FINAL EXAMINATION

GROUP IV

(SYLLABUS 2008)

SUGGESTED ANSWERS TO QUESTIONS

JUNE 2013

Paper-18 : BUSINESS VALUATION MANAGEMENT

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

The figures in the margin on the right side indicate full marks.
Answer Question No. 1 which is compulsory carrying 25 marks and any five from the rest.

1. (a) State whether the following statements are True or False: 1x5=5

(i) Zero coupon bonds have no coupon rate, hence no yield.
(ii) Deferred Tax Liabilities are the liabilities towards payment of tax at some future point of time and hence, while calculating the Net Worth of a company, it should be deducted.
(iii) Value gap is the difference between the synergy value and purchase price.
(iv) Industrial groups are inherently less conservative than investors in allocating resources.
(v) In a debt for equity swap, a firm replacing equity with debt decreases its leverage ratio.

(b) Fill in the blanks using words/phrases given in the brackets: 1x10 = 10

(i) Price/Earning (PE) Ratio of a company is…….related to Dividend Payout Ratio, (positively/negatively/not).
(ii) The stronger a brand of a company is,…… its risk, (lower is/higher is/nothing can be said regarding)
(iii) Intangible assets are treated as…….assets, (fixed/fictitious)
(iv) ……risk remains fixed irrespective of number of securities in portfolio (systematic/ unsystematic)
(v) Seller of a futures contract incurs a loss when the future price……. (increases/decreases)
(vi) The…… (Tangible/ Intangible) Assets monitor is a management tool for organizations that wish to track and value their……assets, (tangible/ intangible)
(vii) Dividend yield is the dividend per share as a % of the……value of the share, (book/market)
(viii) The dividend discount model is a specific case of…….valuation.(bond/equity)
(ix) Super profit is the excess of future maintainable profit over…..expected profits, (normally/abnormally)
(x) DCF analysis requires the revenue and expenses of…….past/future)

(c) In each of the questions given below one out of the four options is correct. Indicate the correct answer: 2x5 =10

(i) Which is not a, human – capital related intangible asset?

(A) Trained workforce

(B) Employment agreements

(C) Union contracts

(D) Design patent

(ii) A share, Y, currently sells for ₹50. It is expected that in one year it will either rise to ₹55 or decline to ₹45. The value of a European call, if the strike price of the underlying share is ₹48 and the risk free interest rate is 9% p.a. is

(A) ₹9.33

(B) ₹11.33

(C) ₹18.33

(D) ₹20.50

(iii) The beta (β) of portfolio is equal to

(A) The beta of the market portfolio

(B) The arithmetic average of the individual security betas

(C) The weighted average of the individual security betas

(D) None of these

(iv) A company is having Book Value per share of ₹15 while the market value per share is ₹20. If a company has 20 crores number of shares and Book Debt of ₹100 crores, then its Enterprise Value will be

(A) ₹300 Crores

(B) ₹400 Crores

(C) ₹500 Crores

(D) None of the above

(v) If the company has a P/E Ratio of 12 and a ROE of 13%, then its Market to Book Value Ratio will be

(A) 1.09

(B) 1.56

(C) 9.34

(D) **Nothing can be concluded as information available is insufficient**

Answer 1.

(a)

(i) False

(ii) False

(iii) False

(iv) False

(v) False

(b)

(i) Positively

(ii) Lower

(iii) Fixed

(iv) Systematic
(v) Increases
(vi) Intangible , Intangible
(vii) Market Value
(viii) Equity
(ix) Normally
(x) Future

(c)

(i) (d) Design Patent
(ii) (b) ₹11.33
(iii) (c) The weighted average of the individual security betas.
(iv) (c) ₹500 Crores.
(v) (b) 1.56

2.(a) What do you understand by 'Knowledge companies'? 5

(b) 'Balance Scorecard translates a business's vision and strategy enabling better monitoring and management'. Do you agree with the statement? 5

(c) What are the factors that need to be taken into account in arriving at the replacement cost?

Answer 2.

(a) **Knowledge Companies**:

The term knowledge companies or knowledge intensive companies is increasingly being used to describe companies that focus or leverage their intellectual capital. Knowledge companies are utilizing their intellectual capital as a key source of competitive advantage. In a knowledge company, profits are generated primarily though the commercialization of new ideas and innovations, that is through the interaction of the company's human capital and structural capital that create intangibles always lead to a series of tangible outcomes, over a period of time. It is the interaction between tangible and intangibles that determine the corporate value. It is entrepreneurial activity that generates the primary value of so many business. The embedded 'know-how' or knowledge of an organization is dynamic, complex, heterogeneous and networked.

(b) **The Balanced Scorecard**:

The balance Scorecard (BSC), developed by prof. Robert Kaplan of Harvard Business School, is an organization framework for implement and managing a strategy at all levels of an enterprise by linking objectives, initiatives and measures to an organization's vision and strategy.

The BSC translates a business's vision and strategy into objectives and measures across four balanced perspectives – financial performance, customers, internal business processes, and organizational growth, learning and innovation. A BSC is a structured way of communicating measurements and targets, and is becoming a widwspread way of how to manage,

measure and communicate the financial, non- financial and intangible assets of a company. The BSC allows an organization to monitor both its current performance (financial, customer satisfaction and business process) and its efforts to improve processes, motivate and educate employees and enhance its ability to learn and improve. The BSC is closely related to the concept of intellectual capital and comprises not only tools for the measurement of intangible resources but also a vision of continuous learning and changes as to create value for the future. Since being introduced in 1992 the balance scorecard concept has been implemented at the corporate, strategic business unit and even individual level in hundreds of public and private sector organizations worldwide.

Despite its widespread use, the balanced scorecard concept does suffer from several shortcomings. Firstly, the creation of a BSC can involve a considerable amount of time on the part of everyone whose performance is to be measured. The selection of appropriate measures for the four perspectives can be especially time consuming. This is due to that fact that in any company there are a large number of potential goals and targets, and even more ways to measured and how to measure those objectives, and it will take time until consensus is achieved. Secondly, a well- designed scoreboard will be useless without the participation and commitment of staff in implementing and using it. Thirdly, companies using BSC often come up with too many measures. For example, a division of one company came up with 500 important measures for its scorecard on the first pass. This is a problem because it is very difficult to accurately track a large numbers. Fourthly, the BSC does not have an explicit focus on intellectual capital – unlike some later IC measurement models. Finally, the fact that a BSC gathers all key indicators of business perfortm.mca (and their linkages) into one management tool may deprive a company's executives of the various information flows required to remain competitive in today's challenging business environment.

(c)

The factors that need to be taken into account in arriving at the replacement cost are:

1. Current F. O. B/ F.O. R Cost of a new asset
2. Price escalation
3. Foreign Currency rate
4. Duties & taxes: Customs/ Excise/ S. tax
5. St off as Cenvat credit
6. Freight, Insurance, handling, Inland transit
7. Erection costs

3. The following financial statements have been extracted from the Annual report 2011-12 of solid Biscuit Ltd. Balance sheet of solid Biscuits Ltd. as At 31st March…… 5

(₹. In Crores)

Particulars	2011	2012
Equity and Liabilities **Shareholder's Funds**		

Share capital	23.89	23.89
Reserves and surplus	427.41	496.15
	451.30	520.04
Non- Current Liabilities		
Long- term Borrowings	430.57	28.15
Deferred tax liabilities (Net)	6.24	8.16
Other long term liabilities	15.99	19.91
Long term provisions	122.68	116.82
	575.48	173.04
Current Liabilities		
Trade payables	239.68	336.20
Other current liabilities	119.38	518.26
Short term provisions	96.65	124.80
	455.71	979.26
TOTAL	1,482.49	1,672.34
Assets		
None- Current Assets		
Fixed Assets:		
Tangible assets	298.68	370.63
Capital work-in-progress	5.02	8.46
Intangible assets	11.70	79.73
	315.40	458.82
Other non-current Assets:		
Non current investments	308.94	218.40
Long-term loans and advances	142.13	125.02
Other non-current assets	12.12	12.12
	463.19	355.54
Current- Assets		
Current investments	236.06	210.54
Inventories	311.20	382.28
Trade receivable	57.26	52.14
Cash and bank balance	28.75	30.94
Short- term loans and advances	70.63	182.08
	703.90	857.98
Total	1,482.49	1,672.34

Statement of profit And Loss of solid Biscuit Ltd. for the Year Ending on 31st March……

(₹. In Crores)

Particulars	2011	2012
Revenue from operations	4,230.59	5,005.66
Less: Excise duty	32.27	58.62
	4,198.32	4,947.04
Other Operating income	25.20	27.15
Other Income	48.92	58.53

Total revenue	**4,272.44**	**5,032.72**
EXPENSES		
Raw materials consumed	**2,371.92**	**2,655.01**
Cost of finished, semi- finished and other Products sold/consumed	**392.42**	**524.74**
Employee benefits expense	**119.93**	**145.87**
Depreciation and amortization expense	**37.75**	**38.07**
Finance costs	**44.59**	**47.32**
Other expenses	**1,107.77**	**1,369.34**
Total Expenses	**4,074.38**	**4,780.35**
Profits/(Loss) Before tax	**198.06**	**252.37**
Tax Expenses	**52.77**	**65.63**
Profits/(Loss) After Tax	**145.29**	**186.74**

- **Miscellaneous information about the Company**

1. Face value of the Share of the Company	**₹2 per share**
2. Beta of the company	**0.90**
3. Promoter's Holding	**62.59%**

4. Dividend History of the Company:

Year ending on March 31,	Dividend Rate (%)
2003	100
2004	110
2005	140
2006	150
2007	150
2008	180
2009	400
2010	250
2011	325
2012	425

5. Effective Corporate dividend Tax Rate = 16.22%

- **Miscellaneous information about the Industry to which the company belong to:**

P/E (Price/Earning Ratio)	**31.68**
P/B (Price/Book value Ratio)	**9.42**
Market capitalization/Enterprise Value	**0.97**
Enterprise value/PBDITA	**19.06**

- **Miscellaneous information about the Stock Market and Interest Rate:**
  1. **The Market Rate of Return 15.60%**
  2. **Risk Free Interest Rate 7.75%**

On the basis of the above, you are required to determine the following:

i. Intrinsic value of the share using constant Growth Model. 5

ii. Determine the relative valuation of the company's share using

I.	**P/E Multiple**	**2**
II.	**P/B Multiple**	**4**
III.	**Market capitalization/Enterprise Value**	**4**

Answer 3.

Determination of Intrinsic Value of the Share using constant Growth Model:

(₹ in crores)

Calculation of Net Worth	**31 – Mar -12**
Share Capital	₹23.89
Reserves and Surplus	₹496.15
Deferred tax liabilities (Net)	₹8.16
Net Worth	**₹528.20**
Calculation of return on Equity	
PAT	₹186.74
Return on Equity	**35.35%**

(₹ in crores)

Dividend Particulars	2011-12
Total share capital	₹23.89
No. of shares (No. in crores)	11.945
Dividend per share (₹2*425%)	₹8.50
Total dividend	₹101.53
Tax on dividends @ 16.22%	₹16.47
Total pay Out	₹118.00
PAT (Profit after tax)	₹186.74
Dividend pay Out ratio	**63.19%**
Retention Ratio	36.81%
Return on Equity (ROE)	35.35%
Growth Rate (ROE x retention rate)	**13.01%**
Dividend per share	8.50
Cost of Equity	14.81%
Intrinsic Value of the Share	**₹533.32**

Calculation of the cost of Equity using CAPM:

Risk Free Interest rate	7.755
Market rate of return	15.60%
Beta of the Company	0.90%
Cost of Equity	**14.81%**

I. Answer:

Valuation as per P/E Multiple

(₹ in crores)

Industry P/E Multiple	31.68
PAT	₹186.74
No. of Shares	11.945
Earning Per share(EPS)	₹15.63
Valuation as per P/E Multiple	**₹495.26**

II. Answer:

Valuation as per P/B Multiple

Industry P/B Multiple	9.42
Net worth	₹528.20
No. of Shares	11.945
Book value Per share(B)	₹44.22
Valuation as per P/B Multiple	**₹416.55**

III.Answer:

Valuation as per market capitalization/ Enterprise value

Industry Market capitalization/Enterprise value	0.97
Industry enterprises value/PBDITA	19.06
PBITA (profit Before Depreciation Interest tax and amortization) = (Profit Before tax + Finance Cost + depreciation and Amortization)	₹337.76
Enterprise value (19.06 *337:76)	₹6,437.71
Market capitalization as per Industry ratio of Market Capitalization/ Enterprise value	₹6,244.57
No. Shares	11.945
Valuation as per Market capitalization/ Enterprise value (₹ in crores)	**₹522.78**

4. Frontier Company Limited (FCL) is in negotiation for taking over Back Moving Company Limited (BMCL). The management of FCL is seeing strong strategic fit in taking over BMCL provided it is a profitable proposition. Mr. Guha, GM (Finance) has been asked to look into the viability of the probable takeover of BMCL. He has collected the following necessary information. **15**

Summarized Balance Sheet of Back Moving Company Limited (BMCL) as on March 31, 2012

LIABILITIES	Amount (₹ in crores)
Shareholders' Fund:	
Equity Share Capital (₹10 par)	**200.00**
12% Preference Capital (₹100 par)	**75.00**
Reserves and Surplus	**125.00**
	400.00
Non-Current Liabilities:	
10% Debentures	**40.00**
Long Term Loans	**25.00**
	65.00
Current Liabilities:	
Current Liabilities	**24.75**
Total Liabilities	**489.75**
ASSETS	

Non-Current Assets	
Net Fixed Assets	**332.75**
Investments	**125.00**
	457.75
Current Assets:	
Inventories	**10.00**
Debtors	**15.00**
Cash in Hand and at Bank	**4.25**
Loans and Advances	**1.75**
	31.00
Miscellaneous Expenses to the extent not written off	**1.00**
Total Assets	**489.75**

Proposed Purchase Consideration:

- **10.50% Debentures of FCL for redeeming 10% Debentures of BMCL - ₹44 crores.**
- **11 % Convertible Preference Shares of FCL for the payment of Preference Shareholders of BMCL - ₹100 crores.**
- **12.50 crores of Equity Shares of FCL would be issued to the shareholders of BMCL at the prevailing market price of ₹20 each.**
- **FCL would meet all dissolution expenses of ₹0.50 crores.**

The management of FCL would dispose any asset and liability which may not be required after takeover:

- **Investments ₹150 crores**
- **Debtors ₹15 crores**
- **Inventories ₹9.75 crores**
- **Payment of Current Liabilities ₹25 crores**
- **All intangible assets will be written off**

The management of FCL would like to run the takenover company, BMCL, for next 7 years and after that, it would discontinue with it. It is expected that for the next 7 years, the takenover company would generate the following yearly operating cash flows after tax:

	1	2	3	4	5	6	7
Operating Cash Flows After Tax (₹ In crores)	**70**	**75**	**85**	**90**	**100**	**125**	**140**

It is estimated that the terminal cash flows of BMCL would be ₹ 50 crores at the end of 7th year.

If the cost of capital of FCL is 16%, then you are required to find out whether the decision to takeover BMCL at the terms and conditions mentioned above will be a profitable decision:

Year	1	2	3	4	5	6	7
Discounting Factor @ 16%	**0.8621**	**0.7432**	**0.6407**	**0.5523**	**0.4761**	**0.4104**	**0.3538**

Answer 4.

Cost of Acquisition:		
Proposed Payments:		
Dissolution Expenses	0.50	
Current Liabilities	25.00	
10.50% debentures	44.00	
11% Convertible Preference Shares	100.00	
Equity Shares	250.00	
		419.50
Less:		
Sales proceeds from-		
Investments	150.00	
Debtors	15.00	
Inventories	9.75	
Cash and Bank Balance		
	174.75	
	4.25	179.00
Net cost of Acquisition		**240.50**

Year	Cash Flows (in ₹ crores)	Discounting factor	Present Value
1	70	0.8621	60.34
2	75	0.7432	55.74
3	85	0.6407	54.46
4	90	0.5523	49.71
5	100	0.4761	47.61
6	125	0.4104	51.31
7	140	0.3538	49.54
7	50	0.3538	17.69
		Total =	386.39

Since the present Value of the future cash flows is more than the cost of acquisition, it will be a profitable proposition to take over the said company, BMCL.

5. (a) Identify and explain four techniques of relative valuation. 5
(b) What are the misconceptions about Valuation? 5
(c) How do you minimize Valuation bias? 5

Answer 5.

(a) Relative valuation approaches and techniques are based on the premise that the value of any asset can be estimated by analyzing the market prices of similar or comparable assets. In this approach comparable assets are identified and their market value obtained (e.g. from share price listing on stock exchange). These market values are converted into multiples based on revenues or EBITDA or other key numbers. The multiple or adjusted multiple is

applied to the asset being valued to obtain its market value.

Thus, relative valuation techniques assume that prices have stable and consistent relationships to various firm variables across groups of firms:

(i) Price – earnings ratio
(ii) Price – cash flow ratio
(iii) Price – book value ratio
(iv) Price sales ratio

i) The **Price- earnings ratio**, popularly known as P/E ratio is affected by two variables;

(i) Required rate of return on its equity (k)
(ii) Expected growth rate of dividends (g)

$$\frac{P}{E1} = \frac{\frac{D1}{E}}{k-g}$$ using the P/E approach to valuation we can (i) estimate earnings for the next year, (ii) Estimate P/E ratio and (iii) multiply expected earning by the expected P/E ratio to get expected price

$$V = E_1 * \frac{P}{E}$$

ii) **Price – cash flow ratio**: Cash flows can also be used in this approach are often considered less susceptible to manipulation by management. The steps are similar to using P/E ratio

$$V - CF_1 * \frac{P}{CF}$$

iii) **Price – book value rateio**: Book values can also be used as a measure of relative value. The steps to obtaining valuation estimates are again similar to using the P/E ratio

$$V = BV_1 * \frac{P}{BV}$$

iv) **Price sales ratio**: Finally, sales can be used in relation to stock price. There are some drawbacks, in that sales do not necessarily produce profits and positive cash flows. The advantage is that sales are also less susceptible to manipulation. The steps are similar to using the P/E ratio

$$V = S_1 * \frac{P}{S}$$

(b) There are a number of misconceptions about valuation. Some of the misconceptions are as under : -

i) A valuation is an objective search for true value
ii) A good valuation provides a precise estimate of value
iii) The more quantitative, the better the valuation
iv) Valuing a private business should be done only when the business is ready to be sold
v) Business in an industry always sell for 'X' times the annual revenue. So why should valuation of the business be done by external valuer
vi) The business should be at least worth equivalent to what a competitor sold his business recently
vii) The business loses money, so it is not worth much.

(c) Valuation bias exists and no valuation is completely objective or 'true'. The effort can be made to minimize the direction (i.e. over or under valuation) and magnitude(how much is the variation) of the bias. Bias may be introduced due to personal views of valuer, source of data, assumptions

made, which party has commissioned the valuation (buyer or seller) etc.

Bias can't be regulated or legislated out of existence, However, there are ways in which we can mitigate the effects of bias on valuation: -

Reduce institutional pressures: A significant portion of bias can be attributed to Institutional factors. Equity-research analysts in the 1990s, for instance, in addition to dealing with all of the standard sources of bias had to grapple with the demand from their employers that they bring in investment banking business. Institutions that want honest sell-side equity research should protect their equity research analysts from such bias.

De-link valuations from reward/punishment: Any valuation process where the reward or punishment i s conditioned on the outcome of the valuation will result in biased valuations. In other words, if we want acquisition valuations to be unbiased, we have to separate the deal analysis from the deal making to reduce bias.

No pre-commitments: Decision makers should avoid taking strong public positions on the value of a firm before the valuation is complete. An acquiring firm that comes up with a price prior to the valuation of a target firm has put analysts in an untenable position, where they are- called upon to justify this price. In far too many cases, the decision on whether a firm is under or overvalued precedes the actual valuation, leading to seriously biased analyses.

Self- Awareness: The best antidote to bias is awareness. An analyst who is aware of the biases he or she brings to the valuation process can either actively try to confront these biases when making input choices or open the process up to more objective points of view about a company's future.

Honest reporting: In Bayesian statistics, analysts are required to reveal their priors (biases) before they present their results from an analysis. Thus, an environmentalist will have to reveal that he or she strongly believes that there is a hole in the ozone layer before presenting empirical evidence to that effect. The person reviewing the study can then factor that bias in while looking at the conclusions. Valuations would be much more useful if analysts revealed their biases up front.

While we cannot eliminate bias in valuations, we can try to minimize its impact by designing valuation processes that are more protected from overt outside influences and by report our biases with our estimated values

6. The following projections for T Ltd., have been developed based on internal estimates and market information: 15

₹ In million					
Year	**1**	**2**	**3**	**4**	**5**
Free cash flow to the firm	**200**	**250**	**300**	**340**	**380**
Interest bearing debt	**500**	**400**	**300**	**200**	**100**
Interest expenses	**60**	**48**	**36**	**24**	**12**

You are required to calculate the enterprise value of T Ltd., using the following assumptions:

(a) Beyond year 5, the free cash flow to the firm will grow at a constant rate of 10 percent per annum
(b) T Ltd.'s unlevered cost of equity is 14%
(c) After year 5, T Ltd. will maintain a debt equity ratio of 4:7
(d) The borrowing rate for T Ltd. will be 12 percent
(e) The tax rate for T Ltd. is 30%
(f) The risk free rate of return is 8%
(g) The market risk premium is 6%

Answer 6.

The present value of the unlevered equity free cash flow (which is the same as the free cash flow to the firm) during the planning period is :

$$\sum_{t=1}^{n} \frac{FCFF_t}{(1+r_{UE})^t} = \frac{200}{(1.14)} + \frac{250}{(1.14)^2} + \frac{300}{(1.14)3} + \frac{340}{(1.14)^4} + \frac{380}{(1.14)^5} = ₹969 \text{ million}$$

The present value of the interest tax shield during the planning period is:

$$\sum_{t=1}^{n} \frac{I_t * T}{(1+r_D)^t} = \frac{60 \times 0.3}{(1.12)} + \frac{48 \times 0.3}{(1.12)^2} + \frac{36 \times 0.3}{(1.12)3} + \frac{24 \times 0.3}{(1.12)^4} + \frac{12 \times 0.3}{(1.12)^5} = ₹41.9 \text{ million}$$

The Present value of the terminal value at the end of the planning period is:

$$\frac{FCFF_n(1+g)}{WACC-g}\left[\frac{1}{1+r_{UE}}\right]^n = \frac{380(1.10)}{0.1349-0.10}\left[\frac{1}{1.14}\right]^5 = ₹6220.5 \text{ million}$$

Hence the enterprise value of the Optex Ltd. is:
969.0+41.9+6220.5= ₹7231.4 million
It may be noted that the WACC value of 13.49% used above has been arrived as follows:

1. Given that r_{UE} is 14%, β_{UE}, the unlevered equity beta, was calculated by solving the following equation:

   r_{UE} = Risk – free rate + β_{UE} * Market risk premium
   14 = 8 + β_{UE} * 6
   β_{UE} = 1
2. Given β_{UE} = 1, β_{LE}, the levered equity beta was calculated:

   $B_{LE} = \beta_{UE}[1+ (1-T)\frac{D}{E}]$
   = 1[1+4/7(1-0.3)]
   = 1.4
3. Given β_{UE} = 1.4, r_{LE}, the cost of levered equity was calculated:

   r_{LE} = 8+1.4*6 = 16.4%
4. Given r_{LE} = 16.4%, WACC, the weighted average cost of capital was calculated.
   WACC = $\frac{7}{11}$ * 16.4 + $\frac{4}{11}$ * 12* (1-0.3) = 10.44 + 3.05 = 13.49%

7. XYZ Ltd. is faced with a decision to purchase or acquire on lease a mini car. The cost of mini car is ₹1,26,965. It has a life of 5 years. The mini car can be obtained on lease by paying equal lease rental annually. The leasing company desires a return of 10% on the gross value of the lease assets. XYZ Ltd. can also obtain 100% finance from its regular banking channel. The rate of interest will be 15% pa and the loan will be paid in 5 equal annual instalments, inclusive of interest. The effective tax rate of the company is 40%. For the purpose of taxation, it is to be assumed that the asset will be written off over the period of 5 years on a straight line basis.

(a) Advice XYZ Ltd. Which option should the company consider? 10

(b) What should be the annual lease rental to be charged by leasing company to match the loan option? 5

Present Value of ₹1

Rate of Interest / Year	10%	15%	9%
1	.91	.87	.92
2	.83	.76	.84
3	.75	.66	.77
4	.68	.57	.71
5	.62	.49	.65

Answer 7.

(a) Cost of mini car is ₹1,26,965

Assume lease rent is payable at the beginning of each year for five years.

So total present value of Re 1;

$$\text{Re } 1 = 1 + \frac{1}{(1+1)} + \frac{1}{(1+.1)^2} + \frac{1}{(1+.1)^3} + \frac{1}{(1+.1)^4} = 4.17$$

Therefore annual lease rent payable at beginning of each year for five years = 1,26,965/4.17 = ₹30,447

As there is no security deposit so initial cost is Zero.

Period	1	2	3
	Rent(₹)	Tax savings on Rent (₹)	Inflow(₹) (2)-(1)
0	30,447	-------	(30,447)
1	30,447	12,179	(18,268)
2	30,447	12,179	(18,268)
3	30,447	12,179	(18,268).
4	30,447	12,179	(18,268)
5		12,179	12,179

Cost of debt = 15% (fully financed by debt)
Cost of debt after tax [155 (1 -4)] = 9% cost of capital
Total present value of Re. 1 at 9% interest rate

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

NPV = -30,447 – (18,268 x 3.24)+ (12,179 x .65) = ₹(-)81,719
If mini car is purchased:
Cost of machine ₹1,26,965
Assume loan instalment including 15% interest p. a is to be paid at the beginning of the year.
So total present value of Re. 1 @ 15% interest p. a. is to be paid at the beginning of the year.
So total present value of Re 1 @ 15% interest rate.

$$1 + \frac{1}{(1+.15)} + \frac{1}{(1+.15)^2} + \frac{1}{(1+.15)^3} + \frac{1}{(1+.15)^4} = 3.86$$

So loan instalment inclusive of interest = $\frac{1,26,965}{3.86}$ = ₹32,892

Clarification of interest and principle of loan re payment year

Particulars	Loan	Interest	Principal
Beginning of 1st year	1,26,965		
Less: 1st instalment	32,892		
	94,073		
Add: Interest 1st year @ 15%	14,111		
	1,08,184		
Less: Instalment at the beginning of 2nd year	32,892	14,111	18,781
	75,292		
Add: interest of 2nd year	11,294		
	86,586		
Less: Instalment at the beginning of 3rd year	32,892	11,294	21,598
	53,694		
Add; interest of 3rd year	8,054		
	61,748		
Less: Instalment at the beginning of 4th year	32,892	8,054	24,838
	28,856		
Add: Interest of 4th year	4,036		
	32,892		
Less: Instalment at the beginning of 5th year	32,892	4,036	28,856

Year	(1) Cash outflow for principal payment	(2) Cash outflow for interest payment	(3) Tax savings on interest 3 = (2) x 0.40	(4) Depreciation on 1,26,965	(5) Cash inflow in terms of tax savings on depreciation	(6) Inflow (3+5-1-2)
0	32,892	-----	----	0	------	(32,892)
1	18,781	14,111	5,644	25,393	10,157	(17,091)
2	21,598	11,294	4,518	25,393	10,157	(18,218)
3	24,838	8,054	3,222	25,393	10,157	(19,513)
4	28,856	4,036	1,614	25,393	10,157	(21,121)
5	---	---	----	25,393	10,157	10,157

$$NPV = \frac{-32,892}{1} + \frac{-17,091}{(1+.09)} + \frac{-18,218}{(1+0.09)^2} + \frac{-19,513}{(1+.09)^3} + \frac{-21,121}{(1+.09)^4} + \frac{10,157}{(1+.09)^5} - 0 = ₹ - 87,335$$

As revenue in both the cases are same and hence ignored. As revenue is ignored so NPV in both the cases are negative. In case of lease option negative NPV is lower at ₹ - 81,719 as compared to NPV at ₹ - 97,335 for purchase option. So it is advisable to take the lease option.

(b) Assume the lease rental at beginning of each year to be ₹ X. So that it matches with loan option i.e., its NPV is equal to NPV of purchase option

Year	(1) Lease rent (₹)	(2) Tax savings on rent	(3) Cash inflow

			(2) – (1)
0	X	------	(X)
1	X	.4X	(.6X)
2	X	.4X	(.6X)
3	X	.4X	(.6X)
4	X	.4X	(.6X)
5		.4X	.4X

$$NPV = \frac{-x}{1} + \frac{-.6x}{(1+.09)^1} + \frac{-.6x}{(1+.09)^2} + \frac{-.6x}{(1+.09)^3} + \frac{-.6x}{(1+.09)^4} + \frac{.4x}{(1+.09)^5} - 0$$

= -x-(.6x *3.24) + .4x *.65 = -2.684x

By condition

-2.684x = -87,335

Breakeven lease rent: x = ₹32,539

Therefore, annual lease rent will be ₹32,539, payable at the beginning of each year for 5 years.

8. A company is trying to decide whether to invest in a new project. Two mutually exclusive projects are available, each requiring an investment of ₹3,00,000. Project A is expected to generate cash inflows of ₹2,00,000 per year in the next two years. It is estimated that the cash inflows associated with project B would either be ₹1,80,000 or ₹2,20,000 (each with 0.5 probability of occurrence) in the first year. If ₹1,80,000 is received in the first year, the cash inflow for the second year is likely to be ₹1,50,000 (probability of 0.3) ₹1,80,000 (Probability of 0.4) and ₹2,00,000 (probability of 0.3).

In case the first year's cash inflow is ₹2,20,000, the second year's likely cash inflow would be ₹1,80,000 and ₹2,70,000 (each with 0.3 probability) and ₹2,20,000 (Probability 0.4). The firm uses a 14% minimum required rate of return for deciding whether to invest in projects comparable in risk to the ones under consideration.

Required :

(a) Calculate the risk adjusted expected NPV for projects A and B. 10
(b) Identify the best and the worst possible outcomes for Project B. 3
(c) Which of the projects, if any, would you recommend? Why? 2

(The PV of 1 rupee at 14%: year 1: .877, year 2: .769 year 3: .675, year 4: .592 and year 5: .519)

Answer 8.

(i) Determination of expected NPV of project A –

Year	CFAT (₹)	PVF at 14%	Total PV (₹)
1	2,00,000	.877	1,75,400
2	2,00,000	.769	1,53,800
			3,29,200
	Less: PV of cash outflows		(-) 3,00,000
		NPV	₹29,200

Determination of expected NPV of Project B

Time 0		1		$CFAT_2$ (₹)	NPVat 14% (₹)	Joint Probability	Expected NPV(₹)*
Cost of the Project ₹ 3,00,000	0.5	CFAT ₹ 1,80,000	.3	1,50,000	-26,790	0.15	- 4,020
			.4	1,80,000	-3,720	0.20	-740
			.3	2,00,000	11,660	0.15	1,750
	.5	CFAT ₹ 2,20,000	.3	1,80,000	31,360	0.15	4,700
			.4	2,20,000	62,120	0.20	12,420
			.3	2,70,000	1,00,570	0.15	15,090
						NPV	29,200

(*Rounded off to nearest ten ₹)

(ii)The worst possible outcome is a CFAT of ₹ 1,80,000 (year 1) and ₹ 1,50,000 (years 2) with the maximum negative NPV as ₹ (-) 26,790.

The best possible outcome is when NPV is maximum ₹ 1,00,570. It results when CFAT in year 1 is ₹ 2,20,000 followed by ₹ 2,70,000 in year 2.

(iii) The expected NPVs (i.e. 29,200) are the same for both projects. However, from the point of view of risk aversion, project A should be chosen as there is no variability of possible outcomes and associated revenues.


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