173 per unit

Sales Revenue New Machine = 1,00,000 units

Sales Revenue by old = 80,000 units

= {1,00,000 units [₹ 200 – ₹ 148]} – {80,000 units [₹ 200 – ₹ 173]}

= ₹ 52,00,000 – ₹ 21,60,000 = ₹ 30,40,000

II. **(₹ '000)**

	0	**1**	**2**	**3**	**4**	**5**
Net Cash Flows	(5,850)	2,284	2,284	2,284	2,284	2,513
PVF at 20%	1.00	0.8333	0.6944	0.5787	0.4823	0.4019
PV of Cash flows	(5,850)	1,903.257	1,586.01	1,321.751	1,101.57	1,009.97
NPV	1,072.56					
PVF at 30%	1.00	0.7692	0.5917	0.4550	0.3501	0.2693
PV of Cash flows	(5,850)	1,756.85	1,351.44	1,039.44	799.63	676.75
NPV	(225.89)					

IRR = $20\% + 10\% \times \frac{1072.56}{1298.45} = 28.27\%$.

III. **Advise:** The Company should go ahead with replacement project, since it is positive NPV decision.

5. (c) (i) The capital structure of a company as on 31st March, 2015 is as follows:

	Amount in (₹)
Equity Capital: 6,00,000 Equity Shares of ₹ 100 each	6 crore
Reserve and Surplus	1.20 crore
12% Debenture of ₹ 100 each	1.80 crore

For the year ended 31st March, 2015 the company is expected to pay equity dividend @ 24%. Dividend is likely to grow by 5% every year. The market price of equity share is ₹ 600 per share. Income-tax rate applicable to the company is 30%.

Required:

I. Compute the Current Weighted Average Cost of Capital.

II. The company has plan to raise a further ₹ 3 crore by way of long-term loan at 18% interest. If loan is raised, the market price of equity share is expected to fall to ₹ 500 per share. Calculate the new weighted average cost of capital of the company. [2+3]

Answer:

(I) $K_d = \frac{I(1-t)}{NP} = \frac{₹12(1-0.30)}{₹100} = 8.4\%$

$K_e = \frac{D_1}{P_O} + g = \frac{₹24}{₹600} + 5\% = 9\%$

Computation of Current Weighted Average Cost of Capital

Source	Amount in (₹ in crores)	Weights	Cost of Capital	WACC
Equity	7.20	0.8	9%	7.20%
Debenture	1.80	0.2	8.4%	1.68%
	9.00	1.0		8.88%

(II) Cost of Existing Debenture K_{d1} = 8.4%

Cost of Loan $K_{d2} = \frac{₹18(1-0.30)}{100} = 12.6\%$

$K_e = \frac{₹24}{₹500} + 5\% = 9.80\%$

Computation of New Weighted Average Cost of capital

Source	Amount (₹ in crores)	Weights	Cost of Capital	WACC
Equity	7.20	0.6	9.80%	5.88%
Debt (Loan)	3.00	0.25	12.6%	3.15%
Debentures	1.80	0.15	8.4%	1.26%
	12.00	1.0		10.29%

5. (c) (ii) List the advantages of a project report. [5]

Answer:

Advantages of a Project Report-

I. A Project Report lists the objective in various spheres of business and evaluates them from the right perspective.
II. Facilitates planning of business by setting guidelines for future action. The successful implementation of a project depends upon the line of action as suggested in the project report. Besides, comparison of results will depend upon the projected profitability and cash flows, production schedule and targets as laid down in the project report.
III. Identifies constraints on resources viz. manpower, equipment, financial and technological etc. well in advance to take remedial measures in due course of time.
IV. Helps in procuring finance from various financial institutions and banks which ask for such detailed information before giving any assistance.
V. Provides a framework of the presentation of the information regarding business required by Government for granting licenses, etc.