COMPENDIUM
ON

FINANCIAL MANAGEMENT
&
INTERNATIONAL FINANCE

ICWAI - FINAL
GROUP – III

PAPER – 12

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PROJECT PLANNING & INVESTMENT ANALYSIS

Question 1

Alpha Limited is faced with a decision to purchase or acquire on lease a mini car. The cost of the mini car is ₹ 2,53,930. It has a life of 5 year The mini car can be obtained on lease by paying equal lease rentals annually. The leasing company desires a return of 10% on the gross value of the asset. Alpha Limited can also obtain 100% finance from its regular banking channel. The rate of interest will be 15% p.a. and the loan will be paid in five annual equal 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 a period of 5 years on a straight line basis.

(a)   Advise Alpha Limited about the method of acquiring the car.
(b)   What should the annual lease rental to be charged by the leasing company to match the loan option?
For your exercise use the following discount factors:

Discount rate	Years				
	1	2	3	4	5
10%	0.91	0.83	0.75	0.68	0.62
15%	0.87	0.76	0.66	0.57	0.49
9%	0.92	0.84	0.77	0.71	0.65

Answer

(a)   Alpha Ltd.

Computation of annual loan repayment instalment

$$= \frac{\text{Loan amount}}{\text{Annuity factor of 15\%}} = ₹ \ \frac{2,53,930}{3.86} = ₹ \ 65,785$$

Note: Annuity factor is based on the assumption that loan instalment is repaid at the beginning of the year to be at par with lease rentals. Such annuity factor at 15% works out to be 3.86.

Computation of interest in debt payments

(₹)

Year	0	1	2	3	4
Opening Balance of Principal	2,53,930	1,88,145	150,582	1,07,384	57,707
Interest @ 15%	_____	28,222	22,587	16,108	8,078[*]
Total	2,53,930	2,16,237	1,73,169	1,23,492	65,785
Repayment of Instalment	65,785	65,785	65,785	65,785	65,785
Closing Balance	**1,88,145**	**1,50,582**	**1,07,384**	**57,707**	**Nil**

*Difference between the instalment amount and opening balance of 4th year.

Schedule of Cash Outflows in debt financing

(₹)

End of year	Annual loan repayment instalment	Interest @ 15%	Depreciation	Tax shield	Net cash outflows	PV factor at 9%	Present value of cash flow at 9%
	(1)	(2)	(3)	(4)	(5)		(6)
				[((2) + (3) × t]	(1) – (4)		
0	65,785	–	–	–	65,785	1.00	65,785
1	65,785	28,222	50,786	31,603	34,182	0.92	31,447
2	65,785	22,587	50,786	29,349	36,436	0.84	30,606
3	65,785	16,108	50,786	26,758	39,027	0.77	30,189
4	65,785	8,078	50,786	23,546	42,239	0.71	29,990
5	–	–	50,786	20,314	(20,314)	0.65	(13,204)
		Total					₹ 1,74,813

Computation of Annual lease rentals:

$$= \frac{\text{Cost of assets}}{\text{Annuity factors of 10\%}} = ₹\ \frac{2,53,930}{4.17} = ₹\ 60,894$$

Schedule of Cash outflows – Leasing alternative

(₹)

End of year	Lease payment	Tax shield	After tax cash out flows	PV factor at 9%	Present value of cash flow at 9%
0	60,894	–	60,894	1.00	60,894
1-4	60,894	24,358	36,536	3.24	1,18,377
5	–	24,358	(24,358)	0.65	(15,833)
Total Present Value =	1,63,438				

Decision: The present value of cash outflows under lease financing is ₹ 1,63,438 while that of debt financing (i.e. owning the asset) is ₹ 1,74,813. Thus leasing has an advantage over ownership in this case.

(b) Let the annual lease rentals be X.

Therefore, the after tax cost of lease rentals will be 0.60 x

Present value will be 0.60 x × 4.17 = 2.502 x

Equating 2.502 x = ₹ 1,74,813; the value of x is obtained at ₹ 69,869.

Therefore the lease rentals should be ₹ 69,869 to match the loan option.

Compendium: Financial Management & International Finance

Question 2

Nine Gems Ltd. has just installed Machine – R at a cost of ₹ 2,00,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 1,50,000 units, which can be sold at ₹ 6 per unit. Annual operating costs are estimated at ₹ 2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at ₹ 3 per unit for the same level of production.

Nine Gems Ltd. has just come across another model called Machine – S capable of giving the same output at an annual operating cost of ₹ 1,80,000 (exclusive of depreciation). There will be no change in fixed costs. Capital cost of this machine is ₹ 2,50,000 and the estimated life is for five years with nil residual value. The company has an offer for sale of Machine – R at ₹ 1,00,000. But the cost of dismantling and removal will amount to ₹ 30,000. As the company has not yet commenced operations, it wants to sell Machine – R and purchase Machine –S. Nine Gems Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available.

The cost of capital may be assumed at 15%. P.V. factors for five years are as follows:

Year	P.V. Factors
1	0.8696
2	0.7561
3	0.6575
4	0.5717
5	0.4972

(i) Advise whether the company should opt for the replacement.

(ii) Will there be ay change in your view, if Machine-R has not been installed but the company is in the process of selecting one or the other machine?

Support your view with necessary workings.

Answer

(i) Replacement of Machine – R:

Incremental cash out flow

		₹
(i)	Cash outflow on Machine – S	2,50,000
	Less: Sale value of Machine – R	
	Less: Cost of dismantling and removal (₹ 1,00,000 – 30,000)	70,000
	Net outflow	1,80,000
	Incremental cash flow from Machine –S	
	Annual cash flow from Machine – S	2,70,000
	Annual cash flow from Machine – R	2,50,000
	Net incremental cash in flow	**20,000**

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Present value of incremental cash in flows = ₹ 20,000 × (0.8696 + 0.7561 + 0.6575 + 0.5717 + 0.4972)

= 20,000 × 3.3523 = ₹ 67,046

NPV of Machine – S = ₹ 67,046 – ₹ 1,80,000 = (–) ₹ 1,12,954.

₹ 2,00,000 spent on Machine – R is a sunk cost and hence it is not relevant for deciding the replacement.

Decision: Since Net present value of Machine –S is in the negative, replacement is not advised.

If the company is in the process of selecting one of the two machines, the decision is to be made on the basis of independent evaluation of two machines by comparing their Net present values.

(ii) Independent evaluation of Machine– R and Machine –S

	Machine– R	Machine– S
Units produced	1,50,000	1,50,000
Selling price per unit (₹)	6	6
Sale value	9,00,000	9,00,000
Less: Operating Cost (exclusive of depreciation)	2,00,000	1,80,000
Contribution	7,00,000	7,20,000
Less: Fixed cost	4,50,000	4,50,000
Annual Cash flow	2,50,000	2,70,000
Present value of cash flows for 5 years	8,38,075	9,05,121
Cash outflow	2,00,000	2,50,000
Net Present Value	6,38,075	6,55,121

As the NPV of Cash in flow of Machine-S is higher than that of Machine-R, the choice should fall on Machine-S.

Note: As the company is a zero tax company for seven years (Machine life in both cases is only for five years), depreciation and the tax effect on the same are not relevant for consideration.

Question 3

Excel Ltd. manufactures a special chemical for sale at ₹ 40 per kg. The variable cost of manufacture is ₹ 25 per kg. Fixed cost excluding depreciation is ₹ 2,50,000. Excel Ltd. is currently operating at 50% capacity. It can produce a maximum of 1,00,000 kgs at full capacity.

The Production Manager suggests that if the existing machines are fully replaced the company can achieve maximum capacity in the next five years gradually increasing the production by 10% per year. The Finance Manager estimates that for each 10% increase in capacity, the additional increase in fixed cost will be ₹ 50,000. The existing machines with a current book value of ₹ 10,00,000 can be disposed of for ₹ 5,00,000. The Vice-President (finance) is willing to replace the existing machines

provided the NPV on replacement is about ₹ 4,53,000 at 15% cost of capital after tax.

(i) You are required to compute the total value of machines necessary for replacement.

For your exercise you may assume the following:

(a) The company follows the block assets concept and all the assets are in the same block. Depreciation will be on straight-line basis and the same basis is allowed for tax purposes.
(b) There will be no salvage value for the machines newly purchased. The entire cost of the assets will be depreciated over five year period.
(c) Tax rate is at 40%.
(d) Cash inflows will arise at the end of the year.
(e) Replacement outflow will be at the beginning of the year (year 0).
(f)

Year	0	1	2	3	4	5
Discount Factor at 15%	1	0.87	0.76	0.66	0.57	0.49

(ii) On the basis of data given above, the managing director feels that the replacement, if carried out, would at least yield post tax return of 15% in the three years provided the capacity build up is 60%, 80% and 100% respectively. Do you agree?

Answer

(i) Computation of the total replacement value of machine. (Assuming that existing machines also have valid life for 5 years

Step 1 : Incremental Cash Inflows

Year	1	2	3	4	5
Incremental Capacity	10%	20%	30%	40%	50%
Incremental production and sales (Kgs.)	10,000	20,000	30,000	40,000	50,000
	₹	₹	₹	₹	₹
Incremental contribution	1,50,000	3,00,000	4,50,000	6,00,000	7,50,000
Incremental Fixed cost	50,000	1,00,000	1,50,000	2,00,000	2,50,000
Incremental PBTD	1,00,000	2,00,000	3,00,000	4,00,000	5,00,000
Tax at 40%	40,000	80,000	1,20,000	1,60,000	2,00,000
Incremental PAT BD	60,000	1,20,000	1,80,000	2,40,000	3,00,000
Discount factors	0.87	0.76	0.66	0.57	0.49
Discounted value of PAT BD	52,200	91,200	1,18,800	1,36,800	1,47,000
Total for 5 years	5,46,000				

Step 2: Incremental Cash outflow

Let the total cost of replacement	X
Disposal value of existing machines	5,00,000
Incremental cash outflow	(X − 5,00,000)

Step 3: Tax savings on depreciation

=(Incremental block/5) × Tax rate × (Annuity factor of 15% for 5 years)

=[(X − 5,00,000/5] × 40% × 3.35 = 0.268 × − 1,34,000

Step 4: Total Discounted cash inflows

Total incremental discounted cash inflows : 5,46,000 + .268X − 1,34,000 = 4,12,000 + .268 X

Step 5: Equation

NPV = Sum of discounted cash inflows − Sum of the discounted cash outflows

4,53,000 = (4,12,000 + .268 X) − (X − 5,00,000)

4,53,000 = 4,12,000 + .268 X − X + 5,00,000

4,53,000 − 4,12,000 − 5,00,000 = .268 X − X

− 4,59,000 = −0.732 X

Or 0.732 X = 4,59,000

Or X = 4,59,000/0.732 = ₹ 6,27,049

(ii) Evaluation whether replacement would yield post tax return of 15% in 3 years

	1	2	3
Incremental capacity	10%	30%	50%
Incremental PBTD	1,00,000	3,00,000	5,00,000
Depreciation (6,27,049 − 5,00,000)/5	25,410	25,410	25,410
Incremental PBT	74,590	2,74,590	4,74,590
Tax at 40%	29,836	1,09,836	1,89,836
Incremental PAT	44,754	1,64,754	2,84,754
PAT + Depreciation	70,164	1,90,164	3,10,164
Discount factors	0.87	0.76	0.66
Discounted cash inflows	61,043	1,44,525	2,04,708
Total discounted cash inflow	4,10,276		
Discounted incremental cash outflow	1,27,049		
NPV	2,83,227		

Conclusion: As the net present value is positive the view of the Managing Director is correct.

Alternative Solution:

(i) Cash inflows:

(Figures in lakhs of Rupees)

		60%	70%	80%	90%	100%
Capacity		60%	70%	80%	90%	100%
Sales		18.00	21.00	24.00	27.00	30.00
Less: Variable cost		9.00	10.50	12.00	13.50	15.00
Contribution	(A)	9.00	10.50	12.00	13.50	15.00
Less: Fixed cost	(B)	3.00	3.50	4.00	4.50	5.00
Profit before Depreciation & Tax	(C)	6.00	7.00	8.00	9.00	10.00
Discount factors (D)		0.87	0.76	0.66	0.57	0.49
Present value PATBD (E) (C × D)		5.22	5.32	5.28	5.13	4.90

Sum Total of Present Values in E   (F)   ₹ 25.85

After Tax present Values (G) = (1 − T) F = ₹ 25.85 × 0.6 = ₹ 15.51

Tax savings on depreciation

Let 'X' be the cost of machines purchased.
The salvage value of old machine is ₹ 5 lakhs.
∴ Net outflow of new machines would be (X − 5) lakhs.

Depreciation on straight line basis on this would be $\left(\dfrac{X-5}{5}\right)$ lakhs

Which will be the same for 5 years

The present value of such recurring Depreciation in equal sum would be $\left(\dfrac{X-5}{5}\right) \times 3.35$

Note: 3.35 is the sum total of present values for 5 years of uniform flow.

Tax saving on such depreciation is $\left(\dfrac{X-5}{5}\right) \times 3.35 \times 0.4 =$ ₹ 0.268 X - ₹ 1.34

Equation:
Net present value of replacement = In flows in N years − outflow in the year 0.
According to the Vice-President (Finance) NPV should be equal to ₹ 4.53 lakhs.
Hence, the equation 0.268 X − 1.34 + 15.51 − (X − 5) = 4.53
= 0.268 X + 14.17 − X + 5 = 4.53 lakhs
or 0.732 X = 14.64 lakhs

$X = \dfrac{14.64}{0.732} =$ ₹ 20.00 lakhs The cost of new machines is ₹ 20 lakhs.

(ii) (Rupees in lakhs)

		60%	80%	100%
Capacity		60%	80%	100%
Profit before Depreciation & Taxes	(A)	6.00	8.00	10.00
Less: Depreciation	(B)	5.00	5.00	5.00
Profit after Depreciation (A – B)	(C)	1.00	3.00	5.00
Less: Tax @ 40%	(D)	0.40	1.20	2.00
Profit after tax	(E)	0.60	1.80	3.00
Profit after tax but Depreciation added back i.e. inflow (B + E)	(F)	5.60	6.80	8.00
Discount factor	(G)	0.87	0.76	0.66
Present values of (F)	(H)	4.872	5.168	5.28

Net Present Value (I)

=Total of (H) – Initial outflow = ₹ 15.32 – 15.00 = ₹ 0.32 lakhs

As the Net Present Value is positive. The view of the Managing Director is correct.

Question 4

S Engineering Company is considering to replace or repair a particular machine, which has just broken down. Last year this machine costed ₹ 2,00,000 to run and maintain. These costs have been increasing in real terms in recent years with the age of the machine. A further useful life of 5 years is expected, if immediate repairs of ₹ 1,90,000 are carried out. If the machine is not repaired it can be sold immediately to realize about ₹ 50,000 (Ignore loss/gain on such disposal).

Alternatively, the company can buy a new machine for ₹ 4,90,000 with an expected life of 10 years with no salvage value after providing depreciation on straight line basis. In this case, running and maintenance costs will reduce to ₹ 1,40,000 each year and are not expected to increase much in real term for a few years at least. S Engineering Company regard a normal return of 10% p.a. after tax as a minimum requirement on any new investment. Considering capital budgeting techniques, which alternative will you choose? Take corporate tax rate of 50% and assume that depreciation on straight line basis will be accepted for tax purposes also. Given cumulative present value of ₹ 1 p.a. at 10% for 5 years ₹ 3.791, 10 years ₹ 6.145.

Answer

Evaluation of proposal to repair existing machine or buy a new machine for M/s S. Engineering Company
(i) To repair existing machine:

₹

Present value of after-tax cash outflows
Cost of repairs immediately net of tax ₹ 95,000 (50% of ₹ 1,90,000)

Equivalent annual cost for 5 years $\left(\dfrac{₹\ 95,000}{3.791} \right)$ 25,059

Running and maintenance cost per annum net of tax (50% of ₹ 2,00,000) 1,00,000
Total net equivalent cash outflows p.a. **1,25,059**

(ii) To buy a new machine:

	₹
Present value of after-tax cash outflows	
Purchase cost of new machine	4,90,000
Less: Sale Proceeds of old machine	50,000
	4,40,000

Equivalent annual cost for 10 years $\left(\dfrac{₹\ 4,40,000}{6.145} \right)$ — 71,603

Tax saving of depreciation (₹ 4,90,000/10) × 50%	(24,500)
Running and maintenance cost p.a. net of tax (50% of ₹ 1,40,000)	70,000
Total net equivalent cash outflows p.a.	1,17,103

Since, net equivalent cash outflows p.a. for buying a new machine ₹ 1,17,103 is less than net equivalent cash outflows of ₹ 12,506 for repairing of an existing machine. Therefore, it is advisable that the company should go for buying a new machine.

(Second Solution)

(i) To repair an existing machine:

	₹
Present value of after-tax cash outflow	
Cost of repairs immediately net of tax (₹ 1,90,000 × 50%)	95,000
Running and maintenance cost for 5 years (₹ 2,00,000 × 50% × 3.791)	3,79,100
Total net present value of after tax cash outflows for 5 years	4,74,100

Hence, net equivalent cash outflows p.a. ₹ $\left(\dfrac{4,74,100}{3.791} \right)$ — 1,25,059

(ii) To Buy new machine

		₹
Present value of after-tax cash outflow		
Purchase cost of new machine	4,90,000	
Less: Sale proceeds of old machine	50,000	4,40,000
Tax benefit on depreciation p.a. (₹ 4,90,000/10) × 50%	(24,500)	
Running and maintenance cost p.a. (50% of ₹ 1,40,000)	70,000	
	45,500	
Net cash outflows for 10 years (₹ 45,500 × 6.145)		2,79,598
Total net present value of after tax cash outflows for 10 years		7,19,598

Hence, net equivalent cash outflow p.a ₹ $\left(\dfrac{7,19,598}{6.145} \right)$ — 1,17,103

Since, net equivalent cash outflows p.a. for buying a new machine ₹ 1,17,103 is less than net equivalent outflows of ₹ 1,25,509 for repairing of an existing machine. Therefore, it is advisable that the company should go for buying a new machine.

Question 5

A limited company operates a lodging house with a restaurant, shops and recreational facilities attached. Its manager has entrusted you with the planning of the coming year's operatins, more particularly on the level of profits the company was likely to earn. The lodging house has 100 double-bed rooms, which are likely to be rented at ₹ 150 per day. The manager expects an occupancy ratio of 70% for a period of 250 days during the tourist season. It is also anticipated that both the beds in a room will be occupied during the period. Each person staying in the lodging house is expected to spend, on the basis of past statistics, ₹ 30 per day in the shops attached to the lodge and ₹ 60 per day in the restaurant. The recreational facilities are not charged to the customer.

Some other relevant data available to you is as under:

(i) Variable cost to volume ratio:

	Shops	Restaurant
Cost of goods sold	40%	30%
Supplies	5%	15%
Others	5%	10%

(ii) For the lodging house, the variable costs are ₹ 25 per day per occupied room for cleaning, laundry etc.

(iii) Annual fixed costs for the entire complex are ₹ 19,50,000.

From the above, you are required to prepare:

(a) an income statement for the coming year; and

(b) an analysis to indicate whether the manager's suggestion of reducing the room rent to ₹ 120 per day to enhance the occupancy ratio to 80% should be accepted.

Answer

(a) Expected Income Statement of A Ltd. Company

(A) Revenue: ₹

Hotel Room receipts (100 rooms × 250 days × ₹ 150 × 70%)	26,25,000
Shops (100 rooms × 2 persons × 250 days × ₹ 30 × 70%)	10,50,000
Restaurant (100 rooms × 2 persons × 250 days × ₹ 60 × 70%)	21,00,000
	57,75,000

(B) Variable costs: ₹ ₹

Hotel Room (100 rooms × 250 days × ₹ 25 × 70%)	4,37,500	
Shops (₹ 10,50,000 × 50%)	5,25,000	
Restaurant (₹ 21,00,000 × 55%)	11,55,000	21,17,500

(C) Contribution (A – B)	36,57,500
Less: Fixed costs	19,50,000
Expected profits	**17,07,500**

(b) Income Statement based on Manger's suggestions

(A) Revenue:		₹
Hotel Room receipts (100 rooms × 250 days × ₹ 120 × 80%)		24,00,000
Shops (100 rooms × 2 persons × 250 days × ₹ 30 × 80%)		12,00,000
Restaurant (100 rooms × 2 persons × 250 days × ₹ 60 × 80%)		24,00,000
		60,00,000
(B) Variable costs:	₹	₹
Hotel Room (100 rooms × 250 days × ₹ 25 × 80%)	5,00,000	
Shops (₹ 12,00,000 × 50%)	6,00,,000	
Restaurant (₹ 24,00,000 × 55%)	13,20,000	24,20,000
(C) Contribution (A – B)		35,80,000
Less: Fixed costs		19,50,000
Profits		**16,30,000**

The profit based on manager's suggestion ₹ 16,30,000 is lower than the expected profit ₹ 17,07,500 , therefore, it is advisable that the manager's suggestion of reducing the room rent to ₹ 120 per day to enhance the occupancy ratio to 80% should not be accepted.

Question 6

(a) Following are the data on a capital project being evaluated by the management of X Ltd.

	Project M ₹
Annual cost saving	4,00,000
Useful life	4 years
I.R.R.	15%
Profitability Index (PI)	1.064
NPV	?
Cost of capital	?
Cost of project	?
Payback	?
Salvage value	0

Find the missing values considering the following table of discount factor only:

Discount factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

(b) S Ltd. has ₹ 10,00,000 allocated for capital budgeting purposes. The following proposals and associated profitability indexes have been determined:

Project	Amount ₹	Profitability Index
1	3,00,000	1.22
2	1,50,000	0.95
3	3,50,000	1.20
4	4,50,000	1.18
5	2,00,000	1.20
6	4,00,000	1.05

Which of the above investments should be undertaken? Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Answer

(a) Cost of Project M

At 15% I.R.R., the sum total of cash inflows = Cost of the project i.e. Initial cash outlay

Given:

Annual cost saving	₹ 4,00,000
Useful life	4 years
I.R.R.	15%

Now, considering the discount factor table @ 15% cumulative present value of cash inflows for 4 years is 2.855. Therefore, Total of cash inflows for 4 years for Project M is (₹ 4,00,000 × 2.855) = ₹ 11,42,000

Hence cost of project is   = ₹ 11,42,000

Payback period of the Project M

$$\text{Pay back period} = \frac{\text{Cost of the project}}{\text{Annual cost saving}} = \frac{₹\, 11,42,000}{4,00,000}$$

= 2.855 or 2 years 11 months approximately

Cost of Capital

If the profitability index (PI) is 1, cash inflows and outflows would be equal. In this case, (PI) is 1.064. Therefore, cash inflows would be more by 0.64 than outflow.

$$\text{Profitability index (PI)} = \frac{\text{Discounted cash inflows}}{\text{Cost of the project}}$$

$$\text{Or } 1.064 = \frac{\text{Discounted cash inflows}}{₹ 11,42,000}$$

or 1.064 × ₹ 11,42,000 = ₹ 12,15,088. Hence, Discounted cash inflows = ₹ 12,15,088

Since, Annual cost saving is ₹ 4,00,000. Hence, cumulative discount factor for 4 years

$$= ₹ \frac{12,15,088}{4,00,000}$$

= 3.037725 or 3.038

Considering the discount factor table at discount rate of 12%, the cumulative discount factor for 4 years is 3.038. Hence, the cost of capital is 12%.

Net present value of the project.

N.P.V. = Total present value of cash inflows – Cost of the project

= ₹ 12,15,088 – ₹ 11,42,000

= ₹ 73,088.

(b)   Statement showing ranking of projects on the basis of Profitability Index

Project	Amount	P.I.	Rank
1	3,00,000	1.22	1
2	1,50,000	0.95	5
3	3,50,000	1.20	2
4	4,50,000	1.18	3
5	2,00,000	1.20	2
6	4,00,000	1.05	4

Assuming that projects are indivisible and there is no alternative use of the money allocated for capital budgeting on the basis of P.I., the S Ltd., is advised to undertake investment in projects 1.3, and 5. However, among the alternative projects the allocation should be made to the projects which adds the most to the shareholders wealth. The NPV method, by its definition, will always select such projects.

Statement showing NPV of the projects

Project	Amount (₹)	P.I.	Cash inflows of project (₹)	N.P.V. of Project (₹)
(i)	(ii)	(iii)	(iv) = [(ii) × (iii)]	(v) = [(iv) − (ii)]
1	3,00,000	1.22	3,66,000	66,000
2	1,50,000	0.95	1,42,500	(−)7,500
3	3,50,000	1.20	4,20,000	70,000
4	4,50,000	1.18	5,31,000	81,000
5	2,00,000	1.20	2,40,000	40,000
6	4,00,000	1.05	4,20,000	20,000

The allocation of funds to the projects 1, 3 and 5 (as selected above on the basis of P.I.) will give N.P.V. of ₹ 1,76,000 and ₹ 1,50,000 will remain unspent.

However, the N.P.V. of the projects 3, 4 and 5 is ₹ 1,91,000 which is more than the N.P.V. of projects 1, 3 and 5. Further, by undertaking projects 3, 4 and 5 no money will remain unspent. Therefore, S Ltd. is advised to undertake investments in projects 3, 4 and 5.

Question 7

(a) A company is considering two mutually exclusive projects X and Y. Project X costs ₹ 3,00,000 and Project Y ₹ 3,60,000. You have been given below the net present value, probability distribution for each project:

Project X		Project Y	
NPV Estimate	Probability	NPV Estimate	Probability
₹		₹	
30,000	0.1	30,000	0.2
60,000	0.4	60,000	0.3
1,20,000	0.4	1,20,000	0.3
1,50,000	0.1	1,50,000	0.2

    (i) Compute the expected net present value of Projects X and Y.
    (ii) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.
    (iii) Which project do you consider more risky and why?
    (iv) Compute the profitability index of each project.

(b) Determine the risk adjusted net present value of the following projects:

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

The company selects the risk-adjusted rate of discount on the basis of the co-efficient of variation:

Coefficient of variation	Risk adjusted rate of discount	Present value 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

Answer

(a) <div align="center">**Project X**</div>

NPV Estimate	Probability	NPV Estimate × Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation × Probability
₹		₹		₹	₹
30,000	0.1	3,000	60,000	36,00,000,000	3,60,000,000
60,000	0.4	24,000	30,000	9,00,000,000	3,60,000,000
1,20,000	0.4	48,000	−30,000	9,00,000,000	3,60,000,000
1,50,000	0.1	15,000	−60,000	36,00,000,000	3,60,000,000
Expected NPV		90,000			14,40,000,000

<div align="center">**Project Y**</div>

NPV Estimate	Probability	NPV Estimate × Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation × Probability
₹		₹		₹	₹
30,000	0.2	6,000	60,000	36,00,000,000	7,20,000,000
60,000	0.3	18,000	30,000	9,00,000,000	2,70,000,000
1,20,000	0.3	36,000	−30,000	9,00,000,000	2,70,000,000
1,50,000	0.2	30,000	−60,000	36,00,000,000	7,20,000,000
Expected NPV		90,000			19,80,000,000

(i) The expected net present value of Projects X and Y is ₹ 90,000 each.

(ii) Standard Deviation = $\sqrt{\text{Square of the deviation} \times \text{probability}}$

In case of Project X : Standard Deviation = $\sqrt{₹\ 14,40,000,000}$

= ₹ 37,947

In case of Project Y : Standard Deviation = $\sqrt{₹\ 19,80,000,000}$

= ₹ 44,497

(iii)   Coefficient of variation = $\dfrac{\text{Standard deviation}}{\text{Expected net present value}}$

In case of Project X : Coefficient of variation $= \dfrac{37,947}{90,000} = 0.42$

In case of Project Y : Coefficient of variation $= \dfrac{44,497}{90,000} = 0.4944 \text{ or } 0.50$

Project Y is riskier since it has a higher coefficient of variation.

(iv)   Profitability index = $\dfrac{\text{Discounted cash inflow}}{\text{Discounted cash outflow}}$

In case of Project X : Profitability Index $= \dfrac{90,000 + 3,00,000}{3,00,000} = 1.30$

In case of Project Y : Profitability Index $= \dfrac{90,000 + 3,60,000}{3,60,000} = \dfrac{4,50,000}{3,60,000} = 1.25$

(b)   Statement showing the determination of the risk adjusted net present value

Projects	Net cash outlays	Coefficient of variation	Risk adjusted discount rate	Annual cash inflow	PV factor 1-5 years at risk adjusted rate of discount	Discounted cash inflow	Net present value
	₹			₹	₹	₹	₹
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii) = (v) × (vi)	(viii) = (vii) − (ii)
A	1,00,000	0.4	12%	30,000	3.605	1,08,150	8,150
B	1,20,000	0.8	14%	42,000	3.433	1,44,186	24,186
C	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180

Question 8

C developed original specification of a product and founded C Manufacturing Ltd. In 2009 the firm manufactured 980 Nos. at an average price of ₹ 900 each. In 2010 due to continuous price rise of the inputs, he raised his prices at an average of 12%, since he knew he could sell his plant's full capacity of 980 Nos. per year. In spite of price rise for the product, which sold for over ₹ 1,000 for the first time, C was surprised to learn in late 2010 (as may be seen from the financial statements) that C Manufacturing Ltd. show a decline in earnings and still worse, decline in cash flow.

His accountant has brought the following:

(i)   We are following FIFO system for the purpose of issues.

(ii)   Costs are going up faster than 12% and they will go up further in 2011.

(iii)   We are not setting aside enough to replace the machinery; we need to set aside ₹ 1,65,000, not ₹ 1,50,000 so as to be able to buy new machinery.

(iv)   It is still not late to switch to LIFO for 2010. This will reduce closing inventory to ₹ 3,30,000 and raise cost of goods sold.

C Manufacturing Ltd.		Income Statement (₹ 000)	
	2010		2009
Sales	1,008		900
Cost of goods sold			
Opening inventory	320	250	
Raw material	500	400	
Labour	200	174	
Depreciation	150	150	
End inventory	(−)390	(−)320	
	780		654
Gross margin	228		246
Administration expenses	100		92
EBIT	128		154
Interest	50		50
	78		104
Income-tax	39		52
Profit after tax	39		52
Add: Non-cash expenses	150		150
Inventory change	(−)70		(−)70
Cash flow	119		132

Required:

(1)   What is the weighted average inflation factor for the firm using LIFO?

(2)   If the firm desires a 15 per cent profit margin on sales, how much should the firm charge for the product per unit?

Answer

(1)   (₹ 000)

	2010		2009	
		Expenses		Expenses
Raw material				
Opening inventory	320		250	
Add: Purchases	500		400	
	820		650	
Less: Closing inventory based on LIFO*	330	490	320	330
Labour		200		174
Depreciation		165*		150
Cost of goods sold		855		654
Add: Administration expenses		100		92
		955		746

        *considered on replacement cost basis.

Hence, weighted average inflation factor for the firm in 2010 = $\dfrac{955}{746}$

= 1.28 i.e. 28% over 2009

(2)   If the firm desires a 15 per cent profit margin on sales the price which the firm should charge for the product per unit can be identified in two ways:-

    (i)   In 2009, EBIT as a percentage of sales was 17.1%.

        Hence, if we take the weighted average inflation in 2010 over 2009 and increase prices to that extent the charge per product in 2010 will be

$$₹ \; \dfrac{9,00,000}{980} \times 1.28 = 1,175.50 \text{ , or in other words}$$

        Average price in 2009 × (1 + inflation %)

        = ₹ 918.36 × 1.28 = ₹ 1,175.50 per product

        i.e. Total sales will be (₹ 1,175.50 × 980 Nos.) = ₹ 11,52,000 approximately

    Alternatively,

    (ii)   Total cost in 2010, for 980 Nos. is ₹ 9,55,000.

        Hence, for each No. = ₹ 974.50.

        In order to earn 15% profit margin on sales (EBIT level), the sales price per product will be

$$₹ \; \dfrac{974.50}{0.85} = ₹ 1146.50$$

        Total sales will be (₹ 1,146.50 × 980 Nos.) = ₹ 11,23,570 [**Note:** Figures have been rounded off.]

Question 9

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of ₹ 50 lakhs per annum for the next four years. The contract can be terminated upon installation of the aforesaid machine on payment of a compensation of ₹ 30 lakhs before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 200 lakhs to be financed by a loan repayable in 4 equal instalments commencing from the end of year 1. The interest rate is 16% per annum. At the end of the 4th year, the machine can be sold for ₹ 20 lakhs and the cost of dismantling and removal will be ₹ 15 lakhs.

Sales and direct costs of the product emerging from waste processing for 4 years are estimated as under:

				₹ in lakhs
Year	1	2	3	4
Sales	322	322	418	418
Material consumption	30	40	85	85
Wages	75	75	85	100
Other expenses	40	45	54	70
Factory overheads	55	60	110	145
Depreciation (as per income-tax rules)	50	38	28	21

Initial stock of materials required before commencement of the processing operations is ₹ 20 lakhs at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 55 lakhs and the stocks at the end of year 4 will be nil. The storage of materials will utilize space which would otherwise have been rented out for ₹ 10 lakhs per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 15 lakhs in year 1 and ₹ 10 lakhs in year 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 30 lakhs per annum payable on this venture. The company's tax rate is 35%.

Present value factors for four years are as under:

Year	1	2	3	4
Present value factors	0.870	0.756	0.658	0.572

Advise the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

Answer

Statement of Incremental Profit

(₹ in lakhs)

Years	1	2	3	4
Sales: (A)	322	322	418	418
Material consumption	30	40	85	85
Wages	60	65	85	100
Other expenses	40	45	54	70
Factory overheads (Insurance)	30	30	30	30
Loss of rent	10	10	10	10
Interest	32	24	16	8
Depreciation (as per income tax rules)	50	38	28	21
Total cost: (B)	252	252	308	324
Incremental profit: (C) = (A) − (B)	70	70	110	94
Tax (35% of (C))	24.5	24.5	38.5	32.9

Statement of Incremental Cash Flows

(₹ in lakhs)

Years	0	1	2	3	4
Material stocks	(20)	(35)	–	–	–
Compensation for contract	(30)	–	–	–	–
Contract payment saved	–	50	50	50	50
Tax on contract payment	–	(25)	(25)	(25)	(25)
Incremental profit	–	70	70	110	94
Depreciation added back	–	50	38	28	21
Tax on profits	–	(24.5)	(24.5)	(38.5)	(32.9)
Loan repayment	–	(50)	(50)	(50)	(50)
Profit on sale of machinery (net)	–	–	–	–	5
Total incremental cash flows	(50)	35.5	58.8	74.5	62.1
Present value factor	1.00	0.870	0.756	0.658	0.572
Net present value of cash flows	(50)	30.885	44.226	49.021	35.5212

Net present Value = ₹ 159.6532 – ₹ 50 = ₹ 109.6532 lakhs.

Advice: Since the net present value of cash flows is ₹ 109.6532 lakhs which is positive the management should install the machine for processing the waste.

Notes:

1. Materials stock increase are taken in cash flows.

2. idle-time wages have also been considered.

3. Apportioned factory overheads are not relevant only insurance charges of this project are relevant.

4. Interest calculated at 16% based on 4 equal instalments of loan repayment.

5. Sale of machinery – Net income after deducting removal expenses taken. Tax on capital gains ignored.

6. Saving in contract payment and income tax there on considered in the cash flows.

Question 10

(a) ABC Company Ltd. has been producing a chemical product by using machine Z for the last two years. Now the management of the company is thinking to replace this machine either by X or by Y machine. The following details are furnished to you:

	Z	X	Y
Books value (₹)	1,00,000	–	–
Resale value now (₹)	1,10,000	–	–
Purchase price (₹)	–	1,80,000	2,00,000
Annual fixed costs (including depreciation) (₹)	92,000	1,08,000	1,32,000
Variable running costs (including labour) per unit (₹)	3	1.50	2.50
Production per hour (unit)	8	8	12

You are also provided with the following details:

Selling price per unit (₹)	20
Cost of materials per unit (₹)	10
Annual operating hours	2,000
Working life of each of the three machines (as from now)	5 years

Salvage value of machines Z ₹ 10,000, X ₹ 15,000,Y ₹18,000

The company charges depreciation using straight line method. It is anticipated that an additional cost of ₹ 8,000 per annum would be incurred on special advertising to sell the extra output of machine. Assume tax rate of 40% and cost of capital 10%. The present value of ₹ 1 to be received at the end of the year at 10% is as under:

Year	1	2	3	4	5
Present value	.909	.826	.751	.683	0.621

Required: Using NPV method, you are required to analyse the feasibility of the proposal and make recommendations.

(b) The Globe Manufacturing Company Ltd. is considering an investment in one of the two mutually exclusive proposals – Projects X and Y, which require cash outlays of ₹ 3,40,000 and ₹ 3,30,000 respectively. The certainty-equivalent (C.E.) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bond is 8% and this be used as the

riskless rate. The expected net cash flows and their certainty-equivalents are as follows:

Year-end	Project X Cash flow	C.E.	Project Y Cash flow	C.E.
	₹		₹	
1	1,80,000	.8	1,80,000	.9
2	2,00,000	.7	1,80,000	.8
3	2,00,000	.5	2,00,000	.7

Present value factors of Re. 1 discounted at 10% at the end of year 1, 2 and 3 are .9091, .8264 and .7513 respectively.

Required:

(i) Which project should be accepted?

(ii) If risk adjusted discount rate method is used, which project would be analysed with a higher rate?

Answer

(a) **ABC Company Ltd.**
Computation of yearly cash inflow

Machine		Z		X		Y
Sales (units)		16,000		16,000		24,000
Selling price per unit (₹)		20		20		20
Sales : (A)		3,20,000		3,20,000		4,80,000
Less: Costs						
Variable running costs	48,000		24,000		60,000	
Material cost	1,60,000		1,60,000		2,40,000	
Annual fixed cost	92,000	3,00,000	1,08,000	2,92,000	1,32,000	4,32,000
Additional cost (Special advertising)		–		–		8,000
Total costs: (B)		3,00,000	–	2,92,000		4,40,000
Profit before tax: (A) – (B)		20,000		28,000		40,000
Less: Tax @ 40%		8,000		11,200		16,000
Profit after tax		12,000		16,800		24,000
Add: Depreciation		20,000		33,000		36,400
Cash inflow		32,000		49,800		60,400

Computation of cash inflow in 5th year

Machine	Z	X	Y
Cash in flow	32,000	49,800	60,400
Add: Salvage value of machines	10,000	15,000	18,000
Cash inflow	42,000	64,800	78,400

Computation of Net Present Value

Year	Machine Discounting factor	Z Cash inflow ₹	Z P.V. of cash inflow ₹	X Cash inflow ₹	X P.V. of cash inflow ₹	Y Cash inflow ₹	Y P.V. of cash inflow ₹
1	0.909	32,000	29,088	49,800	45,268	60,400	54,904
2	0.826	32,000	26,432	49,800	41,135	60,400	49,890
3	0.751	32,000	24,032	49,800	37,400	60,400	45,360
4	0.683	32,000	21,856	49,800	34,013	60,400	41,253
5	0.621	42,000	26,082	64,800	40,241	78,400	48,686
			1,27,490		1,98,057		2,40,093
Less: Purchase price			1,10,000		1,80,000		2,00,000
Net present value			**17,490**		**18,057**		**40,093**

Recommendation:

The net present value is higher in the case of Machine Y. Therefore, it is advisable that the company should replace machine Z with machine Y.

However, as the cost of investment is not the same for all machines, it would be better to base the decision on profitability index which is as under:

$$P.I. = \frac{P.V. \text{ of cash inflow}}{P.V. \text{ of cash outflow}}$$

$$\text{Machine Z} = \frac{1,27,490}{1,10,000} = 1.159$$

$$\text{Machine X} = \frac{1,98,057}{1,80,000} = 1.10$$

$$\text{Machine Y} = \frac{2,40,093}{2,00,000} = 1.20$$

Since the profitability index of machine Y is the highest therefore machine Z should be replaced by machine Y.

(b) (i)   **Statement showing Net Present Value of Project X**

Year-end	Cash flow ₹	C.E.	Adjusted Cash flow ₹	Present value factor at 8%	Total present value ₹
	(a)	(b)	(c) = (a) × (b)	(d)	(e) = (c) × (d)
1	1,80,000	0.8	1,44,000	0.9091	1,30,910
2	2,00,000	0.7	1,40,000	0.8264	1,15,640
3	2,00,000	0.5	1,00,000	0.7513	75,130
					3,21,680
Less: Initial investment					3,40,000
Net present value					**(18,320)**

Statement showing the Net Present Value of Project Y

Year-end	Cash flow	C.E.	Adjusted Cash flow	Present value factor	Total present value
	₹		₹		₹
	(a)	(b)	(c) = (a) × (b)	(d)	(e) = (c) × (d)
1	1,80,000	0.9	1,62,000	0.9091	1,47,274
2	1,80,000	0.8	1,44,000	0.8264	1,19,002
3	2,00,000	0.7	1,40,000	0.7513	1,05,182
					3,71,458
Less: Initial investment					3,30,000
Net present value					**41,458**

Decision: Since the net present value of project Y is positive, the project Y should be accepted.

(ii) Since the certainty-equivalent (C.E.) Co-efficient of project X is lower than project Y, the project X is riskier than project Y. Therefore, if risk adjusted discount rate method is used the project X would be analysed with a higher rate.

Question 11

(a) A firm has an investment proposal, requiring an outlay of ₹ 40,000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 25,000 and 0.6 probability that cash inflow after tax will be ₹ 30,000. The probabilities assigned to cash inflows after tax for the year II are as follows:

The Cash inflow year I	₹ 25,000		₹ 30,000	
The Cash inflow year II		Probability		Probability
	₹ 12,000	0.2	₹ 20,000	0.4
	₹ 16,000	0.3	₹ 25,000	0.5
	₹ 22,000	0.5	₹ 30,000	0.1

The firm uses a 12% discount rate for this type of investment.

Required:

(i) Construct a decision tree for the proposed investment project.
(ii) What net present value will the project yield if worst outcome is realized? What is the probability of occurrence of this NPV?
(iii) What will be the best and the probability of that occurrence?
(iv) Will the project be accepted?

　　　(12% Discount factor 　　 1 year 　　 0.8929
　　　　　　　　　　　　　　　　2 year 　　 0.7972)

(b) Do the profitability index and the NPV criterion of evaluating investment proposals lead to the same acceptance – rejection and ranking decisions? In what situations will they give conflicting results?

Answer

(i)
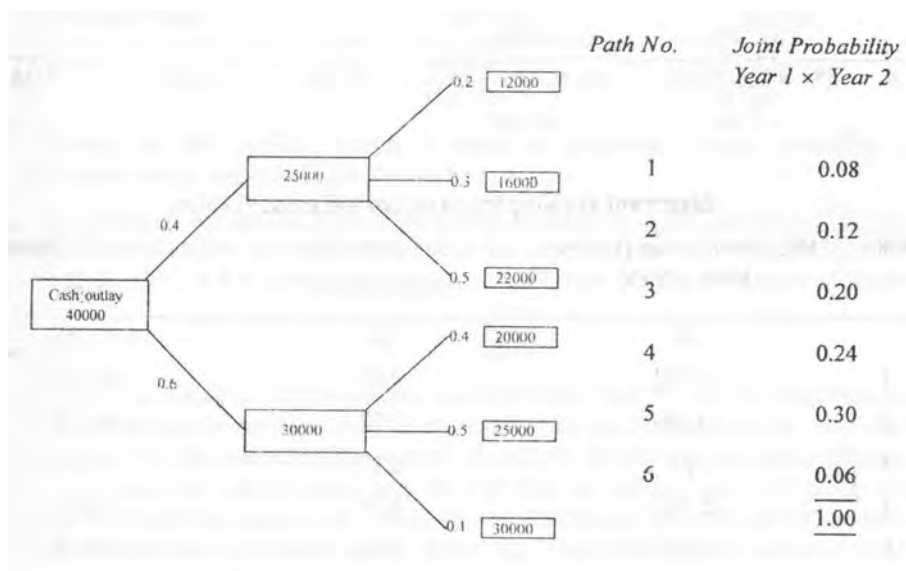
The decision tree given above shows that there are six possible outcomes each represented by a path. The net present value of each path at 12% discount rate is given below:

Path	(Cash inflow year 1 × discount factor year 1)	(Cash inflow year 2 × discount factor year 2)	Total Cash inflow	Cash outflow	Net present value
	(a)	(b)	(c) = (a) + (b)	(d)	(e) = (c) − (d)
			₹	₹	₹
1	(₹ 25,000 × 0.8929) = 22,323	(₹ 12,000 × 0.7972) = 9,566	31,889	40,000	−8,111
2	(₹ 25,000 × 0.8929) = 22,323	(₹ 16,000 × 0.7972) = 12,755	35,078	40,000	−4,922
3	(₹ 25,000 × 0.8929) = 22,323	(₹ 22,000 × 0.7972) = 17,538	39,861	40,000	-139
4	(₹ 30,000 × 0.8929) = 26,787	(₹ 20,000 × 0.7972) = 15,944	42,731	40,000	2,731
5	(₹ 30,000 × 0.8929) = 26,787	(₹ 25,000 × 0.7972) = 19,930	47,717	40,000	6,717
6	(₹ 30,000 × 0.8929) = 26,787	(₹ 30,000 × 0.7972) = 23,916	50,703	40,000	10,703

Statement showing the expected Net Present Value

Path	Net present value @ 10% (Refer above)	Joint probability (Refer above)	Expected Net present value
	(a)	(b)	(a) × (b)
1	−8,111	0.08	−648.88
2	−4,922	0.12	−590.64
3	-139	0.20	−27.80
4	2,731	0.24	655.44
5	6,717	0.30	2,015.10
6	10,703	0.06	642.18
			2,045.40

(ii) If the worst outcome is realized the Net present value which the project will yield is ₹ 8,111 (negative). The probability of occurrence of this Net present value is 8%.

(iii) The best outcome will be path 6 when Net present value is higher i.e. ₹ 10,703 (positive). The probability of occurrence of this Net present value is 6%.

(iv) Yes, the project will be accepted since the Expected Net present value × probability sum total is positive.

(b) In most of the situations the Net present value method (NPV) and Profitability Index (PI) yield same accept or reject decision. In general terms, under PI method a project is acceptable if profitability index value is greater than 1 and rejected if it is less than 1. Under NPV method a project is acceptable if Net present value of a project is positive and rejected if it is negative. Clearly a project offering a profitability index greater than 1 must also offer a net present value which is positive. But a conflict may arise between two methods if a choice between mutually exclusive projects has to be made. Consider the following example:

	Project A	Project B
PV of Cash inflows	2,00,000	1,00,000
Initial cash outflows	1,00,000	40,000
Net present value	1,00,000	60,000
P.I.	$\dfrac{2,00,000}{1,00,000}=2$	$\dfrac{1,00,000}{40,000}=2.5$

According to NPV method, project A would be preferred, whereas according to profitability index method project B would be preferred. This is because Net present value gives ranking on the basis of absolute value of rupees. Whereas profitability index gives ranking on the basis of ratio. Although PI method is based on NPV, it is a better evaluation techniques than NPV in a situation of capital rationing.

Question 12

(a) 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 12 per cent. Which machine company X should buy?

(b) 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 s 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 12 per cent. Advise with reasons.

Answer

(a)   **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 @ 12% (iii)	2.4019	–
Cumulative present value factor for 1-2 years @ 10% (iv)	–	1.6901
Present value of running cost of machines (₹): (v)	96,076	1,01,406
	[(ii) × (iii)]	[(ii) × (iv)]
Cash outflow of machines (₹): (vi) = (i) + (v)	2,46,076	2,01,406
Equivalent present value of annual cash outflow	1,02,451	1,19,168
	[(vi) ÷ (iii)]	[(vi) ÷ (iv)]

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

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

	₹
Cash inflow of a new machine per year	80,000
Cumulative present value for 1-3 years @ 12%	2.4019
Present value of cash inflow for 3 years (₹ 80,000 × 2.4019)	1,92,152

		₹
Less: Cash outflow		
Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	80,000	70,000
N.P.V. of cash inflow for 3 years		1,22,152

Equivalent annual net present value of cash

Inflow of new machine $\left(\dfrac{₹\ 1,22,152}{2.4019} \right)$ — 50,856

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

	₹
Cash inflow of a new machine per year	80,000
Cumulative present value for 1-3 years @ 12%	2.4019
Present value of cash inflow for 3 years (₹ 80,000 × 2.4019)	1,92,152

		₹
Less: Cash outflow		
Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	70,000	80,000
N.P.V. of cash inflow for 3 years		1,12,152

Equivalent annual net present value of cash Inflow $\left(\dfrac{₹\,1,12,152}{2.4019} \right)$ — 46,693

Advise: Since the equivalent annual cash inflow of new machine now and next year is more than cash inflow (₹ 40,000) of an elderly machine the company Y is advised to replace the elderly machine now.

Company Y need not wait for the next year to replace the elderly machine since the equivalent annual cash inflow now is more than the next year's cash inflow.

Question 13

A private university with a current enrolment of 12,000 students is reviewing cost and revenue data for the past academic year. Student tuition is ₹ 3,600 a year. Tuition normally coves 75 per cent of university expenditures. The remaining 25 per cent comes from endowments and contributions. During the last academic year fixed costs amounted to ₹ 300 lakhs. The rest of the costs varied with student enrolment. Cost have been rising more rapidly than tuition or contributions, and the university just broke even last year. A tuition increase is being contemplated. The budget committee thinks endowment revenues and contributions will remain constant at last years' level for the next several years.

The fixed costs are expected to increase by ₹ 50 lakhs and the variable costs are expected to increase by 15 per cent. The president of the university tells the budget committee that he expects a new

grant of ₹ 50 lakhs in addition to the normal contributions for each of the next 5 years from a large corporation owned by an alumnus of the university. The university has been postponing a number of major capital improvements and building projects.

Required:

(i) If the grant is received and tuition is raised to ₹ 4,500, how much money would the university have available in the first year for capital improvements and building with student enrolment of 11,400 and the expected cost increases?

(ii) If the grant is received and costs increases as predicted for the coming year, what tuition should the university charge to break-even with its current enrolment of 12,000 students after providing ₹ 40.20 lakhs for capital improvements?

Answer

Past academic year

	(₹ in lakhs)
Students tuition @ ₹ 3,600 × 12,000 students – (75%)	432
Endowment and contribution – (25%)	144*
Total cost	576*

$$\left(*\,25\% \text{ of total cost i.e.} \frac{100}{75} \times 432 = ₹\ 576\,\text{lakhs} \right)$$

Less: fixed cost	300
Variable cost	276

Hence variable cost per student = $\dfrac{₹\ 276\,\text{lakhs}}{12,000\,\text{students}} = ₹\ 2,300$

*Out of fixed cost of ₹ 300 lakhs, endowment and contribution is of ₹ 144 lakhs.

Statement showing the money which would be available to the university in first year for Capital improvements and Building

			(₹ in lakhs)
(i)	Tuition fee ₹ 4,500 × 11,400 students		513.00
	Add: Endowment and contribution	144.00	
	Grant	50.00	194.00
			707.00
	Less: Variable cost – ₹ 2,300 × 1.15 × 11,400 students	301.53	
	Fixed cost – ₹ 300 lakhs + ₹ 50 lakhs	350.00	651.53
	Balance for Capital improvements and Building		**55.47**

Statement showing the Tuition fee which University should charge to break-even

(ii)	Variable cost – ₹ 2,300 × 1.15 × 12,000 students	317.40
	Add: Fixed cost ₹ 300 lakhs + ₹ 50 lakhs	350.00
	Capital improvements	40.20
	Total cost	707.60
	Less: Endowment, contribution and grants	194.00
	Balance from tuitions	513.60

Hence, tuition which university should charge from each student.

$$= \frac{₹\ 513.60\ \text{lakhs}}{12,000\ \text{students}} = ₹\ 4,280\ \text{per student.}$$

Question 14

Big Oil is wondering whether to drill for oil in Westchester Country. The prospectus are as follows:

Depth of Well Feet	Total Cost Millions of Dollars	Cumulative Probability of Finding Oil	PV of Oil (If found) Millions of Dollars
2,000	4	0.5	10
4,000	5	0.6	9
6,000	6	0.7	8

Draw a decision tree showing the successive drilling decisions to be made by Big Oil. How deep should it be prepared to drill?

Answer

The given data is easily represented by the following decision tree diagram:
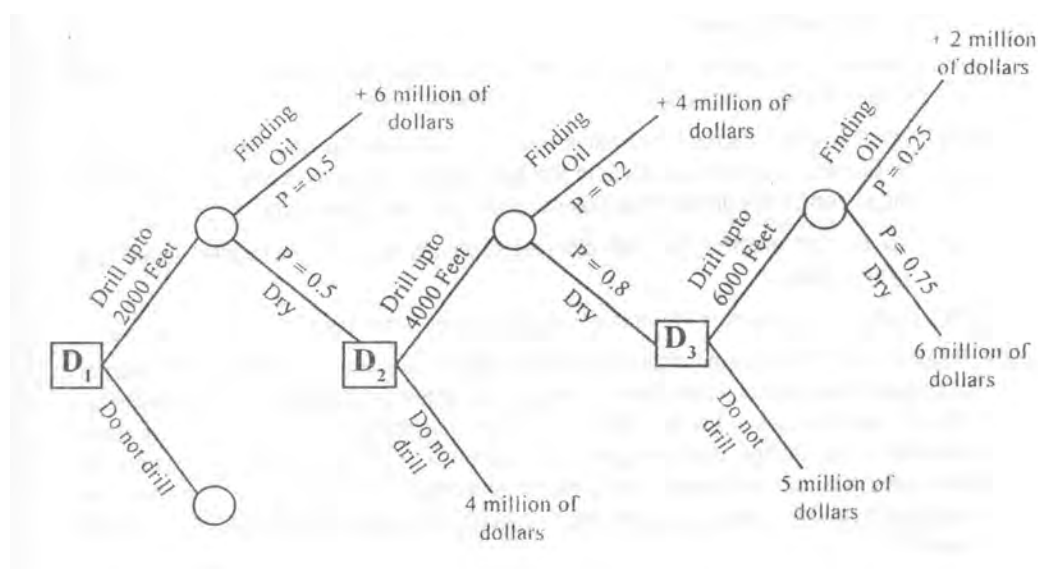
There are three decision points in the tree indicated by D_1, D_2 and D_3.

Using rolling back technique, we shall take the decision at decision point D_3 first and then use it to arrive decision at a decisions point D_2 and then use it to arrive decision at a decision point D_1.

Statement showing the evaluation of decision at Decision Point D_3

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto	Finding Oil	0.25	+ 2	0.50
	6,000 feet	Dry	0.75	−6	−4.50
		(Refer to working note)			
					−4.00
2.	Do not drill				−5.00

Since the Expected P.V. of Oil (if found) on drilling upto 6,000 feet − 4 millions of dollars is greater than the cost of not drilling − 5 millions of dollars. Therefore, Big Oil should drill upto 6,000 feet.

Statement showing the evaluation of decision at Decision Point D_2

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto	Finding Oil	0.2	4	0.8
	4,000 feet	Dry	0.8	−4	−3.2
		(Refer to working note)			
					−2.4
2.	Do not drill				−4

Since the Expected P.V. of Oil (if found) on drilling upto 4,000 feet − 2.4 millions of dollars is greater than the cost of not drilling − 4 millions of dollars. Therefore, Big Oil should drill upto 4,000 feet.

Statement showing the evaluation of decision at Decision Point D_1

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto	Finding Oil	0.5	6	3.0
	2,000 feet	Dry	0.5	−2.4	−1.2
		(Refer to working note)			
					1.8
2.	Do not drill				NIL

Since the Expected P.V. of Oil (if found) on drilling upto 2,000 feet is 1.8 millions of dollars (positive), Big Oil should drill upto 2,000 feet.

Working Notes:

Let x be the event of not finding oil at 2,000 feets and y be the event of not finding oil at 4,000 feet and z be the event of not finding oil at 6,000 feets.

We know, that,

P (x $\cap$ y) = P (x) × P(y/x)

Where, P(x $\cap$ y) is the joint probability of not fiding oil at 2,000 feets and 4,000 feets, P(x) is the probability of not finding oil at 2,000 feets and P(y/x) is the probability of not fiding oil at 4,000 feets, if the event x has already occurred.

P (x $\cap$ y) = 1 – Cumulative probability of finding oil at 4,000 feet

= 1 – 0.6 = 0.4

P(x) = 1 – Probability of finding oil at 2,000 feets

= 1 – 0.5 = 0.5

Hence, P(y/x) = $\dfrac{P(x \cap y)}{P(x)} = \dfrac{0.4}{0.5} = 0.8$

Therefore, probability of finding oil between 2,000 feets to 4,000 feets = 1 – 0.8 = 0.2.

We know that, P (x $\cap$ y $\cap$ z) = P (x) × p (y/x) × p (z/x $\cap$ y)

Where P (x $\cap$ y $\cap$ z) is the joint probability of not finding oil at 2,000 feets, 4,000 feets and 6,000 feets, P(x) and P(y/x) are as explained earlier and P(z/x $\cap$ y) is the probability of not finding oil at 6,000 feets if the event x and y has already occurred.

P (x $\cap$ y $\cap$ z) = 1 – Cumulative probability of finding oil at 6,000 feets = 1- 0.7 = 0.3

P(z/x $\cap$ y) = $\dfrac{P(x \cap y \cap z)}{P(x) \times P(y/x)} = \dfrac{0.3}{0.5 \times 0.8} = \dfrac{0.3}{0.4} = 0.75$

Therefore, probability of finding oil between 4,000 feets to 6,000 feets = 1 – 0.75 = 0.25

Question 15

Ze-Te Fashions is a high-fashion women's garments manufacturer. It is planning to introduce a new fashion garment in the market in the forthcoming Diwali season. Four metres of cloth (material) are required to layout the dress pattern. After cutting, some material remains that can be sold as a cut-piece. The left-over material can also be used to manufacture a matching cap and handbag. Ze-Te expects to sell 2,500 dresses, if matching caps and handbags are not provided and 20% more, if matching caps and handbags are made available. The market research indicates that the cap and/or handbag cannot be sold independently, but only as accessories with the dress.

The following combination of sales is expected:

Complete sets of dress, cap and handbag	68%
Dress and Cap only	12%
Dress and handbag only	09%
Dress only	11%
	100%

The material used in the dress costs ₹ 60 per metre. The cost of cutting the dress, if the cap and

handbag are not manufactured, is estimated at ₹ 25 a dress and the resulting remnants can be sold for ₹ 5 for each dress cut out.

If the cap and handbag are to be manufactured, it requires a more delicate and skillful cutting and hence cutting cost will increase by ₹ 10 per dress.

The selling prices and the other costs to complete the three items, once they are cut, are as follows:

	Selling price per unit	Other costs per unit
	₹	₹
Dress	400.00	50.00
Cap	29.00	7.00
Handbag	18.00	3.00

Other costs per unit excludes the cost of material and cutting.

You are required to prepare a statement showing:

(a) Should the company go in for caps and handbags along with dresses? Substantiate your answer.

(b) What are the non-quantitative factors that could influence the company's decision to manufacture caps and handbags that match the dress?

Answer

(a)   **Statement showing profitability of Ze-Te Fashions**

	If matching caps and handbags are not provided with dresses	If matching caps and handbags are provided with dresses
Expected Sales/Forecasted Sales (pieces)	2,500	3,000
	₹	₹
Sales revenue: (A)	10,00,000	13,11,180
	(2,500 dresses × ₹ 400)	(Refer to working note 2)
Costs		
Materials (i)	5,50,000	6,58,950
(Refer to working note 3)		
Cutting (ii)	62,500	1,01,700
	(2,500 dresses × ₹ 25)	(Refer to working note 4)
Others (iii)	1,25,000	1,73,730
	(2,500 dresses × ₹ 50)	(Refer to working note 5)
Total costs : (B) = [(i) + (ii) + (iii)]	7,37,500	9,34,380
Operating profit : (A) − (B)	2,62,500	3,76,800

Since, the company can earn an additional profit of ₹ 1,14,300 (₹ 3,76,800 − ₹ 2,62,500) if matching caps and handbags are provided along with dresses. Therefore, the company should go for manufacturing matching caps and handbags and provide them along with dresses.

Working Notes:

1. **Expected sales in forthcoming season, if caps and handbags are provided with dresses:**

Complete sets of dress, cap and handbag	(68% of 3,000)	2,040 dresses
Dress and cap only	(12% of 3,000)	360 dresses
Dress and handbag only	(9% of 3,000)	270 dresses
Dress only	(11% of 3,000)	330 dresses
		3,000 dresses

2. **Sales revenue of expected sales, if caps and handbags are provided with dresses.**

	₹
Complete set of dress, cap and handbag (2,040 dresses × ₹ 447)	9,11,880
Dress and cap only (360 dresses × ₹ 429)	1,54,440
Dress and handbag only (270 dresses × ₹ 418)	1,12,860
Dress only (330 dresses × ₹ 400)	1,32,000
	13,11,180

3. **Material**

	₹
For 2,500 dresses (4 metres × ₹ 60 per metre – ₹ 5) for 3,000 dresses	5,50,500
2,670 dresses (4 metres × ₹ 60 per metre) + 330 dresses (4 metres × ₹ 60 per metre – ₹ 5)	6,58,950

4. **Cutting costs for 3,000 dresses**

	₹
(2,670 dresses × ₹ 35 + 330 dresses × ₹ 25)	1,01,700

5. **Other costs for 3,000 dresses**

	₹
Complete set of dress, cap and handbag (2,040 dresses × ₹ 60)	1,22,400
Dress and cap only (360 dresses × ₹ 57)	20,520
Dress and handbag only (270 dresses × ₹ 53)	14,310
Dress only (330 dresses × ₹ 50)	16,500
	1,73,730

(b) Non-quantitative factors that could influence the company's decision to manufacture caps and handbags that match the dress are:

1. Reliability of various estimates of costs, sales and prices.
2. Proper consideration of quality in terms of design, colour and durability.
3. Timing of production and distribution of four combination i.e. complete set of dress, dress and cap, dress and handbags and dress only has been planned suitably in advance.
4. Effect on the production, sale of other product lines of Ze-Te Fashions has to be examined.

Question 16

Complex Ltd., an infrastructure company is evaluating a proposal to build, operate and transfer a section of 20 kms. of road at a project cost of ₹ 400 crores to be financed as follows:

Equity Shares Capital ₹ 100 crores, loans at the rate of interest of 15% p.a. from financial institutions ₹ 300 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 ₹ 100 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: $CO_0 = \dfrac{CF_i}{(1+r)^n}$

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,

   CO_0 = ₹ 400 crores

   CF_i = ₹ 80 crores p.a. for 15 years

   (Refer to working note (i))

Therefore,

$$₹\,400\,crore = \frac{₹\,80\,crores}{(1+r)^{15}}$$

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. $\left(\dfrac{₹\,400\,crores}{₹\,80\,crores}\right)$. 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% = ₹ 80 crores × PVAF (18%, 15 years)

= ₹ 80 crores × 5.092

= ₹ 407.36

At 19% = ₹ 80 crores × PVAF (19%, 15 years)

= ₹ 80 crores × 4.876

= ₹ 390.08

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

$$\text{IRR} = 18\% + \frac{₹\ 407.36\,\text{crores}\ -\ ₹\ 400\,\text{crores}}{₹\ 407.36\,\text{crores} -\ ₹\ 390.08\,\text{crores}} \times 1\%$$

$$= 18\% + \frac{₹\ 7.36\,\text{crores}}{₹\,17.28\,\text{crores}} \times 1\%$$

$$= 18\% + 0.426\%$$

$$= 18.43\%$$

Therefore, the IRR of the project is 18.43%.

Working Notes:

(i) Net cash inflow of the project

Cash inflow	₹
Toll revenue	100 crores p.a. for 15 years
Cash outflow	₹
Toll collection expenses including maintenance of the roads	20 crores p.a. for 15 years
(5% of ₹ 200 crores)	
Net cash inflow	80 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:

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

Where,

r = Equity IRR

n = Life of the project

Here, Cash inflow at zero date from equity shareholders = ₹ 100 crores

Cash inflow for equity shareholders = ₹ 28.69 crores p.a.

(Refer to working note)

Therefore:

₹ 100 crores = $\dfrac{₹\,28.69\,\text{crores}}{(1+r)^{15}}$

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

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 $3.484\left(\dfrac{₹\,100\,\text{crores}}{₹\,28.69\,crores}\right)$. From the PVAF table at 28% the cumulative discount factor for

1 – 15 years is 3.484. Therefore, the equity IRR of project is 28%.

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

Amount of loan from financial institution	₹ 300 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 ₹ 300 crores/5.847 i.e. ₹ 51.31 crores.

(iii) Cash inflow available for equity shareholders

Net cash inflow of the project	₹ 80.00 crores
[Refer to working note (i)]	
Equated yearly instalment of the project	₹ 51.31 crores
[Refer to working note (ii)]	
Cash inflow available for equity shareholders	₹ 28.69 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 ₹ 300 crores goes to equity shareholders who have invested ₹ 100 crore i.e.

$$3.4\% \times \frac{₹\ 300\ \text{crores}}{₹\ 100\ \text{crores}} = 10.2\%\ \text{is added to the project IRR which gives equity IRR of 28\%.}$$

Question 17

DD amusement Park charges ₹ 40 each for all rides in the park. Variable costs amount to ₹ 8.00 per ride and fixed costs are ₹ 320 lakhs. Last year's net income was ₹ 64 lakhs on sales of ₹ 480 lakhs. Rising costs have cut sharply into net income for DD for the last 2 years. This year management again expects a cost increase of 25 per cent in variable costs and 10 per cent in fixed costs. To help offset these increases, the management is considering raising the price of a ride to ₹ 50.

Required:

(1) How many rides did DD sell last year?

(2) If the price increase is not implemented, what is the expected net income for this year assuming the same volume of activity?

(3) Compute the price in difference point for the new ride price.

(4) Compute the Break-even point for this year using the old price and the new price.

(5) Should management raise the price of a ride, if the price increase will reduce ride volume 10 per cent from the last years' level? In that situation, what will be the expected net income?

Answer

(1) Rides which DD Amusement Park sell last year

$$\text{No. of rides DD sell last year} = \frac{\text{Total Sales of rides last year}}{\text{Charges per ride last year}}$$

$$= \frac{₹\ 4,80,00,000}{₹\ 40}$$

$$= 12,00,000\ \text{rides}$$

(2) Expected net income for this year if price increase is not implemented

(assuming the same volume of activity)

	₹
Charges per ride	40
Less: Expected Variable cost per ride (Refer to working note 1)	10
Contribution per ride: (A)	30
No. of rides : (B)	12,00,000
Total expected contribution for all rides: (C) = (A) × (B)	3,60,00,000
Less: Expected fixed costs (Refer to working note (ii))	3,52,00,000
Expected net income	8,00,000

(3) Price indifference point for the new ride price

Price indifference point is a point at which the expected profits remains the same irrespective of sales price and costs.

	₹
New ride price	50
Less: Variable cost	10
Contribution per ride	40
Fixed costs of this year: (A)	3,52,00,000
Net income of last year: (B)	64,00,000
Contribution required: (A) + (B)	4,16,00,000

$$\text{Price - indfference point} = \frac{₹ 4,16,00,000}{40} = 10,40,000 \text{ rides}$$

(4) Break even point for this year using the old price and the new price

$$\text{Break even point} = \frac{\text{Fixed costs}}{\text{Contribuiton per ride}}$$

$$\text{At old price} = \frac{₹ 3,52,00,000}{40 - ₹10}$$

= 11,73,334 rides

$$\text{At new price} = \frac{₹ 3,52,00,000}{₹ 50 - ₹ 10}$$

= 8,80,000 rides

(5) **Expected net income if the price increase will reduce ride volume by 10% from the last year's levels.**

	₹
Charges per ride	50
Less: Variable cost	10
Contribution per ride: (A)	40
No. of rides (12,00,000 – 1,20,000): (B)	10,80,000
Total contribution for all rides : (A) × (B)	4,32,00,000
Less: Fixed costs	3,52,00,000
Expected net income	80,00,000

Justification:
Since the increase in price of a ride will increase the net income by ₹ 16,00,000 (₹ 80,00,000 – ₹ 64,00,000) the management should raise the price of a ride.

Working Note

(i) Expected variable cost this year

Variable cost last year	₹ 8.00 per ride
Add: Expected increase this year (25% of ₹ 8.00)	₹ 2.00 per ride
Expected variable cost this year	10.00 per ride

(ii) Expected fixed costs this year

	₹
Fixed costs last year	3,20,00,000
Add: Expected increase this year (10% of ₹ 3,20,00,000)	32,00,000
Expected fixed costs this year	3,52,00,000

Question 18

The total market value of the equity share of a Company is ₹ 80,00,000 and the total value of the debt is ₹ 60,00,000. The treasurer estimate that the beta of the stock is currently 1.5 and that the expected risk premium on the market is 12 per cent. The treasury bill rate is 8 per cent.
Required:
(1) What is the beta of the Company's existing portfolio of assets?
(2) Estimate the Company's Cost of capital and the discount rate for an expansion of the company's present business.

Answer

(1) $\beta_{company} \; assets = \beta_{equity} \times \dfrac{V_E}{V_0} + B_{debt} \times \dfrac{V_D}{V_0}$

If company's debt capital is riskless than above relationship become:

$Here\; \beta_{equity} = 1.5\; \beta_{assets} = \beta_{equity}\; \dfrac{V_E}{V_0}$

$\beta_{debt} = 0$

Note: Since β_{debt} is not given it is assumed that company debt capital is virtually riskless.

V_E = ₹ 80 lakhs.

V_D = ₹ 60 lakhs., V_0 = ₹ 140 lakhs.

$$\beta_{company} \text{ assets} = 1.5 \times \frac{₹ \ 80\,\text{lakhs}}{₹ \ 140\,\text{lakhs}}$$

$$= 0.857$$

(2) Company's cost of capital = $\beta_8 \ \beta_A \times$ Risk premium

Where β_8 = Risk free rate of return

β_A = Beta of company assets

Therefore, company's cost of capital = 8% + 0.857 × 12% = 18.28%

In case of expansion of the company's present business, the same rate of return i.e. 18.28% will be used. However, in case of diversification into new business the risk profile of new business is likely to be different. Therefore, different discount factor has to be worked out for such business.

Question 19

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 third year. At the end of the 8 years, the original equipment will have resale value equivalent to the cost of removal, but the additional equipment would be sold for ₹ 1 lakhs. Working Capital of ₹ 15 lakhs will be needed. The 100% capacity of the plant is of 4,00,000 units per annum, but the production and sales-volume expected are as under:

Year	Capacity in percentage
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 are 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 40% tax, straight-line method of depreciation, (permissible for tax purposes also) and taking 15% as appropriate after tax Cost of Capital, should the project be accepted?

Answer

(a) Computation of initial cash outlay

	(₹ in lakhs)
Equipment Cost (0)	120
Working Capital (0)	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 @ 40%	Nil	10,40,000	55,00,000	33,40,000
Profit/(loss) after tax	(13,00,000)	15,60,000	82,50,000	50,10,000
Add: Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Cash Inflow	**2,00,000**	**30,60,000**	**99,00,000**	**66,60,000**

Computation of PV of CIF

Year	CIF	PV Factor @ 15%	PV
	₹		₹
1	2,00,000	.8696	1,73,920
2	30,60,000	.7561	23,13,666
3	99,00,000	.6575	65,09,250
4	99,00,000	.5718	56,60,820
5	99,00,000	.4972	49,22,280
6	66,60,000	.4323	28,79,118
7	66,60,000	.3759	25,03,494
8	66,60,000	.3269	21,77,154
WC	15,00,000	.3269	4,90,350
SV	1,00,000	.3269	(32,690)
			2,75,97,362
		PV of COF_0	1,35,00,000
	Additional Investment = ₹ 10,00,000 × 0.7561		7,56,100
		NPV	1,33,41,262

Recommendation: Accept the project in view of positive NPV.

Question 20

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 an airline operations. The company wants to know:

(i) The expected NPV of this venture assuming independent probability distribution with 8 per cent risk free rate of interest.

(ii) The possible deviation in the expected value.

(iii) State the importance of standard deviation of the present value distribution in Capital Budgeting decisions?

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 @ 8%	Total PV
27	0.9259	25.00
29.3	0.8573	25.12
27.9	0.7938	22.15
	PV of cash inflow	72.27
	Less: Cash outflow	50.00
	NPV	**22.27**

(ii) **Possible deviation in the expected value**

Year I

$X - \overline{X}$	$X - \overline{X}$	$(X - \overline{X})^2$	P_1	$(X - \overline{X})^2 P^1$
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
				$\overline{85.4}$

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

Year II

$X - \overline{X}$	$X - \overline{X}$	$(X - \overline{X})^2$	P_2	$(X - \overline{X})^2 \times P_2$
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
				$\overline{98.61}$

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

Year III

$X - \overline{X}$	$X - \overline{X}$	$(X - \overline{X})^2$	P_3	$(X - \overline{X})^2 \times P_3$
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
				$\overline{74.29}$

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

Standard deviation about the expected value:

$$\sigma\sigma = \sqrt{\frac{85.4}{(1.08)^2} + \frac{98.61}{(1.08)^4} + \frac{74.29}{(1.08)^6}} = 13.8749$$

(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 riskier 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 21

Jemini Ltd. is in the business of manufacturing bearings. Some more product lines are being planned to be added to the existing system. The machinery required may be bought or may be taken on lease. The cost of machine is ₹ 40,00,000 having a useful life of 5 years with the salvage value of ₹ 8,00,000. The full purchase value of machine can be financed by 20% loan repayable in five equal instalments falling due at the end of each year. Alternatively, the machine can be procured on a 5 years lease, year-end lease rentals being ₹ 12,00,000 per annum. The Company follows the written down value method of depreciation at the rate of 25%. Company's tax rate is 35 per cent and cost of capital is 16 per cent:

(i) Advise the company which option it should choose – lease or borrow.

(ii) Assess the proposal from the lessor's point of view examining whether leasing the machine is financially viable at 15% cost of capital (Detailed working notes should be given. Calculations can be rounded off to ₹ lakhs).

Answer

(i) P.V. of Cash outflow under lease option

(in ₹)

Year	Lease Rental after tax	PVIFA @ 13%	Total P.V.
1 – 5	12,00,000 (I – T)	20% (I – T)	
	= 7,80,000	3.517	27,43,260

Cash Outflow under borrowing option

5 equal instalments

₹ 40,00,000 ÷ 2.991 (PVIFA 20%) = 13,37,345

Tax Savings

Year	Loan Instalments	On Interest	On Depreciation	Net Cash Outflow	PVIF 13%	Total PV
1	13,37,345	2,80,000	3,50,000	7,07,345	.885	6,26,000
2	13,37,345	2,48,386	2,62,500	8,26,459	.783	6,47,117
3	13,37,345	1,97,249	1,96,875	9,43,221	.693	6,53,652
4	13,37,345	1,43,085	1,47,656	10,46,604	.613	6,41,568
5	13,37,345	78,087	1,10,742	11,48,516	.543	6,23,644
						31,91,981

Total PV	31,91,981
Less: PV Salvage value adjusted for Tax savings on loss of sale of machinery	4,62,759
(₹ 8,00,000 × .543 = ₹ 4,34,400) + (₹ 28,359)	
(See Working Note on Depreciation)	
9,49,219 – 8,00,000 =	
1,49,219 × .35 × .543 = 28,359	
Total present value of cash outflow	**27,29,222**

Decision: PV of cash outflow of lease option is greater than borrow option and hence borrow option is recommended.

Working Notes:

1. **Debt and Interest Payments**

Year	Loan Instalments	Loan at the beginning of the year	Interest	Principal	Balance at the end of year
1	13,37,345	40,00,000	8,00,000	5,37,345	34,62,655
2	13,37,345	34,62,655	6,92,531	6,44,814	28,17,841
3	13,37,345	28,17,841	5,63,568	7,73,777	20,44,064
4	13,37,345	20,44,064	4,08,813	9,28,532	11,15,532
5	13,37,345	11,15,532	2,23,106	11,14,239	Nil

2.

Year		Depreciation
1	40,00,000 × .25	10,00,000
2	30,00,000 × .25	7,50,000
3	22,50,000 × .25	5,62,500
4	16,87,500 × .25	4,21,875
5	12,65,625 × .25	3,16,406

B.V. of machine = 12,65,625 – 3,16,406 = 9,49,219.

(ii) Proposal from the Lessor's point of view

Lessor's Cash Flow

	1	2	3	4	5
Lease Rentals	12,00,000	12,00,000	12,00,000	12,00,000	12,00,000
Less: Dep.	10,00,000	7,50,000	5,62,500	4,21,875	3,16,406
EBT	2,00,000	4,50,000	6,37,500	7,78,125	8,83,594
Less: Tax @ 35%	70,000	1,57,500	2,23,125	2,72,344	3,09,258
EAT	1,30,000	2,92,500	4,14,375	5,05,781	5,74,336
CFAT	11,30,000	10,42,500	9,76,875	9,27,656	8,90,742
PV factor @ 15%	.8696	.7561	.6575	.5717	.4972
PV	9,82,648	7,88,234	6,42,295	5,30,341	4,43,144

Total P.V. =	33,86,662	
Add: Tax Saving on sale of asset	25,967	(1,49,219 x 0.35 x 0.4972)
Total PV of cash inflow	34,12,629	
Cost of Machine	40,00,000	
NPV	(5,87,371)	

Decision: Lease rate is not financially viable. Hence, not recommended.

Question 22

(a) 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	Project
		A	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 9 per cent, which project should be accepted? Explain with workings.

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

Project	Expected NPV	Standard deviation
	(₹)	
X	1,06,000	75,000
Y	2,40,000	1,35,000

(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?

Answer

(a) Project A

Expected Net Cash flow (ENCF)

.3 (6,00,000) + .4 (4,00,000) + .3 (2,00,000) = 4,00,000

σ^2 = .3 (6,00,000 – 4,00,000)^2 + .4 (4,00,000 – 4,00,000)^2 + .3 (2,00,000 – 4,00,000)^2

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

σ = 1,54,919.33

ENPV = 4,00,000 × 4.100 = 16,40,000

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

Project B

ENCF = .3 (5,00,000) + .4 (4,00,000) + .3 (3,00,000) = 4,00,000

σ^2 = .3 (5,00,000 – 4,00,000)^2 + .4 (4,00,000 – 4,00,000)^2 + .3 (3,00,000 – 4,00,000)^2

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

$\sigma = 77,459.66$

ENPV = 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.

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

(ii) $CV_x = \dfrac{SD}{ENPV} = \dfrac{75,000}{1,06,000} = .71$

$CV_y = \dfrac{1,35,000}{2,40,000} = .5626$

On the basis of Co-efficient of Variation (C.V.) Project X appears to be more risky and 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 23

Armada Leasing Company is considering a proposal to lease out a school bus. The bus can be purchased for ₹ 8,00,000 and, in turn, be leased out at ₹ 2,00,000 per year for 8 years with payments occurring at the end of each year:

(i) Estimate the internal rate of return for the company assuming tax is ignored.

(ii) What should be the yearly lease payment charged by the company in order to earn 20 per cent annual compounded rate of return before expenses and taxes?

(iii) Calculate the annual lease rent to be charged so as to amount to 20% after tax annual compound rate of return, based on the following assumptions:

(i) Tax rate is 40%;

(ii) Straight line depreciation;

(iii) Annual expenses of ₹ 50,000; and

(iv) Resale value ₹ 1,00,000 after the turn.

Answer

(i) Payback period = $\dfrac{8,00,000}{2,00,000}$ = 4.00

PV factor closest to 4.00 in 8 years is 4.078 at 18%

Thus IRR = 18%

Note: We may also arrive at the answer of 18.63% instead of 18% if exact calculation are made as follows:-

PV factor in 8 years at 19% is 3.9544

Interpolating for 4.00

$$\text{IRR} = 18\% + \frac{4.0776 - 4.000}{4.0776 - 3.9544} = 18.63\%$$

(ii) Desired lease rent to earn 20% IRR before expenses and taxes:

Lease Rent = $\dfrac{8,00,000}{PVIFA\ 8\ yr, 20\%}$ = $\dfrac{8,00,000}{3.837}$ = ₹ 2,08,496 p.a.

(iii) Revised lease rental on school bus to earn 20% return based on the given conditions.

PV factor [(X – E – D) (1 – T) + D] + (PV factor × S.V.) = Initial investment

3.837 [(x – 50,000 – 1,00,000) (1 – 0.4) + 1,00,000] + (0.233 × 1,00,000) = 8,00,000

3.837 [(x – 1,50,000) 0.6} + 1,00,000] + 23,300 = 8,00,000

3.837 [{0.6x – 90,000} + 1,00,000] + 23,300 = 8,00,000

3.837 [0.6x + 10,000] + 23,300 = 8,00,000

2.3022x + 38,370 + 23,300 = 8,00,000

2.3022x = 8,00,000 – 38,370 – 23,300

2.3022x = 7,38,330

X = 3,20,706

This may be confirmed as lease rental	3,20,706
Less: Expenses + Depreciation	1,50,000
EBT	1,70,706
Less tax 40%	68,282
PAT	1,02,424
Add: Depreciation	1,00,000
CFAT	2,02,424

$$\frac{Co - PV\ of\ SV}{CFAT} = \frac{8,00,000 - 23,300}{2,02,424} = 3.837\ or\ 20\%$$

Question 24

The Textile Manufacturing Company Ltd., is considering one of two mutually exclusive proposals, Projects M and N, which require cash outlays of ₹ 8,40,000 and ₹ 8,75,000 respectively. The certainty-equivalent (C.E) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bonds is 7% and this is used as the risk free rate. The expected net cash flows and their certainty equivalents are as follows:

Year-end	Project M Cash Flow ₹	Project M C.E.	Project N Cash Flow ₹	Project N 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 Re. 1 discounted at 7% at the end of year 1, 2 and 3 are 0.9346, 0.8734 and 0.8163 respectively. **Which of the project should be accepted?**

Answer

Statement Showing the Net Present Value of Project M

Year end	Cash Flow (₹)	C.E.	Adjusted Cash flow (₹)	Present value factor at 7%	Total Present value (₹)
	(a)	(b)	(c) = (a) × (b)	(d)	(e) = (c) × (d)
1	4,50,000	0.8	3,60,000	0.9346	3,36,456
2	5,00,000	0.7	3,50,000	0.8734	3,05,690
3	5,00,000	0.5	2,50,000	0.8163	2,04,075
					8,46,221
Less: Initial Investment					8,40,000
Net Present Value					**6,221**

Statement Showing the Net Present Value of Project N

Year end	Cash Flow (₹)	C.E.	Adjusted Cash flow (₹)	Present value factor (d)	Total Present value (₹)
	(a)	(b)	(c) = (a) × (b)		(e) = (c) × (d)
1	4,50,000	0.9	4,05,000	0.9346	3,78,513
2	4,50,000	0.8	3,60,000	0.8734	3,14,424
3	5,00,000	0.7	3,50,000	0.8163	2,85,705
					9,78,642
Less: Initial Investment					8,75,000
Net Present Value					**1,03,642**

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

Question 25

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 ₹ 1,00,000 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%. 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).

Answer

<div align="center">

A & Co.
Equivalent cost of (EAC) of new machine

</div>

		₹
(i)	Cost of new machine now	1,00,000
	Add: P.V. of annual repairs @ ₹ 10,000 per annum for 8 years (₹ 10,000 × 4.4873)	44,873
		1,44,873
	Less: P.V. of salvage value at the end of 8 years (₹20,000×0.3269)	6,538
		1,38,335
	Equivalent annual cost (EAC) (₹ 1,38,335/4.4873)	30,828

Equivalent Cost (EAC) of keeping the machine

Present value (P.V)	I Year (₹)	II Year (₹)	III Year (₹)	IV Year (₹)
Value Present	40,000	25,000	15,000	10,000
Add:P.V of annual maintenance (Annual Maintenance/1.15)	8,696	17,391	26,087	34,783
Total	48,696	42,391	41,087	44,783
Less: P.V. of salvage value at the end of the year (P.V./1.15)	21,739	13,043	8,696	Nil
	26,957	29,348	32,391	44,783
	1.15	1.15	1.15	1.15
Equivalent Annual Cost (EAC)	31,000	33,750	37,250	51,500

Advice: The company should replace the old machine immediately because the Equivalent Annual Cost (EAC) of the new machine at ₹ 30,828 is lower than the cost of using the existing machine in first year, second year, third year and fourth year.

Question 26

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 are 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 8% discount rate for this type of investment.

Required:

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

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

(iii) What will be the best outcome and the probability of that occurrence?

(iv) Will the project be accepted?

(Note: 8% discount factor 1 year 0.9259; 2 year 0.8573)

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:
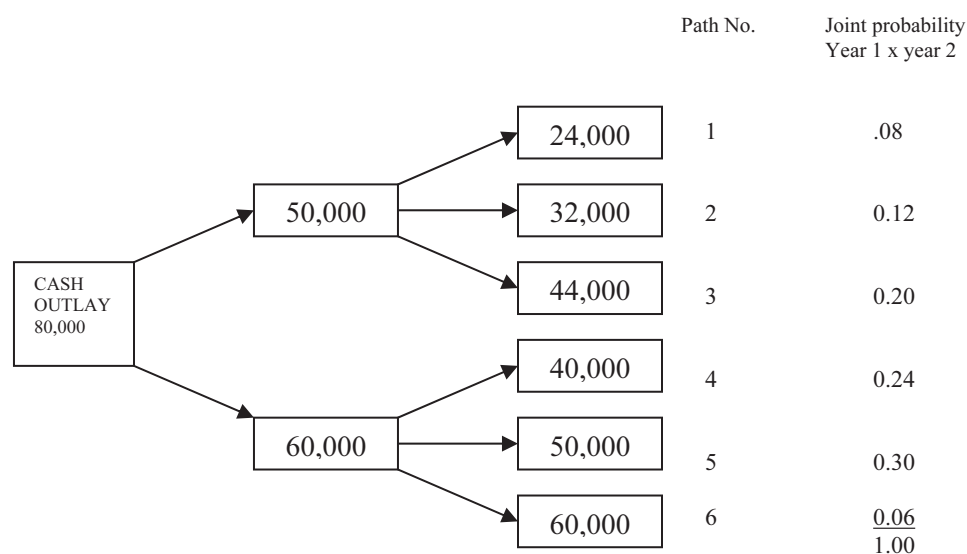
The Net Present Value (NPV) of each path at 8% discount rate is given below:

Path	Year 1 Cash Flows (₹)	Year 2 Cash Flows (₹)	Total Cash Inflows (PV) (₹)	Cash Outflows (₹)	NPV (₹)
1	50,000×.9259= 46,295	24,000×.8573= 20,575	66,870	80,000	(—) 13,130
2	46,295	32,000×.8573= 27,434	73,729	80,000	(—) 6,271
3	46,295	44,000×.8573= 37,721	84,016	80,000	4,016
4	60,000×.9259= 55,554	40,000×.8573= 34,292	89,846	80,000	9,846
5	55,554	50,000×.8573= 42,865	98,419	80,000	18,419
6	55,554	60,000×.8573= 51,438	1,06,992	80,000	26,992

Statement showing Expected Net Present Value

₹

z	NPV(₹)	Joint Probability	Expected NPV
1	(—) 13,130	0.08	−1,050.40
2	(—) 6,271	0.12	−752.52
3	4,016	0.20	803.20
4	9,846	0.24	2,363.04
5	18,419	0.30	5,525.70
6	26,992	0.06	1,619.52
			8,508.54

Conclusions:

(ii) If the worst outcome is realized the project will yield NPV of – ₹ 13,130. The probability of occurrence of this NPV is 8% and a loss of ₹ 1,050.40 (path 1).

(iii) The best outcome will be path 5 when the NPV is at ₹ 18,419. The probability of occurrence of this NPV is 30% and a expected profit of ₹ 5,525.70.

(iv) The project should be accepted because the expected NPV is positive at ₹ 8,508.54 based on joint probability.

Question 27

Your company is considering to acquire an additional computer to supplement its time-share computer services to its clients. It has two options:

(i) To purchase the computer for ₹ 22 lakhs.

(ii) To lease the computer for three years from a leasing company for ₹ 5 lakhs as annual lease rent plus 10% of gross time-share service revenue. The agreement also requires an additional payment of ₹ 6 lakhs at the end of the third year. Lease rents are payable at the year-end, and the computer reverts to the lessor after the contract period.

The company estimates that the computer under review will be worth ₹ 10 lakhs at the end of third year.

Forecast Revenues are:

Year	1	2	3
Amount (₹ in lakhs)	22.5	25	27.5

Annual operating costs excluding depreciation/lease rent of computer are estimated at ₹ 9 lakhs with an additional ₹ 1 lakh for start up and training costs at the beginning of the first year. These costs are to be borne by the lessee. Your company will borrow at 16% interest to finance the acquisition of the computer. Repayments are to be made according to the following schedule:

Year end	1	2	3
Principal (₹'000)	500	850	850
Interest (₹'000)	352	272	136

The company uses straight line method (SLM) to depreciate its assets and pays 50% tax on its income. The management approaches you to advice. Which alternative would be recommended and why?

Note: The PV factor at 8% and 16% rates of discount are:

Year	1	2	3
8%	0.926	0.857	0.794
16%	0.862	0.743	0.641

Answer

Working Notes:

(a) Depreciation: ₹ 22,00,000 – 10,00,000/3 = ₹ 4,00,000 p.a.

(b) Effective rate of interest after tax shield: .16 × (1 - .50) = .08 or 8%.

(c) Operating and training costs are common in both alternatives hence not considered while calculating NPV of cash flows.

Calculation of NPV

1. Alternative I: Purchase of Computer

Particulars	Year 1 ₹	Year 2 ₹	Year 3 ₹
Instalment Payment			
Principal	5,00,000	8,50,000	8,50,000
Interest	3,52,000	2,72,000	1,36,000
Total (A)	**8,52,000**	**11,22,000**	**9,86,000**
Tax shield @ 50%;			
Interest payment	1,76,000	1,36,000	68,000
Depreciation	2,00,000	2,00,000	2,00,000
Total (B)	**3,76,000**	**3,36,000**	**2,68,000**

Net Cash outflows (A – B)	4,76,000	7,86,000	7,18,000
PV factor at 8%	0.926	0.857	0.794
PV of Cash outflows	4,40,776	6,73,602	5,70,092
Total PV of Cash outflows:			16,84,470
Less: PV of salvage value (₹ 10 lakhs × 0.794)			7,94,000
Net PV of cash outflows			**8,90,470**

2. Alternative II: Lease of the Computer

Particulars	Year 1	Year 2	Year 3
	₹	₹	₹
Lease rent	5,00,000	5,00,000	5,00,000
10% of gross revenue	2,25,000	2,50,000	2,75,000
Lump sum payment	–	–	6,00,000
Total Payment	7,25,000	7,50,000	13,75,000
Less: Tax shield @ 50%	3,62,500	3,75,000	6,87,500
Net Cash outflows	3,62,500	3,75,000	6,87,500
PV of Cash outflows @ 8%	3,35,675	3,21,375	5,45,875
Total PV of cash outflows			**12,02,925**

Recommendation:

Since the Present Value (PV) of net cash outflow of Alternative I is lower, the company should purchase the computer.

Question 28

Fair finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is ₹ 3 crores. The customer, in order to leverage his tax position, has requested a quote for a three year lease with rentals payable at the end of each year but in a diminishing manner such that they are in the ratio of 3: 2 : 1. Depreciation can be assumed to be on straight line basis and Fair Finance's marginal tax rate is 35%. The target rate of return for Fair Finance on the transaction is 12%.

Required:

Calculate the lease rents to be quoted for the lease for three years.

Answer

Capital sum to be placed under Lease

	₹ in lakhs
Cash Down price of machine	300.00
Less: Present value of depreciation	

Tax Shield

$$100 \times .35 \times \frac{1}{(1.12)} \qquad 31.25$$

$$100 \times .35 \times \frac{1}{(1.12)^2} \qquad 27.90$$

$$100 \times .35 \times \frac{1}{(1.12)^3} \qquad \underline{24.91} \qquad 84.06$$

$$\underline{215.94}$$

If the normal annual lease rent per annum is x, then cash flow will be:

Year	Post-tax cash flow	P.V. of post-tax cash flow
1	$3x \times (1 - .35) = 1.95x$	$1.95 \times (1/1.12)$ = 1.7411x
2	$2x \times (1 - .35) = 1.3x$	$1.30 \times [(1/(1.12)^2] = 1.0364x$
3	$x \times (1 - .35) = 0.65x$	$0.65 \times [1/(1.12)^3] = \underline{0.4626x}$
		= 3.2401x

Therefore 3.2401 x = 215.94 OR x = ₹ 66.6460 lakhs

Year-wise lease rentals:

		₹ in lakhs
Year 1	3×66.6460 lakhs	= 199.938
2	2×66.6460 lakhs	= 133.292
3	1×66.6460 lakhs	= 66.6460

Question 29

ABC Ltd. is considering a proposal to acquire a machine costing ₹ 1,10,000 payable ₹ 10,000 down and balance payable in 10 annual equal instalments at the end of each year inclusive of interest chargeable at 15%. Another option before it is to acquire the asset on a lease rental of ₹ 15,000 per annum payable at the end of each year for 10 years. The following information is also available.

(i)   Terminal Scrap value of ₹ 20,000 is realizable, if the asset is purchased.

(ii)   The company provides 10% depreciation on straight line method on the original cost.

(iii) Income tax rate is 40%.

You are required to compute the analyse cash flows and to advise as to which option is better.

Answer

Option I : To buy the asset:

In this option the firm has to pay ₹ 10,000 down and the balance ₹ 1,00,000 together with interest @ 15% is payable in 10 annual equal instalments. The instalment amount may be calculated by dividing ₹ 1,00,000 by the PVAF for 10 years at 15% i.e.

Annual repayment = ₹ 1,00,000/5.0188 = ₹ 19,925

The cash flows of the borrowing and purchase option may be computed as follows:

Year	Instalment	Interest	Repayment	Balance
	₹	₹	₹	₹
1	19,925	15,000	4,925	95,075
2	19,925	14,261	5,664	89,411
3	19,925	13,412	6,513	82,898
4	19,925	12,435	7,490	75,408
5	19,925	11,311	8,614	66,794
6	19,925	10,019	9,906	56,888
7	19,925	8,533	11,392	45,496
8	19,925	6,824	13,101	32,395
9	19,925	4,859	15,066	17,329
10	19,925	2,596*	17,329	–

* Difference between the outstanding balance and the last instalment (i.e. ₹ 19,925 – ₹ 17,329 = ₹ 2,596)

Year	Instalment	Interest	Depreciation	Tax Shield 40% (2 + 3)	Net CF (1-4)	PVF	PV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	₹	₹	₹	₹	₹		₹
0	10,000	–	–	–	–	1.000	10,000
1	19,925	15,000	11,000	10,400	9,525	.870	8,287
2	19,925	14,261	11,000	10,104	9,821	.756	7,425
3	19,925	13,412	11,000	9,765	10,160	.658	6,685
4	19,925	12,435	11,000	9,374	10,551	.572	6,035
5	19,925	11,311	11,000	8,924	11,001	.497	5,467
6	19,925	10,019	11,000	8,408	11,517	.432	4,975
7	19,925	8,533	11,000	7,813	12,112	.376	4,554
8	19,925	6,824	11,000	7,130	12,795	.327	4,183
9	19,925	4,859	11,000	6,344	13,581	.284	3,857
10	19,925	2,596	11,000	5,438	14,487	.247	3,578
	Present value of total outflows						−65,046
10	Salvage value (after tax)		12,000	–	–	.247	+2,964
	Net present value of outflows						**−62,082**

Note: - It may be noted that (i) depreciation of ₹ 11,000 has been provided for all the 10 years. This

is 10% of the original cost of ₹ 1,10,000. (ii) The asset is fully depreciated during its life of 10 years, therefore, the book value at the end of 10th year would be zero. As the asset is having a salvage value of ₹ 20,000, this would be capital gain and presuming it to be taxable at the normal rate of 40%, the net cash inflow on account of salvage value would be ₹ 12,000 only. This is further discounted to find out the present value of this inflow.

Option II – Evaluation of Lease Option:

In case the asset is acquired on lease, there is a lease rent of ₹ 15,000 payable at the end of next 10 years. This lease rental is tax deductible, therefore, the net cash outflow would be only ₹ 9,000 (after tax). The PVAF for 10 years @ 15% is 5.0188. So, the present value of annuity of ₹ 9,000 is

Present value of annuity of outflow = ₹ 9,000 × 5.0188 = ₹ 45,169.

Advice:

If the firm opts to buy the asset, the present value of outflow comes to ₹ 62,082; and in case of lease option, the present value of outflows comes to ₹ 45,164. Hence, the firm should opt for the lease option. In this way, the firm will be able to reduce its costs by ₹ 16,913 [i.e. ₹ 62,082 – ₹ 45,169]. This may also be referred to as Net Benefit of Leasing.

Question 30

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 12%. The expected annual rate of inflation is 5%. Show how the viability of the project is to be evaluated.

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 @ 12%	PV of cash flows
0	(70)	–	(70)	1.000	(70)
1	30	0.952	28.56	0.8929	25.50
2	40	0.907	36.28	0.7972	28.92
3	30	0.864	25.92	0.7117	18.45
				Total	72.87
				Less: Cash out flow	70.00
				NPV (+)	**2.87**

* 1/1.05; 1/(1.05)^2 ; 1/(1.05)^3; 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 @ 12% adjusted by the inflation factor i.e. 5%*	PV of cash flows
0	(70)	1.000	(70)
1	30	0.8504	25.512
2	40	0.7231	28.924
3	30	0.6148	18.444
		Cash inflow	72.88
		Less: Cash out flow	70.00
		Net present value	2.88

$$* \ \frac{0.8929}{1.05}=0.8504, \frac{0.7972}{1.1025}=0.7231, \frac{0.7117}{1.1576}=0.6148$$

with positive NPV, the project is financially viable.

2
SOURCES OF FINANCING

Question 1

TSL Ltd. a highly profitable and tax paying company is planning to expand its present capacity by 100%. The estimated cost of the project is ₹ 1,000 lakhs out of which ₹ 500 lakhs is to be met out of loan funds. The company has received two offers from their bankers:

	Option 1	Option 2
Value of loan	₹ 500 lakhs	US $ 14 lakhs equal to ₹ 500 lakhs
Interest	15% payable yearly	6% payable (fixed) yearly in US $
Period	5 years	5 years
Repayment	(In 5 instalments. First instalment is payable 1 year after draw down)	
Other expenses (to be treated as revenue expenditure)	1% of the value of the loan	1% at US $ = ₹ 36 (Average)
Future exchange rate	–	End of 1 year 1US $ = ₹ 38 thereafter to increase by ₹ 2 per annum

The company is liable to pay Income-tax at 35% and eligible for 25% depreciation on W.D. value. You may assume that at the end of 5th year the company will be able to claim balance in WDV for tax purposes. The company follows Accounting Standard AS-11 for accounting changes in Foreign Exchange Rate.

(1) Compare the total outflow of cash under the above options.

(2) Using discounted cash flow techniques, evaluate the above offers.

The following discounting table may be adopted:

Years:	0	1	2	3	4	5
Discounting Factor:	1	0.9174	0.8417	0.7722	0.7084	0.6499

Answer

Option I

(₹ in lakhs)

Years:	Repayment of Principal	Interest at 15%	Other Expenses	Tax saving	Net Outflow
0	–	–	5.00	1.75	3.25
1	100	75	–	26.25	148.75
2	100	60	–	21.00	139.00
3	100	45	–	15.75	129.25
4	100	30	–	10.50	119.50
5	100	15	–	5.25	109.75
Total Outflows	**500**	**+ 225**	**+5.00**	**– 80.50**	**= 649.50**

Option II

Exchange Rate	Year	Repayment of principal	Interest at	Other Charges	Total Amount	Repayment of principal	Balance being Premium	Interest	Other Charges	Total Payment	Tax Savings	Net Outflow
		US $						₹ in lakhs				
36	0	–	–	0.140	0.140	–	–	–	5.04	5.04	1.764	3.276
38	1	2.8	0.840	–	3.640	100.00	6.4	31.920		138.32	11.732	126.588
40	2	2.8	0.672	–	3.472	100.00	12.0	26.880		138.88	10.878	128.002
42	3	2.8	0.504	–	3.304	100.00	17.6	21.168		138.768	10.048	128.720
44	4	2.8	0.336	–	3.136	100.00	23.2	14.784		137.984	9.184	128.800
46	5	2.8	0.168	–	2.968	100.00	28.8	7.728		136.528	24.814	111.714
		14.0	2.520	0.140	16.660	500.00	88.0	102.48	5.04	695.520	68.420	627.100

As per AS 11, the premium paid on exchange rate difference, on loans acquired for the purpose of capital expenditure, should be capitalized. The same is applicable under the Indian Income-tax Act for tax calculations also.

Tax savings on Premium capitalization (₹ in lakhs)

Year	Opening Value	Premium	Total	Depreciation on premium at 25%	Tax saving at 35%	Closing WDV
1	–	6.40	6.40	1.60	0.56	4.80
2	4.80	12.00	16.80	4.20	1.47	12.60
3	12.60	17.60	30.20	7.55	2.64	22.65
4	22.65	23.20	45.85	11.46	4.01	34.39
5	34.39	28.80	63.19*	63.19	22.11	Nil

*Assumed that full benefit will be claimed for tax purposes.

Tax savings on interest, other charges and Premium.

(₹ in lakhs)

Year	Amount of interest and other charges	Tax savings	Tax saving on premium	Total Tax savings
0	5.040	1.764	–	1.764
1	31.920	11.172	0.560	11.732
2	26.880	9.408	1.470	10.878
3	21.168	7.408	2.640	10.048
4	14.784	5.174	4.010	9.184
5	7.728	2.704	22.110	24.814

(2) Discounted Cash Flow: Option I

(₹ in lakhs)

Year	Net outflow	Discounting factor	Discounted value
0	3.250	1.000	3.25
1	148.750	0.9174	136.46
2	139.000	0.8417	117.00
3	129.250	0.7722	99.81
4	119.500	0.7084	84.65
5	109.750	0.6499	71.33
			512.25

Discounted cash flow: Option II

(₹ in lakhs)

Year	Gross outflow	Total tax saving	Net outflow	Discounted factor	Discounted value
0	5.040	1.764	3.276	–	3.276
1	138.320	11.732	126.588	0.9174	116.132
2	138.880	10.878	128.002	0.8417	108.739
3	138.768	10.048	128.720	0.7722	99.397
4	137.984	9.184	128.800	0.7084	91.242
5	136.528	24.814	111.714	0.6499	72.603
					490.389

Question 2

X Ltd., a widely held company is considering a major expansion of its production facilities and the following alternatives are available:

Alternative (₹ in lakhs)

	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%. The company at present has low debt. Corporate taxation 40%.

Which of the alternatives you would choose?

Answer:

(₹ in lakhs)

	A	B	C
Return on ₹ 50 lakhs @ 25%	12.50	12.50	12.50
Less: Interest on Debentures	–	2.80	2.10
Interest on loan	–	1.80	4.50
Taxable profit	12.50	7.90	5.90
Income tax 40%	5.00	3.16	2.36
Profit after tax available to shareholders	7.50	4.74	3.54
Rate of return on share capital	15%	23.70%	35.40%

From shareholders point of view alternative C (highest) is to be chosen.

Question 3

The following figures are made available to you:

	₹
Net profits for the year	18,00,000
Less: Interest on secured debentures at 15% p.a.	
(debentures were issued 3 months after the commencement of the year)	1,12,500
	16,87,500
Less: Income-tax at 35% and dividend distribution tax	8,43,750
Profit after tax	8,43,750
Number of equity shares (₹ 10 each)	1,00,000
Market quotation of equity share	₹ 109.70

The company has accumulated revenue reserves of ₹ 12 lakhs. The company is examining a project calling for an investment obligation of ₹ 10 lakhs. This investment is expected to earn the same rate of return as funds already employed.

You are informed that a debt equity ratio (Debt divided by debt plus equity) higher than 60% will cause the price earning ratio to come down by 25% and the interest rate on additional borrowals will cost company 300 basis points more than on their current borrowal on secured debentures.

You are required to advise the company on the probable price of the equity share, if

(a) the additional investment were to be raised by way of loans; or

(b) the additional investment were to be raised by way of equity.

Answer

Working Note:

Present earning/share:		₹
Profit before taxes		16,87,500
Less: Tax at 35%		5,90,625
Profit after tax		**10,96,875**
No. of equity shares		1,00,000

$$E.P.S. = \frac{₹\,10,96,875}{1,00,000}$$

E.P.S. = ₹ 10.97

Market price ₹ 109.70 .

$$Hence, P/E = \frac{₹\,109.70}{₹\,10.97} = 10$$

(a) **Probable price/share, if the additional investment were to be raised by way of loans**

Present capital employed:	₹	
Equity	10,00,000	
Debenture (Long term)	10,00,000	
Revenue reserves	12,00,000	₹ 32,00,000

Pre-interest and pre-tax profits given ₹ 18 lakhs

$$Rate\ of\ return\ EBIT = \frac{₹\,18\,lakhs \times 100}{₹\,32\,lakhs} = 56.25\%$$

Debt equity ratio, if ₹ 10 lakhs (additional investment) were to be borrowed (Debt ₹ 20 lakhs and equity ₹ 22 lakhs), will be

$$\frac{₹\,20\,lakhs \times 100}{₹\,42\,lakhs} = 47.6\%,$$ since, the debt equity ratio will not exceed 60% P/E will remain same.

If ₹ 10 lakhs is to be borrowed, the earning will be as under:

	₹	₹
Return of 56.25% on ₹ 42 lakhs		23,62,500
Less: Interest at 15% on existing ₹ 10 lakhs debentures	1,50,000	
Interest on fresh borrowed amount of ₹ 10 lakhs at 18%	1,80,000	3,30,000

Profit after interest before tax	20,32,500
Less: Tax at 35%	7,11,375
Profit after tax	13,21,125
No. of equity shares	1,00,000

$$E.P.S. = \frac{₹\ 13,21,125}{₹\ 1,00,000} = ₹\ 13.21$$

Probable price of equity share = ₹ 13.21 × 10

(Refer to working note)

= ₹ 132.10

(b) Probable price/share, if additional investment were to be raised by way of equity.

If ₹ 10 lakhs were to be raised by way of equity shares at market rates. The existing market price of ₹ 109.70 may come down a little and may possibly settle at ₹ 100. Hence, new equity shares to be raised will be

₹ 10,00,000/₹ 100 = 10,000 shares.

If ₹ 10 lakhs is to be raised by way of equity shares, the earning will be as under:

	₹
Profit before interest and tax	23,62,500
Less: Interest on debentures	1,50,000
Profit after interest before tax	22,12,500
Less: Tax @ 35%	7,74,375
Profit after tax	14,38,125
No. of equity shares	1,10,000

$$E.P.S. = \left(\frac{₹\ 14,38,125}{1,10,000}\right) = ₹\ 13.07$$

Probable price of equity share = ₹ 13.07 × 10

(Refer to working note)

= ₹ 130.70

The suggested solution will be to issue fresh debentures to finance expansion.

Question 4

The following is the Balance Sheet as at 31st March, 2011 of S Co. Ltd.

	₹	₹
Share Capital:		
10,000 equity shares of ₹ 100 each fully paid up	10,00,000	
25,000 12% cum preference shares of ₹ 10 each fully paid up	2,50,000	12,50,000
Reserves and surplus		25,00,000
Secured loans		20,00,000
Unsecured loans		12,00,000
Trade creditors		18,00,000
Outstanding expenses		7,50,000
		95,00,000
Represented by		
Fixed assets	55,00,000	
Current assets	37,00,000	
Advances and deposits	3,00,000	95,00,000

The company plans to manufacture a new product in line with its current production, the capital cost of which is estimated to be ₹ 25 lakhs. The company desires to finance the new project to the extent of ₹ 16 lakhs by issue of equity shares at a premium of ₹ 100 per share and the balance to be raised from internal sources.

Additional informations made available to you are:

(a) Rate of dividends declared in the past five years i.e. year ended 31st March, 2011, 31st March, 2010, 31st March, 2009, 31st March, 2008 and 31st March, 2007 were 24%, 24%, 20%, 20% and 18% respectively.

(b) Normal earning capacity (net of tax) of the business is 10%.

(c) Turnover in the last three years was ₹ 80 lakhs (31.3.2011), ₹ 60 lakhs (31.3.2010) and ₹ 50 lakhs (31.3.2009).

(d) Anticipated additional sales from the new project ₹ 30 lakhs annually.

(e) Net profit before tax from the existing business which was 10% in the last three years is expected to increase to 12% on account of new product sales.

(f) Income-tax rate is 35%.

(g) The trend of market price of the equity share of the company, quoted on the Stock Exchange was:

Year	High	Low
	₹	₹
2010-11	300	190
2009-10	250	180
2008-09	240	180

You are required to examine whether the company's proposal is justified. Do you have any suggestions to offer in this regard? All workings must form part of your answer.

Answer

(a) Earning per share for the year ended 31st March, 2011 of S Co. Ltd.

	₹
Turnover	80,00,000
Net Profit (10% of ₹ 80,00,000)	8,00,000
Less: Income tax @ 35%	2,80,000
Profit after tax	5,20,000
Less: Preference dividend (12% of ₹ 2,50,000)	30,000
Profit available for equity shareholders: (A)	4,90,000
Number of equity shares: (B)	10,000
Earning per share: (A)/(B)	₹ 49.00

(b) Expected earning per share after the manufacture of new product

(New project financed to the extent of ₹ 16 lakhs by issue of equity shares)

	₹
Anticipated turnover	1,10,00,000
(Refer to Working Note 1)	
Net Profit (12% of ₹ 1,10,00,000)	13,20,000
Less: Income tax @ 35%	4,62,000
Profit after tax	8,58,000
Less: Preference dividend (12% of ₹ 2,50,000)	30,000
Profit available for equity shareholders: (A)	8,28,000
Number of equity shares: (B)	18,000
(Refer to Working Note 2)	
Expected earning per share: (A)/(B)	₹ 46.00

(c) Price earning ratio for the year ended as on 31st March 2011 of S Co. Ltd.

Average price per share (300 + 190)/2 : (A)	₹ 245
Earning per share : (B)	₹ 49.00
(Refer to (a) above)	
Price earning ratio : (A)/(B)	5 times (rounded off)

Justification: On the basis of (a), (b) and (c) above.

1. There will be decline in market value of share after the new project financed by issue of equity shares and internal sources become operational. Expected market value of share will be E.P.S. × P/E ratio i.e. ₹ 46 × 5 = ₹ 230.

2. The stock exchange quotation reveal that the company share has been quoted at below book value of ₹ 350 per share (Refer to working note 4). The proposed financing pattern is not going to increase E.P.S. It will on the other hand decline marginally. Thus, the existing equity shareholders will not be benefited much from the new issue. However, in case shares are offered to the outsiders, they will gain since a share with intrinsic (book) value of ₹ 350 is being offered at a price of ₹ 200.

   Thus, the company's proposal to finance the new project to the extent of ₹ 16 lakhs by issue of equity shares at premium of ₹ 100 per share and balance from internal sources is not justified and the company should, therefore, reconsider the scheme of financing the project by a new equity issue.

   The S Co. Ltd. present debt equity ratio is 0.53 (Refer to working note 5). As per the prudential norm, the debt equity ratio shall not exceed 2 : 1. Accordingly, the company seems to possess debt capacity/leverage. It can raise the required funds say, by issue of debentures @ 12% to 13% interest.

Expected earnings per share after the manufacture of new product

(New project financed to the extent of 16 lakhs by issue of debentures @ 12%)

	₹
Anticipated turnover	1,10,00,000
(Refer to Working Note 1)	
Expected profit on turnover	13,20,000
Less: Interest on debentures (12% on ₹ 16 lakhs)	1,92,000
Net Profit before tax	11,28,000
Less: Income tax @ 35%	3,94,800
Net profit after tax	7,33,200
Less: Preference dividends	30,000
Profit available for equity shareholders	7,03,200

No. of equity shares	10,000
Earning per share	₹ 70.32

Justification:

1. There will be increase in the market value of share after the new project financed by issue of debentures and internal accruals become operational. Expected market value of share will be E.P.S. × P/E ratio i.e. ₹ 70.57 × 5 times = ₹ 352.85.
2. The E.P.S. will increase to ₹ 70.57.
3. The debt equity ratio of the S Co. Ltd. will be 0.96 (Refer to working note 6) after the new project is financed by issue of debentures. The ratio 0.96 is within the prudential norm of 2 : 1.

Suggestion: On the basis of the above workings, it is suggested that it will be better if the company raise the funds, required for financing the new project, by issuing debentures instead of equity shares. This is because the market price per share and earning per share is higher in case of debenture financing without undue risk.

Working Notes:

	₹
1. Anticipated turnover	
Present turnover	80,00,000
Add: Anticipated additional sales of new product	30,00,000
	1,10,00,000

	₹
2. Number of new equity shares to be issued	
Funds required by issue of equity shares : (A)	₹ 16,00,000
Funds raised by issue of 1 new equity share: (B)	₹ 200
No. of new equity share to be issued: (A)/(B)	8,000

	₹
3. Book value of one equity share	
10,000 equity shares of ₹ 100 each fully paid up	10,00,000
Add: Reserves and surplus	25,00,000
	35,00,000
No. of equity shares	10,000
Book value of one equity share	350

Alternatively,	₹	
Fixed assets	55,00,000	
Current assets	37,00,000	
Advances and deposits	3,00,000	95,00,000
Less: Preference share capital	2,50,000	
Secured loans	20,00,000	
Unsecured loans	12,00,000	
Trade creditors	18,00,000	
Outstanding expenses	7,50,000	60,00,000
		35,00,000
No. of equity shares		10,000
Book value of one share		350

4. **Present debt equity ratio**

$$= \frac{\text{Secured loans}}{\text{Share Capital} + \text{Reserves and surplus}}$$

$$= \frac{₹\, 20\, \text{lakhs}}{₹\, 37.50\, \text{lakhs}}$$

= 0.53

5. **Expected debt equity ratio**

$$= \frac{\text{Secured loans} + \text{Proposed debentures}}{\text{Share Capital} + \text{Reserves and surplus}}$$

$$= \frac{₹\, 20\, \text{lakhs} + ₹16\, \text{lakhs}}{₹\, 37.50\, \text{lakhs}}$$

= 0.96

Question 5

The Modern Chemicals ltd. requires ₹ 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹ 5,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share. It has three alternatives to finance the project–by raising debt of ₹ 2,50,000 or ₹ 10,00,000 or ₹ 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹ 150, but is expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10% upto ₹ 2,50,000, at 15% over ₹ 2,50,000 and upto ₹ 10,00,000 and at 20% over ₹ 10,00,000. The tax rate applicable to the company is 40%. Which form of financing should be the company choose?

Answer:

Calculation of Earning per share for three alternatives to finance the project

	Alternatives		
	I	**II**	**III**
Particulars	To raise debt of ₹ 2,50,000	To raise debt of ₹ 10,00,000	To raise debt of ₹ 15,00,000
	and equity of ₹ 22,50,000	and equity of ₹ 15,00,000	and equity of ₹ 10,00,000
	₹	₹	₹
Earnings before interest and tax	5,00,000	5,00,000	5,00,000
Less: Interest on debt	25,000	1,37,500	2,37,500
at the rate of	(10% on ₹ 2,50,000)	(10% on ₹ 2,50,000)	(10% on ₹ 2,50,000)
		(15% on ₹ 7,50,000)	(15% on ₹ 7,50,000)
			(20% on ₹ 5,00,000)
Earning before tax	4,75,000	3,62,500	2,62,500
Less: Tax @ 40%	1,90,000	1,45,000	1,05,000
Earnings after tax: (A)	2,85,000	2,17,500	1,57,500
Number of shares: (B)	15,000	10,000	8,000
(Refer to working note)			
Earning per share: (A) / (B)	19.00	21.75	19.69

Decision: The earning per share is higher in alternative II i.e. if the company finance the project by raising debt of ₹ 10,00,000 and issue equity shares of ₹ 15,00,000. Therefore the company should choose this alternative to finance the project.

Working Note:

	Alternatives		
	I	**II**	**III**
Equity financing : (A)	₹ 22,50,000	₹ 15,00,000	₹ 10,00,000
Market price per share: (B)	₹ 150	₹ 150	₹ 125
Number of equity shares : (A)/(B)	15,000	10,000	8,000

Question 6

The following is the capital structure of Simons Company Ltd. as on 31.12.2010:

	₹
Equity shares: 10,000 shares (of ₹ 100 each)	10,00,000
10% Preference Shares (of ₹ 100 each)	4,00,000
12% Debentures	6,00,000
	20,00,000

The market price of the company's share is ₹ 110 and it is expected that a dividend of ₹ 10 per share would be declared for the year 2010. The dividend growth rate is 6%:

(i)   If the company is in the 40% tax bracket, compute the weighted average cost of capital.

(ii)   Assuming that in order to finance an expansion plan, the company intends to borrow a fund of ₹ 10 lakh bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from ₹ 10 to ₹ 12 per share. However, the market price of equity share is expected to decline from ₹ 110 to ₹ 105 per share.

Answer

(i)   Computation of the weighted average cost of capital

Source of finance	Proportion	After tax cost (%) (1-tax rate i.e. 40%)	Weighted average cost of capital (%)
(a)	(b)	(c)	(d)= (b) × (c)
Equity share	0.5	15.09	7.54
		(Refer to working note 1)	
10% Preference share	0.2	10.00	2.00
12% Debentures	0.3	7.20	2.16
Weighted average cost of capital			11.70

(ii)   Computation of Revised weighted average cost of capital

Source of finance	Proportion	After tax cost (%) (1-tax rate i.e. 40%)	Weighted average cost of capital (%)
(a)	(b)	(c)	(d) = (b) × (c)
Equity share	0.333	17.42	5.80
		(Refer to working note 2)	
10% Preference share	0.133	10.00	1.33
12% Debentures	0.200	7.20	1.44
14% Loan	0.333	8.40	2.80
Revised weighted average cost of capital			**11.37**

Working Notes:

(1) Cost of equity shares (K_e)

$$K_e = \frac{\text{Dividend per share}}{\text{Market price per share}} + \text{Growth rate}$$

$$= \frac{10}{110} + 0.06 \qquad = 0.1509 \text{ or } 15.09\%$$

(2) Revised cost of equity shares (K_e)

$$\text{Revised } K_e = \frac{12}{105} + 0.06 \qquad = 0.1742 \text{ or } 17.42\%$$

Question 7

Harbour Company, is a medium-sized producer of chemicals and vinyl coatings used in a variety of industrial processes.

Last year, the company recorded over ₹ 1,500 lakhs in sales, showed net income after tax of ₹ 250 lakhs and concluded a very successful year. For the year coming up, the firm expects a 10 per cent improvement in its sales and operating income figures. Other relevant details – Total assets ₹ 2,200 lakhs, Debt Asset Ratio (i.e. Total Debts including current liabilities) 31.8%, Earnings per share ₹ 3.16 (No. of equity shares of ₹ 10 paid up 80 lakhs); Dividend per share ₹ 1.50 (These all relate to the last year). Harbour Co. has been invited to bid on a long-term contract to produce a line of plastics for a large chemical company. It appears that the firm can easily get ₹ 600 lakhs contract, which will yield an additional ₹ 180 lakhs in operating income (EBIT). These figures are for next year only and the firm estimates even higher sales and profits in future years.

The production manager knows of a small plastics company located about three kilometers away from the present factory and has all the equipment needed to produce the new line of plastics and the company is presently for sale with a ₹ 1,050 lakhs asking price (which represents largely the value of the assets). The company is available at the negotiated price of ₹ 900 lakhs.

Harbour Co. has sufficient working capital to add the new plastic line, but does not have the cash to buy ₹ 900 lakhs for machinery and equipment. The following financing options are available:

(i) Harbour Co. can borrow ₹ 400 lakhs through a 12% mortgage on its main facilities. A mortgage company has indicated that it would help finance the plastic machinery with a ₹ 500 lakhs, 12% mortgage. Harbour as per its policy wants to keep debt asset ratio between 45 per cent.

(ii) The company can probably issue upto ₹ 1,000 lakhs in 13% preferred stock or class A equity shares. If equity shares are issued, it could net ₹ 50 per share.

Harbour Co. shares has traditionally traded at a 15/1 price-earnings multiple and it is expected that this will hold in the future. (Corporate Income-tax 40%).

Required:

1. Analysis needed to decide whether to accept the plastic project.

2. Recommendation on the financing method of the project.

Answer

(1) Analysis of the decision whether to accept the plastic project

Current position:

Sales ₹ 1,500 lakhs, Net profit after tax ₹ 250 lakhs

Net profit before tax ₹ 625 lakhs (Tax 40%)

Total assets ₹ 2,200 lakhs,

Debt asset ratio (i.e. total debts including Current Liabilities) = 31.8%

Hence Debt = 31.8% × ₹ 2,200 lakhs = ₹ 700 lakhs

Equity Balance = ₹ 2,200 lakhs – 700 lakhs = ₹ 1,500 lakhs.

Return on capital employed ₹ $\dfrac{625}{2,200}$ lakhs × 100 = 28.41%

Project details:

Sales ₹ 600 lakhs, Operating income ₹ 180 lakhs, Investment ₹ 900 lakhs

Return on new project = $\dfrac{\text{Operating income}}{\text{investment}} \times 100 = ₹ \dfrac{180}{900}$ lakhs × 100 = 20%

Cost of capital for the project for alternative financing methods:

(i) Loan against Mortgage 12% interest

(ii) Preference shares 13% i.e. 13% out of post tax profits i.e. pre-tax cost 32.5% (exceeds the return of 20% on new project)

(iii) Equity shares at ₹ 50 per share $\left(\text{no. of shares to be issued} \dfrac{₹\,900\,\text{lakhs}}{₹\,50} \text{i.e. 18 lakhs} \right)$

Dividend 15%, hence post-tax cost $\dfrac{15}{5} = 3\%$, pre-tax cost $= 7.5\%$

$Or \quad \mathrm{K}_e = \dfrac{\mathrm{Div.}}{\mathrm{P}_0}$

Where,

Div. = Dividend per share,

P_0 = Price per share

K_e = Cost of equity

$\mathrm{K}_e = \dfrac{1.50}{50}$

= 3%, Pre-tax cost = 7.5%.

Since the earnings are more than the cost against loan and equity, one should go for the project by financing either by loan/equity or combination of both.

(2) Computation of Earning per share when new project is financed by either loan or equity

	Debt ₹ 900 lakhs	Equity ₹ 900 lakhs
	(₹ in lakhs)	
Expected operating profit of project	180	180
Less: Interest on debt (12% on ₹ 900 lakhs)	108	–
Profit before tax	72	180
Less: Taxation (40%)	28.80	72
Profit after tax	43.20	108
Existing profit after tax	250	250
Profit available to equity shareholders	293.20	358
No. of shares	80 lakhs	80 lakhs + 18 lakhs = 98 lakhs
Earnings per share	₹ 3.665	₹ 3.653
Market price	₹ 3.665 × 15 = ₹ 54.98	₹ 3.653 × 15 = ₹ 54.80

$$\text{Debt asset ratio} \qquad \frac{₹ \, 700 \, + \, ₹ \, 900}{₹ \, 2,200 \, + \, ₹900} \qquad \frac{₹ \, 700}{₹ \, 2,200 \, + \, ₹ \, 900}$$

51.6%		22.6%

Since the debt option exceeds the debt asset ratio of 45% we cannot go fully on financing by debt option though it gives higher earning per share.

Computation of maximum debt for new project

In order to keep debt asset ratio of 45%, total debt including the project

should not exceed (₹ 2,200 + ₹ 900) lakhs × 45%	₹ 1,395 lakhs
Less: Existing debt	₹ 700 lakhs
Maximum debt which can be taken on the new project	₹ 695 lakhs

Against mortgage of plastic machinery ₹ 500 lakhs can be obtained @ 12% and balance ₹ 400 lakhs can be raised by issue of equity shares @ ₹ 50 per share

Computation of Earning per share when new project is financed by debt of ₹ 500 lakhs and equity of ₹ 400 lakhs

	(₹in lakhs)
Expected operating profit of project	180
Less: Interest on debt (12% on ₹ 500 lakhs)	60
Profit before tax	120
Less: Taxation (40%)	48
Profit after tax	72
Existing profit after tax	250
Profit available to equity shareholders	322
No. of shares 80 lakhs + 8 lakhs	88 lakhs
Earning per share	₹ 3.66

Debt asset ratio $\quad ₹ \dfrac{700+500}{2,200+900}$ lakhs $= ₹ \dfrac{1,200}{3,100}$ lakhs $= 38.7\%$ (less than 40%)

Market price = ₹ 3.66× 15 = ₹ 54.90

Recommendation: Since Earning per share (EPS) is higher when company raises funds for investment in new project by borrowing against mortgage of ₹ 500 lakhs and raising equity capital of ₹ 400 lakhs. The company should opt for this alternative.

Question 8

A company is evaluating a new venture that will cost ₹ 10 crores. The venture will have a return on investment of 20 per cent and the firm forecasts a 12 per cent growth in earnings from the project. The treasurer has identified the following sources for financing the project:

(a)   Equity shares to be sold at ₹ 400 per share.

(b)   Convertible debentures with a 6 per cent coupon to net ₹ 980 (face value ₹ 1,000), and convertible at ₹ 500 per share after 2012.

(c)   Debentures with warrants with a 6 per cent coupon to net ₹ 980 (face value ₹ 1,000), and with each bond having one warrant entitling the holder to buy one equity share at ₹ 500 after 2012.

The financing decision is being made in the fourth quarter of 2000. Over the past ten years, a company has been growing at a 10 per cent rate of sales and earnings.

The treasurer expects the company to continue to grow at 10 per cent even though the firm has traditionally paid 40 per cent of its earnings as dividends. The treasurer expects A's equity shares to continue to rise in price. Using the price trend over the past 5 years, he has projected probable market price ranges for the next three years. The historical data and the projections of the treasurer are given below:

Year	Historical Market price	Year	Forecasted Probability	Forecasted Market Price
	₹			₹
2005	220	2011	20%	450
2006	250		60%	500
2007	330		20%	600
2008	270	2012	20%	480
2009	380		60%	550
Current	450		20%	620
		2013	20%	500
			60%	600
			20%	700

The proforma Balance Sheet and Income Statement prepared by the treasurer for the year 2010 is shown below:

A Company Ltd. Proforma Balance Sheet (December 31, 2010)

(₹'000)

	2010	2009		2010	2009
Equity Shares (₹ 10)	10,000	10,000	Plant and Equipment	2,52,000	2,31,000
Share Premium	40,000	40,000	Less: Accumulated		
Retained Earnings	1,36,000	1,27,000	Depreciation	(62,000)	(59,000)
Bonds (7%)	90,000	52,000		1,90,000	1,72,000
Mortgage (6%)	30,000	55,000	Inventories	64,000	62,000
Accounts Payable	7,000	6,000	Receivables	44,000	45,000
Other Current Liabilities	11,000	10,000	Cash and Bank Balances	22,000	18,000
			Other Current Assets	4,000	3,000
	3,24,000	3,00,000		3,24,000	3,00,000

Proforma Income Statement (₹'000)

	Sales	EBIT	Interest*	EBT	NIAT	EPS
2010	4,20,000	71,500	8,000	63,500	31,750	31.75
2009	3,80,000	65,000	7,000	58,000	29,000	29.00

*Rounded off.

The management of A Ltd. was initially impressed by the fact that the new venture will increase sales by ₹ 12 crores. Management is also interested in the expected 12 per cent growth rate of the venture. As per Company's Financial Policy, the firm's debt-asset ratio should not be above 40 per cent.

With the above information and detailed analysis for next 3 years, what will be the long-term sources of financing for the new proposal?

Make suitable assumptions in your answer, wherever necessary figures could be rounded off. Income-tax rate applicable to the company is to be taken at 40%.

Answer

The various steps for detailed analysis of given information for next 3 years for determining the long term sources of financing for the new proposal costing ₹ 10 crore are as follows:

Step 1 : Determining the size of offering for various sources of financing

(i)   Equity shares to be sold at ₹ 400 per share

Cost of new venture $\qquad$ = ₹ 10 crore

No. of equity shares to be offered = $\dfrac{₹\,10\,\text{crores}}{₹\,400}$

$\qquad\qquad$ = 2,50,000 shares

(ii)   Convertible debentures with a 6% coupon to net ₹ 980 (face value ₹ 1,000), and convertible   at ₹ 500 per share after 2002..

No. of debentures to be offered = $\dfrac{₹\,10\,\text{crores}}{₹\,980} = 1,02,000\,(\text{rounded off})$

(iii) Debentures with warrants with a 6 per cent coupon to net ₹ 980 (face value ₹ 1,000) and with each bond having one warrant entitling the holder to buy one equity share at ₹   500 after 2002.

No. of debentures to be offered = $\dfrac{₹\,10\,\text{crores}}{₹\,980} = 1,02,000\,(\text{rounded off})$

Step 2 : Computation of earnings before interest and tax (EBIT) for next year

$\quad$ EBIT (without new venture) $\quad$ = Current EBIT × Growth factor

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 7.15 crores × 1.10

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 7.865 crores

$\quad$ EBIT (with new venture) $\qquad$ = Current EBIT × Growth factor + Investment in new venture
$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ × R.O.I of new venture

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 7.15 crores × 1.10 + ₹ 10 crores × 20%

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 7.865 crores + ₹ 2 crores

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 9.865 crores

Step 3 : Computation of Earnings before interest and tax (EBIT) after 3 years (at the end of planning horizon)

EBIT (without new venture)	= Current EBIT × (Growth factor)^3
	= ₹ 7.15 crores × $(1.10)^3$
	= ₹ 9.517 crores
EBIT (with new venture)	= Current EBIT × (Growth factor)^3 + Investment in new
	venture × (R.O.I of new venture)^2
	= ₹ 7.15 crores × $(1.10)^3$ + ₹ 10 crores ×
	(20%) × $(1.12)^2$
	= ₹ 9.5166 crores + ₹ 2.5088 crores
	= ₹ 12.0254 crores

Step 4: To determine likelihood of issue of equity shares by conversion of debentures into equity or by exercise of warrants after year 2012

Expected price of equity shares during 3 year planning period

Year	2011	2012	2013
	₹	₹	₹
	₹ 450 × 20% = 90	₹ 480 × 20% = 96	₹ 500 × 20% = 100
	₹ 500 × 60% = 300	₹ 550 × 60% = 330	₹ 600 × 60% = 360
	₹ 600 × 20% = 120	₹ 620 × 20% = 124	₹ 700 × 20% = 140
	510	**550**	**600**

Expected price

Since the expected price of equity shares is more than the conversion and option price of ₹ 500 per share, it is likely that some equity will be created by 2003 as a result of conversion or exercise of warrants, if one of these financing method is used.

Step 5 : Calculation of the effect on EBIT due to exercise of warrants

In forecasting future earnings per share, the firm must consider a likely profit on the additional capital provided by the exercise of warrants.

EBIT (if warrants are exercised) = ₹ 5.10 crores × 12.54%

= 0.63954 crores

(Refer to working notes 1 & 2)

Step 6: Statement showing computation of Earnings per share for next years' for various alternatives

(₹ in crores)

	Alternatives			
	No new venture	Equity share	Convertible debt	Warrant debt
Earning before interest and tax	7.865	9.865	9.865	9.865
Less: Interest old debt	0.810	0.810	0.810	0.810
(Refer to working note 3)				
New debt	–	–	0.612	0.612
(Refer to working note 4)				
Earning before tax (EBT)	7.055	9.055	8.443	8.443
Less: Tax @ 40%	2.822	3.622	3.377	3.377
Earning after tax (EAT)	4.233	5.433	5.066	5.066
No. of shares (lakhs)	10	12.5	10	10
Earning per share (₹)	42.33	43.46	50.66	50.66

Step 7: Statement showing computation of Earnings per share at the end of planning horizon for various alternatives

	Alternatives			
	No new venture	Equity share	Convertible debt	Warrant debt
Earnings before interest and tax (EBIT)	**9.516**	**12.0254**	**12.0254**	**12.0254**
Add: Earnings before interest & tax by				
Exercise of warrants	–	–	–	0.63954
(Refer to step 5)				
Less: Interest old debt	0.810	0.810	0.810	0.810
New debt	–	–	–	0.612
Earning before tax (EBT)	**8.706**	**11.2154**	**11.2154**	**11.2429**
Less: Tax @ 40%	3.4824	4.4862	4.4862	4.4972
Earning after tax (EAT)	**5.2236**	**6.7292**	**6.7292**	**6.7457**
No. of shares (lakhs)	10	12.50	12.04	11.2
	(Refer to working note 1)		(Refer to working note 2)	
Earning per share (EPS) (₹)	**52.24**	**53.83**	**55.89**	**60.23**

Step 8: Computation of increase in retained earnings for various alternatives can be determined as follows:

$$\frac{\text{1st year earnings after tax} + 3 \text{ years Earnings after tax} (1 - \text{Dividend payout}) \text{No. of years}}{2}$$

$$\text{No new venteure} = \frac{₹ 3.52 \text{ crores} + ₹ 4.353 \text{ crores}}{2} \times 60\% \times 3 \text{ years} \qquad = ₹ 7.085 \text{ crores}$$

$$\text{Issue of equity shares} = \frac{₹ 4.527 \text{ crores} + ₹ 5.608 \text{ crores}}{2} \times 60\% \times 3 \text{ years} \qquad = ₹ 9.121 \text{ crores}$$

$$\text{Issue of convertible debetures} = \frac{₹ 4.2215 \text{ crores} + ₹ 5.608 \text{ crores}}{2} \times 60\% \times 3 \text{ years} = ₹ 8.846 \text{ crores}$$

$$\text{Issue of warrant debt} = \frac{₹ 4.2215 \text{ crores} + ₹ 5.621 \text{ crores}}{2} \times 60\% \times 3 \text{ years} \qquad = ₹ 8.858 \text{ crores}$$

Step 9: Analysis for measuring the degree of risk in capital structure

(₹ in crores)

	No new venture	Equity share	Convertible debt	Warrant debt
End of the year 2010				
Old debt	12.0	12.0	12.0	12.0
New debt	–	–	10.2	10.2
	12.0	12.0	22.2	22.2
Old equity	18.6	18.6	18.6	18.6
New equity		10.0	–	–
	18.6	28.6	18.6	18.6
Debt asset ratio	39.2%	29.6%	54.5%	54.5%
End of the year 2013				
Old debt	12.0	12.0	12.0	12.0
New debt	–	–	–	10.2
	12.0	12.0	12.0	22.2
Old equity	18.6	18.6	18.6	18.6
New equity	–	10.0	10.2	5.10
Increase in retained earnings	7.0865	9.121	8.846	8.858
	25.6865	37.721	37.646	32.558%
Debt asset ratio	**31.8%**	**24.1%**	**24.1%**	**40.5%**

Working Notes:

1. Equity shares from conversion of debentures:

   Debentures issued × Shares per debenture (on conversion)

   = 1,02,000 debentures × 2 share per debenture

   = 2,04,000 shares

   Equity shares from exercise of warrants

   Bonds issued × Shares per bond (Exercise of warrants)

   = 1,02,000 bonds × 1 share per bond

   = 1,02,000 shares

   Value of shares = 1,02,000 shares × ₹ 500 (option price)

   = ₹ 5.10 crores

2. Return on new equity shares (on exercise of warrants)

   The return on additional capital provided by the exercise of warrants to issue equity shares is the lower figure between average return for the firm and the return on the new proposal if adopted.

   Average return on market value of firm

   $$= \frac{\text{EBIT}}{\text{Debt} + \text{Market vlaue of equity shares}}$$

   $$= \frac{₹\, 7.15\, \text{crores}}{(₹\, 9\, \text{crores} + ₹\, 3\, \text{crores}) + (10\, \text{lakhs shres} \times ₹\, 450)}$$

   $$= \frac{₹\, 7.15\, \text{crores}}{₹\, 12\, \text{crores} + ₹\, 45\, \text{crores}}$$

   $$= \frac{₹\, 7.15\, \text{crores}}{₹\, 57\, \text{crores}}$$

   = 12.54%

   R.O.I from new proposal = 20%

   Since the average return on market value of firm is lower than R.O.I. from new proposal (20%). Hence, return on new equity shares on exercise of warrants is 12.54%.

3. Interest on old debt

	(₹ in crores)
7% Bonds of ₹ 9 crores	0.630
6% Mortgage of ₹ 3 crores	0.810
	0.810

4. Interest on new debt

6% debentures of ₹ 10.2 crores = ₹ 0.612 crores

Conclusions:

1. Issue of equity shares for financing the project offers high earnings and is within the company's Financial Policy.

2. Issue of convertible debentures for financing the project offers high earnings but the firm's debt asset ratio exceeds 40% now and there is a possibility of it being within the company's Financial Policy by year 2003.

3. Issue of warrants for financing the project offers high earnings but is beyond the company Financial Policy (Debt asset ratio exceeds 40%) both now and in the year 2003.

In conclusion, the firm should consider financing the project to gain the large rise in earnings. The equity shares only or a mixture of equity shares and debt financing, represents the most attractive financing alternative. With mixed financing, the firm can achieve a significant rise in earnings without increasing the risk of exceeding the 40 per cent debt – asset guidelines.

Assumptions:

1. It is assumed that the earnings from new project occurs at the end of the year.

2. It is assumed that the debentures will be converted into shares in the year 2003.

3. It is assumed that all the holders of the warrants will buy equity shares in the year 2013.

Question 9

The HLL has ₹ 8.00 crore of 10% mortgage bonds outstanding under an open-end scheme. The scheme allows additional bonds to be issued as long as all of the following conditions are met:

(1) $Pre\text{-}tax\ interest\ coverage \left(\dfrac{Income\ before\ tax + Bond\ Interest}{Bond\ Interest} \right)$ remains greater than 4.

(2) Net depreciated value of mortgage assets remains twice the amount of the mortgage debt.

(3) Debt-to-equity ratio remains below 5.

The HLL has net income after taxes of ₹ 2 crores and a 40% tax-rate, ₹ 40 crores in equity and ₹ 30 crores in depreciated assets, covered by the mortgage.

Assuming that 50% of the proceeds of a new issue would be added to the base of mortgaged assets and that the company has no Sinking Fund payments until next year, how much more 10% debt could be sold under each of the three conditions? Which protective covenant is binding?

Answer

Let x be the crores of Rupees of new 10% debt which would be sold under each of the three given conditions. Now, the value of x under each of the three conditions is as follows:

1. Pre - tax interest coverage $\left(\dfrac{\text{Income before tax} + \text{Bond Interest}}{\text{Bond Interest}}\right)$ remains greater than 4.

$$\frac{2\ \text{crores}\,/\,(1\text{-}0.4) + 8\ \text{crores} \times 0.1 + x \times 0.1}{(8\ \text{crores} \times 0.1) \times (x \times 0.1)}$$

Or $\dfrac{₹\ 3.33\ \text{crores} + 0.80\ \text{crores} + 0.10x}{(0.80\ \text{crores} \ + \ ₹\ 0.10x)}$

Or $\dfrac{4.13\ \text{crores} + 0.10x}{₹\ 0.80\ \text{crores} \ + \ ₹\ 0.10x}$

Or ₹ 4.13 crores + 0.10x = 4 (₹ 0.80 crores + ₹ 0.10x)

Or ₹ 4.13 crores + 0.10x = ₹ 3.2 crores + ₹ 0.40x

Or ₹ 0.30x = 0.93

Or   x   = ₹ 0.93/0.30

Or   x   = ₹ 3.10 crores

Additional mortgage required shall be a maximum of ₹ 3.10 crores.

2. **Net depreciated value of mortgage assets remains twice the amount of mortgage debt**

(Assuming that 50% of the proceeds of new issue would be added to the base of mortgaged assets)

i.e. $\dfrac{₹\ 30\ \text{crores} + 0.5x}{₹\ 8\ \text{crores} + x} = 2$

or ₹ 30 crores + 0.5x = 2 (₹ 8 crores + x)

or ₹ 1.5x = ₹ 14 crores

or $x = \dfrac{₹\ 14\ \text{crores}}{1.5}$

or x = 9.33 crores

Additional mortgage required to satisfy condition No. 2 is ₹ 9.33 crores

3. **Debt to equity ratio remains below 5**

i.e. $\dfrac{₹\ 8\ \text{crores} + x}{₹\ 40\ \text{crores}} < 5$

or ₹ 8 crores + x = ₹ 200 crores

or x = ₹ 192 crores

Since all the conditions are to be met, the least i.e. ₹ 3.10 crores (as per condition – 1) can be borrowed by issuing additional bonds.

Note: Since in the question, it is given that Debt to equity ratio remains below 5, the value of

debt is computed by using this condition. However, the new additional debt (x) is exorbitant and is not comparable with the value of new additional debt (x) computed under conditions 1 and 2. For getting the comparable value of new additional debt x the debt to equity ratio should be read as 0.5. Accordingly, value of additional debt would be ₹ 12 crores.

Question 10

Consider the following information for Strong Ltd.

EBIT	1,120 ₹ in lakh
PBT	320 ₹ in lakh
Fixed cost	700 ₹ in lakh

Calculate the percentage of change in earnings per share, if sales increased by 5 per cent.

Answer

Computation of percentage of change in earnings per share, if sales increased by 5%.

$$\text{Degree of combined leverage} = \frac{\%\ \text{change in Earning per share (EPS)}}{\%\ \text{change in sales}}$$

$$\text{or Degree of operating leverage} \times \text{Degree of financial leverage} = \frac{\%\ \text{change in Earning per share (EPS)}}{\%\ \text{change in sales}}$$

$$\text{or } 1.625 \times 3.5 \text{ (Refer to working notes (i) and (ii)} = \frac{\%\ \text{change in Earning per share (EPS)}}{5}$$

$$\text{or } 5.687 = \frac{\%\ \text{change in Earning per share (EPS)}}{5}$$

$$\text{or } \%\ \text{change in EPS} = 5.687 \times 5$$

$$= 28.4375\%$$

Working Notes:

(i) $\text{Degree of operating leverage (DOC)} = \dfrac{\text{Contribution}}{\text{EBIT}}$

$$= \frac{(₹\ 1,120\ +\ ₹\ 700\ \text{lakhs})}{₹\ 1,120\ \text{lakhs}}$$

$$= 1.625$$

(ii) $\text{Degree of financial leverage (DOF)} = \dfrac{\text{EBIT}}{\text{PBT}}$

$$= \frac{₹\ 1,120}{₹\ 320}$$

$$= 3.5$$

Question 11

XYZ Limited pays no taxes and is entirely financed by equity shares. The equity share has a beta of 0.6, a price-earning ratio of 12.5 and is priced to offer an expected return of 20 per cent. XYZ Ltd. now decides to buy back half of the equity shares by borrowing an equal amount. If the debt yields a riskfree return of 10%, calculate:

(i)   The beta of the equity shares after the buyback.

(ii)   The required return and risk premium on the equity shares before the buyback.

(iii) The required return and risk premium on the equity shares after the buyback.

(iv)   The required return on debt.

(v)   The percentage increase in expected earnings per share.

(vi)   The new price-earning multiple.

Assume that the operating profit of the firm is expected to remain constant in perpetuity.

Answer

(i)   Before buyback xyz is all equity financed and the equity beta is 0.6 and the expected return on equity is 20 per cent. Thus the firm's asset beta is 0.6 and the firm's cost of capital is 20 per cent. Over all firm value will not change after the buyback and that the debt is risk-free.

$$\text{Beta}_A = \frac{D}{D+E}\left(\text{Beta}_D\right) + \frac{E}{D+E}\left(\text{Beta}_E\right)$$

.6 = .5 × 0 + .5 × Beta$_E$

or Beta$_E$ = 1.20

(ii)   Before financing, the required rate of return on equity is 20 per cent and the risk-free rate is 10 per cent. Thus the risk premium on equity is 10 per cent.*

*If beta = .6 is considered then Risk Premium will be = .1667 i.e. 16.67%

Calculated as follows

$r_A = r_A + (r_m - r_A) \times \beta$

20 per cent = 10 + (x − 10)$^{x.6}$

10 = (x − 10)$^{x(0.6)}$

$$x = \frac{10}{0.6} = 16.67 \text{ per cent}$$

(iii) After financing

$$r_A = \frac{D}{D+E}r_{E^d} + \frac{E}{D+E}r_E$$

.20 = .5 × .10 + .5 × r$_E$ OR $r_E = \frac{.20 - .05}{.5} = .30$ or 30%.

Thus, the risk premium on Equity is 20 per cent.*

* If beta = 1.2 is considered then Risk Premium will be = .1667 i.e. 16.67% calculated as follows.

$30 = 10 + (r_m - 10) \times 1.2$

$$\text{Risk Premium} = \frac{20}{1.2} = 16.67\%$$

(iv) The required rate of return on debt is 10 per cent i.e. risk free rate.

(v) The percentage increase in EPS has been calculated as follows by assuming the following figures.

	Before buyback	After buyback
Equity	100	50
Debt @ 10%	Nil	50
	100	100
EBIT @ 20%	20	20
Interest	Nil	5
Earnings before tax	20	15
Tax	Nil	Nil
Earnings after tax	20	15
No. of shares	100	50
Earnings per share	0.2	0.3
P/E Ratio	5	3.33
Return on Equity	20%	30%

The percentage increase in EPS is 50 per cent i.e. $(0.3 - 0.2) / 0.2 \times 100$

= 50 per cent.

(vi) The new price-earning multiple is 3.33.

Question 12

A company has a book value per share of ₹ 150.00. 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%, what is the price of the share today?

Answer

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

EPS = ₹ 150.00 × 0.15 = ₹ 22.50

Dividend = 0.40 × 22.50 = ₹ 9.00

The growth in dividend would be:

g = 0.6 × 0.15 = 0.09

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

$$P_0 = \frac{9.00}{0.18 - 0.09}$$

P_0 = ₹ 100.00

Alternative Solution:

However, in case a student follows Walter's approach as against continuous growth model given in previous solution the answer of the question works out to be different. This can be shown as follow:

Given data:

Book value per share	= ₹ 150
Return on equity	= 15%
Dividend Payout	= 40%
Cost of capital	= 18%
∴ EPS	= ₹ 150.00× 15%
	= ₹ 22.50
∴ Dividend	= ₹ 22.50 × 40%
	= ₹ 9.00

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,

$$V_c = \frac{9.00 + \frac{.15}{.18}(22.50 - 9.00)}{.18}$$

$$= \frac{20.25}{.18}$$

= ₹ 112.50

Question 13

A project had an equity beta of 1.2 and was going to be financed by a combination of 30% debt and 70% equity.

Assuming debt-beta to be zero, calculate the Project beta taking risk-free-rate of return to be 10% and return on market portfolio at 18%.

Answer

$$\beta_p = \left[\beta\, equity \times \frac{E}{D+E}\right] + \left[\beta\, debt \times \frac{D}{D+E}\right]$$

= (1.2 × .7) + (0 × .3) = .84

RRR = $R_f + \beta_p (R_m - R_f)$

= .10 + 0.84 (.18 - .10) = .1672 or 16.72%

Question 14

A Ltd. is an all equity Financed Company. The current market price of share is ₹ 180. It has just paid a dividend of ₹ 15 per share and expected future growth in dividend is 15%. Currently, it is evaluating a proposal requiring funds of ₹ 20 lakhs, with annual inflows of ₹ 12 lakhs for 3 years. Find out the Net Present Value of the proposal, if (i) It is financed from retained earnings; and (ii) It is financed by issuing fresh equity at market price with a floatation cost of 5% of issue price.

Answer

(i)   Calculation of Net Present Value

Financed From Retained Earnings:

Cost of Retained Earnings:

$$\left[\frac{Expected\, dividend\, at\, the\, end\, of\, the\, year}{Current\, Market\, Price\, of\, Share} \times 100\right] + Growth\, Rate\, of\, Dividend$$

$$\left[\frac{₹\, 15 + 2.25}{₹\, 180} \times 100\right] + 15\% = 24.58\%$$

NPV of the Proposal: Net Cash Flow

Year		₹
0		−20,00,000
1	(12,00,000 × .8027)	9,63,240
2	(12,00,000 × .6443)	7,73,160
3	(12,00,000 × .5172)	6,20,640
		3,57,040

(ii) Financed through issue of Fresh Equity:

$$\text{Cost of Equity} = \left[\frac{D_1}{P_0 \ (1 - \text{floatation cost})} \times 100 \right] + \text{Growth Rate}$$

$$\left[\frac{₹ \ 15 + 2.25}{₹ \ 180 \ (1 - .05)} \right] + 15\% = 25.09\%$$

NPV of the Proposal:

		Net Cash flow
Year		₹
0		−20,00,000
1	(12,00,000 × .7994)	9,59,280
2	(12,00,000 × .6391)	7,66,920
3	(12,00,000 × .5109)	6,13,080
	NPV	3,39,280

Hence, financing from retained earning is the best source.

Question 15

The net Sales of A Ltd. is ₹ 30 crores. Earnings before interest and tax of the company as a percentage of net sales is 12%. The capital employed comprises ₹ 10 crores of equity, ₹ 2 crores of 13% Cumulative Preference Share Capital and 15% Debentures of ₹ 6 crores. Income-tax rate is 40%.

(i) Calculate the Return-on-equity for the company and indicate its segments due to the presence of Preference Share Capital and Borrowing (Debentures).

(ii) Calculate the Operating Leverage of the Company given that combined leverage is 3.

Answer

(i) Net Sales : ₹ 30 crores

EBIT ₹ 3.6 crores @ 12% on sales

$$\text{ROI} = \frac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \frac{3.6}{10 + 2 + 6} \times 100 = 20\%$$

		₹ in crores
EBIT		3.6
Interest on Debt		0.9
EBT		2.7
Less: Tax @ 40%		1.08
EAT		1.62
Less: Preference dividend		0.26
Earnings available for Equity Shareholders		1.36

Return on equity = 1.36/10 × 100 = 13.6%

Segments due to the presence of Preference share capital and Borrowing (Debentures)
Segment of ROE due to Preference capital: [.20 (1−.4) − .13] × .2 = −.002

Segment of ROE due to Debentures: [.20 (1−.4) − .15 (1 − .4)] × .6 = −.018 or −.2% + 1.8%

= 1.6%

The weighted average cost of capital is as follows:

	Source	Proportion	Cost (%)	WACC (%)
(i)	Equity	10/18	13.60	7.56
(ii)	Preference Shares	2/18	13.00	1.44
(iii)	Debt	6/18	9.00	3.00
			Total	12.00

(ii) $\text{Degree of Financial Leverage} = \dfrac{\text{EBIT}}{\text{EBIT - Interest - Preference dividend}}$

$= \dfrac{3.6}{3.6 - .9 - .26} = 1.4754$

Degree of Combined Leverage = DFL × DOL

$3 = 1.4754 \times \text{DOL or DOL} = \dfrac{3}{1.4754}$

∴ **Degree of operating leverage = 2.033**

Question 16

There is a 9% 5-year bond issue in the market. The issue price is ₹ 90 and the redemption price ₹ 105. For an investor with marginal income tax rate of 30% and capital gains tax rate of 10% (assuming no indexation), what is the post-tax yield to maturity?

Answer

Calculation of yield to Maturity (YTM)

$$YTM = \frac{Coupon + Pro\text{-}rated\ disc.}{(Redemption\ price + Purchase\ Price)/2}$$

After tax coupon = 9 × (1 − .30) = 6.3%

After tax redemption price = 105 − (15 × .10) or ₹ 103.5

After tax capital gain = 103.5 − 90 = ₹ 13.5

$$YTM = \frac{6.3 + (13.5/5)}{(103.5 + 90)/2}\ or\ \frac{9.00}{96.75} = 9.30\%$$

Question 17

M/s Transindia Ltd. is contemplating calling ₹ 3 crores of 30 year's, ₹ 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of ₹ 1,140 and had initially collected proceeds of ₹ 2.91 crores due to a discount of ₹ 30 per bond. The initial floating cost was ₹ 3,60,000. The Company intends to sell ₹ 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of ₹ 1,000. The estimated floatation cost is ₹ 4,00,000. The company is paying 35% tax and its after tax cost of debt is 8 per cent. As the new bonds must first be sold and their proceeds, then used to retire old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and new bonds. What is the feasibility of refunding bonds?

Answer

NPV for bond refunding

	₹
PV of annual cash flow savings (W.N. 2)	
(3,49,600 × PV/FA 8,25) i.e. 10.675	37,31,980
Less: Initial investment (W.N. 1)	32,17,500
NPV	5,14,480

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

Working Notes:

(1) Initial investment:

(a) Call premium

Before tax (1,140 – 1,000) × 30,000	42,00,000	
Less tax @ 35%	14,70,000	
After tax cost of call prem.		27,30,000

(b) Floatation cost   4,00,000

(c) Overlapping interest

Before tax (.14 × 2/12 × 3 crores)	7,00,000	
Less tax @ 35%	2,45,000	4,55,000

(d) Tax saving on unamortised discount on old bond 25/30 × 9,00,000 × .35 (2,62,500)

(e) Tax savings from unamortised floatation

Cost of old bond 25/30 × 3,60,000 × .35		(1,05,000)
		32,17,500

(2) Annual cash flow savings:

(a) Old bond

(i)	Interest cost (.14 × 3 crores)	42,00,000	
	Less tax @ 35%	14,70,000	27,30,000
(ii)	Tax savings from amortisation of discount 9,00,000/30 × .35		(10,500)
(iii)	Tax savings from amortisation of floatation cost 3,60,000/30 × .35		(4,200)
	Annual after cost payment of Debt (A)		27,15,300

(b) New bond

(i)	Interest cost before tax (.12 × 3 crores)	36,00,000	
	Less tax @ 35%	12,60,000	
	After tax interest	23,40,000	
(ii)	Tax savings from amortisation of floatation cost (.35 × 4,00,000/25)	(5,600)	23,24,400
	Annual after tax payment		3,80,900

Question 18

Find the current market price of a bond having face value ₹1,00,000 redeemable after 6 year maturity with YTM at 16% payable annually and duration 4.3202 years. Given $1.16^6 = 2.4364$.

Answer

Duration 4.3202 = $(1.16/0.16) - [1.16 + 6 (c-0.16)]/ (c [(1.16)^6 - 1] + 0.16)$

$$4.3202 = \frac{1.16}{0.16} - \frac{1.16 + 6(c - 0.16)}{c\left[(c\,1.16)^6 - 1\right] + 0.16}$$

$$\frac{1.16 + 6c - 0.96}{1.4364c + 0.16} = 2.9298$$

0.2 + 6c = 4.20836472 c + 0.468768

1.79163528c = 0.268768

C = 0.150012679

∴   c = 0.15, where c = Coupon rate

Therefore, current price = ₹(1,00,000/- x 0.15 x 3.685 + 1,00,000/- x 0.410) = ₹ 96,275/-.

Question 19

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

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

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

Answer

The appropriate discount rate for valuing the bond for Mr. Z is : **R = 9 + 3 + 2 = 14%**

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

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

The YTM of the bond is calculated as follows:

@15%

P = 150 × PVIFA $_{15\%, 4}$ + 1150 × PVIF $_{15\%, 5}$

= 150 × 2.855 + 1150 × 0.497

= 428.25 + 571.55 = 999.80

@14%

As found in sub part (a) P_0 = 1033.80

By interpolation we get, YTM = 14.23%

Question 20

(a) The following data are available for a bond

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

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

Answer

(a) 1. Calculation of Market price:

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

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

Let x be the market price

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

x = ₹ 960.26

Alternatively, the candidate may attempt by

160 (PVIFA 17,6) + 1,000 (PVIFA 17,6)

= 160 (3.589) + 1,000 (.390)

= 574.24 + 390

= 964.24

2. Duration

Year	Cash flow	P.V. @ 17%		Proportion of bond value	Proportion of bond value x time (years)
1	160	.855	136.8	0.142	0.142
3	160	.624	99.84	0.104	0.312
3	160	.624	99.94	0.104	0.312
4	160	.534	85.44	0.089	0.356
5	160	.456	72.96	0.076	0.38
6	1160	.390	452.4	0.467	2.802
			964.4	1.000	4.236

Duration of the Bond is 4.236 years

3. Volatility

$$\text{Volatility of the bonds} = \frac{\text{Duration}}{(1+\text{yields})} = \frac{4.236}{1.17} = 3.62$$

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

= ₹ 960.26 × .75 (3.62/100)

= ₹ 26.071

Hence expected market price is ₹ 960.26 − ₹ 26.071 = ₹ 934.189

Hence, the market price will decrease

This portion can also be alternatively done as follows

= ₹ 964.4 × .75 (3.62/100)

= ₹ 26.18

then the market price will be

= ₹ 964.4 − 26.18 = ₹ 938.22

3

FINANCIAL SERVICES

Question 1

X Co. Ltd. issued commercial paper as per following detail:

Date of issue	17th January, 2011
Date of maturity	17th April, 2011
No. of days	90
Interest rate	11.50% p.a.

What was the net amount received by the company on issue of commercial paper?

Answer

Note: It has been assumed that the amount of commercial paper issued is ₹ 5 crores. Hence the net amount received by the company on issue of commercial paper is as follows:

$$\text{Interest}: 11.50\% \text{ P.A.} = \frac{11.50 \times 90}{365} \quad = 2.836\% \text{ for 90 days}$$

Hence, interest will be

$$= \frac{2.836}{100 + 2.836} \times \quad ₹ 5 \text{ crores } = ₹ 13,78,895$$

Net amount received at the time of issue

= ₹ 5 crores – ₹ 13,78,895

= ₹ 4,86,21,105

Question 2

P Co. has to make payment of ₹ 2 million (₹ 20 lakhs) on 16th April, 2011. It has a surplus money today i.e. 15th January, 2011 and the company has decided to invest in Certificate of Deposit (CD's) of a leading nationalized bank at 8.00% p.a. What money is required to be invested now? Take year as 365 days.

Answer

Money required to be invested today i.e. 15th January, 2011 to make payment of ₹ 2 million (₹ 20 lakhs) on 16th April, 2011.

For making payment of ₹ 2 million (₹ 20 lakhs) on 16th April, 2011 the surplus money to be invested today i.e. 15th January, 2011 in Certificate of Deposits (CDs) for 91 days @ 8% p.a. is

$$₹ \frac{20,00,000}{1.0199452} \text{ (Refer to working note) } = ₹ 19,60,889.66$$

or ₹ 19,60,890 (rounded off)

Working Note:

Interest on ₹ 1 at 8% p.a. on Certificate of Deposit (CD's) of a leading nationalized bank

Interest on ₹ 1 for 91 days $\left(₹\ 0.08 \times \dfrac{91}{365} \right)$

The amount to be received for ₹ 1 invested now after 91 days.

Question 3

A Ltd. has a total sales of ₹ 3.2 crores and its average collection period is 90 days. The past experience indicates that bad-debt losses are 1.5% on Sales. The expenditure incurred by the firm in administering its receivable collection efforts are ₹ 5,00,000. A factor is prepared to buy the firm's receivables by charging 2% Commission. The factor will pay advance on receivables to the firm at an interest rate of 18% p.a. after withholding 10% as reserve.

Calculate the effective cost of factoring to the Firm.

Answer

	₹
Average level of Receivables = 3,20,00,000 × 90/360	80,00,000
Factoring commission = 80,00,000 × 2/100	1,60,000
Factoring reserve = 80,00,000 × 10/100	8,00,000
Amount available for advance =	
₹ 80,00,000 – (1,60,000 + 8,00,000)	70,40,000

Factor will deduct his interest @ 18%:-

$\text{Interest} = \dfrac{₹\ 70,40,000 \times 18 \times 90}{100 \times 360}$ = ₹ 3,16,800

∴ Advance to be paid = ₹ 70,40,000 – ₹ 3,16,800 = ₹ 67,23,200

Annual Cost of Factoring to the Firm:	₹
Factoring commission (₹ 1,60,000 × 360/90)	6,40,000
Interest charges (₹ 3,16,800 × 360/90)	12,67,200
Total	19,07,200

Firm's Savings on taking Factoring Service:	₹
Cost of credit administration saved	5,00,000
Cost of Bad Debts (₹ 3,20,00,000 × 1.5/100) avoided	4,80,000
Total	9,80,000
Net cost to the Firm (₹ 19,07,200 – ₹ 9,80,000)	9,27,200

Effective rate of interest to the firm = $\dfrac{₹\ 9,27,200 \times 100}{67,23,200}$ 13.79%

Note: The number of days in a year have been assumed to be 360 days.

Question 4

A company is considering to engage a factor, the following information is available:

(i)   The current average collection period for the Company's debtors is 80 days and ½% of debtors default. The factor has agreed to pay money due after 60 days and will take the responsibility of any loss on account of bad debts.

(ii)   The annual charge for the factoring is 2% of turnover payable annually in arrears. Administration cost saving is likely to be ₹ 1,00,000 per annum.

(iii) Annual sales, all on credit, are ₹ 1,00,00,000. Variable cost is 80% of sales price. The Company's cost of borrowing is 15% per annum. Assume the year is consisting of 365 days.

Should the Company enter into a factoring agreement.

Answer

The annual change in cash flows through entering into a factoring agreement is:

(Amount in ₹)

Savings		
Administration cost saved		1,00,000
Existing average debtors	21,91,781	
[₹1,00,00,000/365) x 80 days]		
Average New Debtors	16,43,836	
[(₹100,00,000/365) x 60 days]		
Reduction in debtors	5,47,945	
Cost there of @80%	4,38,356	
Add: Interest saving @15% P.A on. ₹4,38,356		65,753
Add: Bad Debts saved @.005 of ₹1,00,00,000		50,000
Total		**2,15,753**
Less: Annual charges @2% of ₹1,00,00,000		2,00,000
Net annual benefits of factoring		**15,753**

Therefore, the factoring agreement is worthwhile and should be undertaken.

Question 5

MSN Ltd. has total sales of ₹4.50 crores and its average collection period is 120 days. The past experience indicates that bad debt losses are 2 percent on sales. The expenditure incurred by the company in administering its receivable collection efforts are ₹ 6,00,000. A Factor is prepared to buy the company's receivables by charging 2 percent commission. The factor will pay advance on receivables to the company at an interest rate of 18 percent per annum after withholding 10 percent as reserve.

You are required to calculate effective cost of factoring to the company.

Answer

MSN Ltd.

Average level of Receivables	45000000 × 120 / 360	15000000
Factoring commission	15000000 × 2%	300000
Factoring Reserve	15000000 × 10%	1500000
Amount available for advance	15000000 − (300000 + 1500000)	13200000

Factor will deduct at interest @ 18%

Interest (13200000 × 18 × 120) / 100 × 360	792000
Advance to be paid = ₹ 13200000 − 792000	12408000

Annual cost of factoring to the firm:

Factoring commission (₹ 300000 × 360 / 120)	900000
Factoring interest (₹ 792000 × 360 / 120)	2376000
	3276000

Firms savings on taking factoring service:

Cost of credit administration saved		600000
Cost of bad debts	(45000000 × 2%)	900000
Total savings		1500000

Net cost to the firm = ₹ 3276000 − 1500000 = ₹ 1776000
Effective rate of interest to the firm = 1776000 × 100 / 12408000 = 14.31%

Note: The number of days in a year is assumed to be 360 days.

4
WORKING CAPITAL MANAGEMENT

Question 1

Hello Limited is launching a new project for the manufacture of a unique component. At full capacity of 48,000 units, the cost will be as follows:

	Cost per unit ₹
Material	40
Labour and Variable Expenses	20
Fixed Manufacturing and Administrative Expenses	10
Depreciation	5
	75

The selling price per unit is expected at ₹ 100 and the selling expenses per unit will be ₹ 5, 80% of which is variable.

In the first two years production and sales are expected to be as follows:

Year	Production	Sales
1	30,000 units	28,000 units
2	40,000 units	36,000 units

To assess working capital requirement, the following additional information is given:

(a)   Stock of raw material -3 months' average consumption.

(b)   Work-in-progress-Nil.

(c)   Debtors-1 month average sales.

(d)   Creditors for supply of materials- 2 months average purchases of the year.

(e)   Creditors for expenses- 1 month average of all expenses during the year.

(f)   Cash balance-₹ 20,000

Stock of finished goods is taken at average cost.

You are required to prepare for the two years:

(1)   A projected statement of profit/loss

(2)   A projected statement of working capital requirements.

Answer

<p align="center">Marks Ltd.</p>

(1)   Projected Statement of Profit/Loss

	Year I	Year II
	₹	₹
Production in units	30,000	40,000
Sales in units	28,000	36,000
Sales Revenue @ ₹ 100 per unit (A)	28,00,000	36,00,000
Cost of Production		
Material @ ₹ 40 per unit	12,00,000	16,00,000
Direct labour & variable expenses @ ₹ 20 per unit	6,00,000	8,00,000
Fixed manufacturing & Administrative expenses @ ₹10 on 48,000 units	4,80,000	4,80,000
Depreciation @ ₹ 5 for 48,000 units	2,40,000	2,40,000
Total Cost of Production	25,20,000	31,20,000
Add: Opening stock of finished goods at average cost	-	1,68,000*
Cost of goods available	25,20,000	32,88,000
Less: Closing stock of finished goods at average cost	1,68,000	4,69,714#
Cost of goods sold	23,52,000	28,18,286
Add: Selling expenses (Variable at ₹ 4)	1,12,000	1,44,000
Selling expenses fixed at ₹ 1	48,000	48,000
Cost of Sales (B)	25,12,000	30,10,286
Profit A-B	**2,88,000**	**5,89,714**

$$* \frac{25,20,000}{30,000} \times 2,000$$

$$\# \frac{32,88,000}{42,000} \times 6,000$$

Working Notes

		Year I	Year II
		₹	₹
(a)	Creditors for supply of material		
	Materials consumed	12,00,000	16,00,000
	Add: Closing stock of Average consumption (3 months)	3,00,000	4,00,000
		15,00,000	20,00,000
	Less: Opening Stock	-	3,00,000
	Purchases	15,00,000	17,00,000
	Average purchases per month (Creditors)	1,25,000	1,41,667
	Creditors (2 months for goods)	2,50,000	2,83,334
(b)	Creditors for expenses	1,03,334*	1,22,667*
	Total of Current Liabilities (B)	3,53,334	4,06,001
	*Labour, Manufacturing expenses & Selling expenses		
		6,00,000	8,00,000
		4,80,000	4,80,000
		1,12,000	1,44,000
		48,000	48,000
		12,40,000	14,72,000
		12	12

(2) Projected Statement of Working Capital Requirements

		Year I	Year II
		₹	₹
Current Assets:		3,00,000	4,00,000
Stock of materials			
(3 months average consumption)			
Finished Goods		1,68,000	4,69,714
Debtors (one month)		2,33,334	3,00,000
Cash		20,000	20,000
Total Current Assets	(A)	7,21,334	11,89,714
Current Liabilities:			
Creditors for supply of materials		2,50,000	2,83,334
Creditors for expenses		1,03,334	1,22,667
(See W.N. (b) above)			
Estimated Working Capital requirement	(B)	3,53,334	4,06,001
Estimated Working Capital		3,68,000	7,83,713

Question 2

A newly formed company has applied to the commercial bank for the first time for financing its working capital requirements. The following information is available about the projections for the current year:

Estimated level of activity: 4,16,000 completed units of production plus 16,000 units of work-in-progress. Based on the above activity, estimated cost per unit is:

Raw material	₹ 20 per unit
Direct wages	₹ 7.50 per unit
Overheads (exclusive of depreciation)	₹ 15 per unit
Total cost	₹ 42.50 per unit
Selling price	₹ 100 per unit

Raw materials in stock: Average 4 weeks consumption, work-in-progress (assume 50% completion stage in respect of conversion cost) (materials issued at the start of the processing).

Finished goods in stock	32,000 units
Credit allowed by suppliers	Average 4 weeks
Credit allowed to debtors/receivables	Average 8 weeks
Lag in payment of wages	Average $1\frac{1}{2}$ weeks

Cash at banks (for smooth operation) is expected to be ₹ 25,000

Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.

Find out

(i) the net working capital required; (on Cost Basis)

(ii) the maximum permissible bank finance under first and second methods of financing as per Tandom Committee Norms.

Answer

(i) Estimate of the Requirement of Working Capital

	₹	₹
A. Current Assets:		
Raw material stock	6,64,615	
(Refer to Working note 3)		
Work in progress stock	5,00,000	
(Refer to Working note 2)		
Finished goods stock	13,60,000	
(Refer to Working note 4)		
Debtors	25,10,769	
(Refer to Working note 5)		
Cash and Bank balance	25,000	50,60,384

B. Current Liabilities:

Creditors for raw materials	7,15,740	
(Refer to Working note 6)		
Creditors for wages	91,731	8,07,471
(Refer to Working note 7)		
Net Working Capital (A-B)		**42,52,913**

(ii) The maximum permissible bank finance as per Tandom Committee Norms

First Method:

75% of the net working capital financed by bank i.e. 75% of ₹ 42,52,913

(Refer to (i) above)

= ₹ 31,89,685

Second Method:

(75% of Current Assets) – Current liabilities (i.e. 75% of ₹ 50,60,384) – ₹ 8,07,471

(Refer to (i) above)

= ₹ 37,95,288 – ₹ 8,07,471

= ₹ 29,87,817

Working Notes:

1. Annual cost of production

	₹
Raw material requirements (4,16,000 units × ₹ 20)	83,20,000
Direct wages (4,16,000 units × ₹ 7.50)	31,20,000
Overheads (exclusive of depreciation)(4,16,000 × ₹ 15)	62,40,000
	1,76,80,000

2. Work in progress stock

	₹
Raw material requirements (16,000 units × ₹ 20)	3,20,000
Direct wages (50% × 16,000 units × ₹7.50)	60,000
Overheads (50% × 16,000 units × ₹15)	1,20,000
	5,00,000

3. Raw material stock

It is given that raw material in stock is average 4 weeks consumption. Since, the company is newly formed, the raw material requirement for production and work in progress will be issued and consumed during the year.

Hence, the raw material consumption for the year (52 weeks) is as follows:

	₹
For Finished goods	83,20,000
For Work in progress	3,20,000
	86,40,000

Raw material stock $\dfrac{₹\,86,40,000}{52\ \text{weeks}} \times 4\ \text{weeks} = ₹\,6,64,615$

4. Finished goods stock

   32,000 units @ ₹ 42.50 per unit = ₹ 13,60,000

5. Debtors for sale

Credit allowed to debtors	Average 8 weeks
Credit sales for year (52 weeks) i.e. (4,16,000 units- 32,000 units)	3,84,000 units
Selling price per unit	₹ 100
Credit sales for the year (3,84,000 units × ₹ 42.50)	₹ 1,63,20,000

   Debtors $\dfrac{₹\,1\,63,20,000}{52\ \text{weeks}} \times 8\ \text{weeks}$ = ₹ 25,10,769

6. Creditors for raw material:

Credit allowed by suppliers	Average 4 weeks
Purchases during the year (52 weeks) i.e.	₹ 93,04,615

   (₹ 83,20,000 + ₹ 3,20,000 + ₹ 6,64,615)

   (Refer to Working notes 1,2 and 3 above)

   Creditors $\dfrac{₹\,93,04,615}{52\ \text{weeks}} \times 4\ \text{weeks}$ =₹ 7,15,740

7. Creditors for wages

   Lag in payment of wages   Average $1\frac{1}{2}$ weeks

   Direct wages for the year (52 weeks) i.e.   =₹ 31,80,000

   (₹ 31,20,000 + ₹ 60,000)

   (Refer to Working notes 1 and 2 above)

   Creditors $\dfrac{₹\,31,80,000}{52\ \text{weeks}} \times 1\frac{1}{2}\ \text{weeks}$

          = ₹ 91,731

Question 3

The following information has been extracted from the records of a Company:

Product Cost Sheet	₹/unit
Raw materials	45
Direct labour	20
Overheads	40
Total	105
Profit	15
Selling price	120

- Raw materials are in stock on an average of two months.
- The materials are in process on an average for 4 weeks. The degree of completion is 50%.
- Finished goods stock on an average is for one month.
- Time lag in payment of wages and overheads is 1½ weeks.
- Time lag in receipt of proceeds from debtors is 2 months.
- Credit allowed by suppliers is one month.
- 20% of the output is sold against cash.
- The company expects to keep a Cash balance of ₹2,00,000.
- Take 52 weeks per annum.

The Company is poised for a manufacture of 1,50,000 units in the year. You are required to prepare a statement showing the Working Capital requirements of the Company.

Answer

Statement showing the Working Capital Requirement

		₹
A.	Current Assets:	
	Stock of raw materials	11,25,000
	[₹ 67,50,000 / 12 months] × 2 months	
	Work-in-progress	6,05,769
	[(₹ 1,57,50,000 × 4) / 52 months] × 50%	
	Finished goods	13,12,500
	(₹ 1,57,50,000 / 12 months)	
	Debtors	24,00,000
	(₹ 30,00,000 × 80%)	
	(Refer to Working note 2)	
	Cash balances	2,00,000
		56,43,269
	Current Liabilities:	
	Creditors of raw materials	5,62,500
	(₹ 67,50,000 / 12 months)	
	Creditors for wages & overheads	2,59,615

$$\left(\frac{₹\,90,00,000}{52 \text{ weeks}} \times 1.5 \text{ weeks} \right)$$

Net Working Capital (C.A– C.L)	48,21,154

Working Notes:

1,	Annual raw materials requirements (₹)	67,50,000
	1,50,000 units × ₹45	
	Annual direct labour cost (₹)	30,00,000
	1,50,000 units × ₹20	
	Annual overhead costs (₹)	60,00,000
	1,50,000 units × ₹40	
	Total Cost (₹)	1,57,50,000
2.	Total Sales:	1,80,00,000
	(1,50,000 units × ₹120)	
	Two months sales	30,00,000
	(₹1,80,00,000 / 6 months)	

Question 4

XYZ Co. Ltd. is a pipe manufacturing company. Its production cycle indicates that materials are introduced in the beginning of the production cycle; wages and overhead accrue evenly throughout the period of the cycle. Wages are paid in the next month following the month of accrual. Work in process includes full units of raw materials used in the beginning of the production process and 50% of wages and overheads are supposed to be conversion costs. Details of production process and the components of working capital are as follows:

Production of pipes	6,00,000 units
Duration of the production cycle	One month
Raw materials inventory held	One month consumption
Finished goods inventory held for	Two months
Credit allowed by creditors	One month
Credit given to debtors	Two months
Cost price of raw materials	₹ 120 per unit
Direct wages	₹ 20 per unit
Overheads	₹ 40 per unit
Selling price of finished pipes	₹ 200 per unit

Required to calculate:

(i) The amount of working capital required for the company.

(ii) Its maximum permissible bank finance under all the three methods of lending norms as

suggested by the Tondon Committee, assuming the value of core current assets: ₹ 1,00,00,00.

Answer

(i)   Amount in ₹

A – Current Assets

(i) Raw material inventory –(1 month)- [6,00,000 Units × 120 × 1/12]   60,00,000

(ii) – Work in Progress – Production cycle 1 month

   Raw material   =   60,00,000

   Wages $(6,00,000 \times 20 \times \frac{1}{12}) \times 50\% = ₹5,00,000$

   Overheads $6,00,000 \times 40 \times \frac{1}{12} \times 50\% = ₹\underline{10,00,000}$

                                          75,00,000

(iii) Finished goods (inventory held for 2 months)

   Total Cost Material   120.00   1,80,00,000

        Labour   20.00

        Overheads $\underline{40.00}$ $= 180 \times 6,00,000 \times \frac{2}{12}$

(iv) Debtors for 2 months : $[\ 6,00,000 \times Rs\ 180 \times \frac{2}{12}\ ]$ 1,80,00,000

   Total current assets   **4,95,00,000**
   B – Current liabilities
(v) Creditors for Raw material – 01 month

   $120 \times 6,00,000 \times \frac{1}{12}$ 60,00,000

(vi) Creditors for wages

   $6,00,000 \times 20 \times \frac{1}{12}$ 10,00,000

                                    Net working capital   **4,25,00,000**

(ii) Computation of Maximum Permissible Bank Finance according to Tandon Committee Norms

1ˢᵗ Method

	₹
CAs	4,95,00,000
CLs	70,00,000
Working capital gap	4,25,00,000
Less 25% from long term sources	(1,06,25,000)
Max Permissible Bank Finance	**3,18,75,000**

2ⁿᵈ Method

	₹
Working capital gap	4,25,00,000
Less: 25% of CAs	(1,23,75,000)
MPBF	**3,01,25,000**

3ʳᵈ Method

Total current assets – Core current assets = ₹ 4,95,00,000 – 1,00,00,000 = ₹3,95,00,000

	₹
Real current assets	3,95,00,000
Less: 25%	98,75,000
	2,96,25,000
Less: Current Liabilities	70,00,000
MPBF	**2,26,25,000**

Question 5

The following annual figures relate to MNP Limited:

Sales (at three months credit)	₹90,00,000
Materials consumed (suppliers extend one and half month's credit)	₹22,50,000
Wages paid (one month in arrear)	₹18,00,000
Manufacturing expenses outstanding at the end of the year (cash expenses are paid one month in arrear)	₹2,00,000
Total Administrative expenses for the year (cash expenses are paid one month in arrear)	₹6,00,000
Sales Promotion expenses for the year (paid quarterly in advance)	₹12,00,000

The company sells its products on gross-profit of 25% assuming depreciation as a part of cost of production. It keeps two month's stock of finished goods and one month's stock of raw materials as inventory. It keeps cash balance of ₹2,50,000.

Assume a 5% safety margin, work out the working capital requirements of the company on cash cost basis. Ignore work-in-progress.

Answer: Statement showing Total Cash Cost:

		₹
Sales		90,00,000
Less: Gross profit (25 % x Sales)		22,50,000
Total Manufacturing cost (A)		**67,50,000**
Less: Material consumed cost	22,50,000	
Less: Wages paid	18,00,000	40,50,000
Manufacturing expenses		**27,00,000**
Less: Cash manufacturing expenses (₹2,00,000 × 12)		24,00,000
Depreciation: (B)		**3,00,000**
Total Manufacturing cost : (C) = (A) – (B)		64,50,000
Add: Administrative expenses		6,00,000
Add: Sales promotion expenses		12,00,000
Total cash cost of manufacturing and sales		82,50,000

Calculation of Current Assets :

	₹
Debtors	20,62,500
(Total cash cost × 3/12) or (₹ 82,50,000 × 3/12)	
Cash balance	2,50,000
Pre-paid sales promotion expenses	3,00,000
Raw materials stock	1,87,500
(Material consumed / 12) or (₹ 22,50,000 / 12)	
Finished goods stock	13,75,000
(Total cash cost x 2/12) or (₹ 82,50,000 x 2/12)	
Total Current Assets	**41,75,000**

Calculation of Current Liabilities:

Sundry creditors	2,81,250
Material cost (₹ 22,50,000 x 1.5/ 12 months)	
Manufacturing expenses outstanding	2,00,000
Wages outstanding (₹ 18,00,000 x 1/12 months)	1,50,000
Administrative expenses outstanding (6,00,000 x 1/12)	50,000
Total Current Liabilities	**6,81,250**

Working Capital = Current assets – Current Liabilities = ₹ 41,75,000 – 6,81,250 = ₹ 34,93,750

Question 6

A proforma cost sheet of a Company provides the following particulars:

	Amount per unit (₹)
Raw materials cost	100.00
Direct labour cost	37.50
Overheads cost	75.00
Total cost	212.50
Profit	37.50
Selling Price	250.00

The Company keeps raw material in stock, on an average for one month; work-in-progress, on an average for one week; and finished goods in stock, on an average for two weeks. The credit allowed by suppliers is three weeks and company allows four weeks credit to its debtors. The lag in payment of wages is one week and lag in payment of overhead expenses is two weeks. The Company sells one-fourth of the output against cash and maintains cash-in-hand and at bank put together at ₹37,500.

Required:

Prepare a statement showing estimate of Working Capital needed to finance an activity level of 1,30,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. Work-in-progress stock is 80% complete in all respects.

Answer

(a)   **Activity level: 1,30,000 units**
                 Statement showing Estimate of Working Capital Needs

A.   Investment in Inventory:

Raw material inventory: 1 month	10,00,000

$$\left(1,30,000 \times \frac{4}{52} \times ₹\,100\right)^*$$

WIP Inventory : 1 week $\left(1,30,000 \times \dfrac{1}{52} \times 0.80 \times 212.50\right)$	4,25,000

Finished goods inventory: 2 weeks

$$\left(1,30,000 \times \frac{2}{52} \times 212.50\right)$$

10,62,500

B.   Investment in Debtors: 4 weeks at cost

$$\left(1,30,000 \times \frac{3}{4} \times \frac{4}{52} \times 212.50\right)$$

15,93,750

C.   Cash balance   37,500

D.   Investment in Current Assets (A + B + C)   41,18,750

E.   Current Liabilities:

Creditors : 3 weeks

$$\left(1,30,000 \times \frac{3}{52} \times 100\right)$$ 7,50,000

Deferred wages : 1 week

$$\left(1,30,000 \times \frac{1}{52} \times 37.50\right)$$ 93,750

Deferred overheads : 2 weeks

$$\left(1,30,000 \times \frac{2}{52} \times 75\right)$$ 3,75,000   12,18,750

Net Working Capital Needs   29,00,000

* For calculation purposes, 4 weeks has been considered as equivalent to a month.

Question 7

A proforma cost sheet of a Company provides the following data:

	₹
Raw material cost per unit	117
Direct Labour cost per unit	49
Factory overheads cost per unit	
(includes depreciation of ₹ 18 per unit at budgeted level of activity)	98
Total cost per unit	264
Profit	36
Selling price per unit	300

Following additional information is available:

Average raw material in stock	:	4 weeks
Average work-in-process stock	:	2 weeks
(% completion with respect to		
Materials : 80% ;		
Labour and Overheads : 60%)		
Finished goods in stock	:	3 weeks
Credit period allowed to debtors	:	6 weeks
Credit period availed from suppliers	:	8 weeks
Time lag in payment of wages	:	1 week
Time lag in payment of overheads	:	2 weeks

The company sells one-fifth of the output against cash and maintains cash balance of ₹ 2,50,000.

Required:

Prepare a statement showing estimate of working capital needed to finance a budgeted activity level of 87,000 units of production. You may assume that production is carried on evenly throughout the year and wages and overheads accrue similarly.

Answer

Estimation of Working Capital Needs

I. Investment in Inventory   ₹

(i)   Raw material Inventory $= 87,000 \times \dfrac{4}{52} \times$ ₹ 117   7,83,000

(ii) Work-in-Process Inventory

Material $= 87,000 \times \dfrac{2}{52} \times 0.80 \times 117 = 3,13,200$

Labour and Overheads Cost (other than depreciation)

$= 87,000 \times \dfrac{2}{52} \times 0.60 \times 129 = 2,58,992$ 5,72,192

(iii) Finished Goods Inventory (Cash Cost)

$= 87,000 \times \dfrac{3}{52} \times 246$ 12,34,731

II. Investment in Debtors (Cash Cost)

$= 87,000 \times \dfrac{6}{52} \times 0.8 \times 246$ 19,75,569

III. Cash Balance   2,50,000

Total Investment in Current Assets   48,15,492

Current Liabilities and Deferred Payment

                                                                                              ₹

(i)   Creditors $= 87,000 \times \dfrac{8}{52} \times 117$ 15,66,000

(ii) Wages outstanding $= 87,000 \times \dfrac{1}{52} \times 49$ 81,981

(iii) Overheads outstanding (cash cost) $= 87,000 \times \dfrac{2}{52} \times 80$ 2,67,692

Total Deferred Payments   19,15,673

Net Working Capital (Current assets – Non-interest bearing current liabilities)
= ₹ (48,15,492 – 19,15,673) = ₹ 28,99,819

DEBTORS MANAGEMENT

Question 8

B Ltd. has a present annual sales of 5,000 units at ₹ 600 per unit. The variable cost is ₹ 400 per unit and the fixed costs amount to ₹ 3,00,000 per annum. The present credit period allowed by the company is 1 month. The company is considering a proposal to increase the credit period to 2 months and 3 months and has made the following estimates:

	Existing	Proposed	
Credit Policy	1 month	2 months	3 months
Increase in sales	-	15%	30%
% of Bad Debts	1%	3%	5%

There will be increase in fixed cost by ₹ 50,000 on account of increase of sales beyond 25% of present level. The company plans on a pre-tax return of 20% on investment in receivables.

You are required to calculate the most viable credit policy for the company.

Answer

H Ltd.

Evaluation of Credit Policy

		Present Policy	Proposed Policy	
		1 month	2 months	3 months
A.	Sales (Units)	5,000	5,750	6,500
B.	Sales income	30,00,000	34,50,000	39,00,000
	Variable cost at ₹ 400 per unit	20,00,000	23,00,000	26,00,000
	Contribution	10,00,000	11,50,000	13,00,000
	Fixed Costs	3,00,000	3,00,000	3,50,000
C.	Net Margin	7,00,000	8,50,000	9,50,000
D.	Investment in receivables	1,91,666	4,33,333	7,37,500
	(see Working notes)			
E.	Expected Return on receivables at 20%	38,333	86,666	1,47,500
F.	Bad Debts	30,000	1,03,500	1,95,000
G.	Net Profit	6,31,667	6,59,834	6,07,500
	(C−E−F)			
H.	Increase in profits	-	28,167	(-) 52,334

As 2 months credit policy yield higher return, it should be adopted.

Working Notes:

Calculation showing investments in receivables:

$$\text{Formula} = \frac{\text{Variable Cost} + \text{Fixed Cost}}{12} \times \text{No. of months credit.}$$

Investment

$$1 \text{ month}: \frac{23,00,000}{12} \times 1 = 1,91,666$$

$$2 \text{ months}: \frac{26,00,000}{12} \times 2 = 4,33,333$$

$$3 \text{ months} = \frac{29,50,000}{12} \times 3 = 7,37,500$$

Question 9

The present credit terms of P Company are 1/10 net 30. Its annual sales are ₹ 80 lakhs, its average collection period is 20 days. Its variable cost and average total costs to sales are 0.85 and 0.95 respectively and its cost of capital is 10 per cent. The proportion of sales on which customers currently take discount is 0.5. P company is considering relaxing its discount terms to 2/10 net 30. Such relaxation is expected to increase sales by ₹ 5 lakhs, reduce the average collection period to 14 days and increase the proportion of discount sales to 0.8. What will be the effect of relaxing the discount policy on company's profit? Take year as 360 days.

Answer

Evaluation of effect of relaxing the discount policy on company's profit

A. Incremental Revenue   ₹

Increase in contribution (₹ 5,00,000 × 15%)   75,000

Reduction in investment in receivable × cost of capital

Present: $\left[\dfrac{₹\,80\,lacs \times 0.95 \times 20\,days}{360\,days} \right] = Rs.\,4,22,222$

Proposed: $\left[\dfrac{(₹\,80\,lacs \times 0.95\ +\ ₹\,5\,lacs \times 0.85) \times 14\,days}{360\,days} \right] = ₹\,3,12,083$

Reduction in investment in receivable ₹ 1,10,139 (₹4,22,222 – ₹ 3,12,083)

Cost of savings on investment in receivable (₹ 1,10,139 × 10%)   <u>11,014</u>

                                                                                                      <u>86,014</u>

B. Incremental Cost

Increase in discount

Present: (₹ 80 lacs × 1% × 0.5)   = ₹   40,000

Proposed : (₹ 85 lacs × 2% × 0.8)   = ₹ 1,36,000

Net increase in discount   = ₹ 96,000

C.   Net effect on profits (A–B)   = ₹ 86,014 – ₹ 96,000 = (–) ₹ 9,986

Since, the proposed discount policy will reduce the profits of the company to the extent of ₹ ₹ 9,986. Therefore, it is not advisable for the company to relax the present discount policy.

Question 10

Radiance Garments Ltd. manufacturers readymade garments and sells them on credit basis through a network of dealers. Its present sale is ₹60 lakh per annum with 20 days credit period. The company is contemplating an increase in the credit period with a view to increasing sales. Present variable costs are 70% of sales and the total fixed costs ₹ 8 lakh per annum. The company expects pre-tax return on investment @ 40%. Tax Rate 35%. Some other details are given as under:

Proposed Credit Policy	Average Collection Period (days)	Expected Annual Sales (₹ Lakh)
I	30	65
II	40	70
III	50	74
IV	60	75

Required: Which credit policy should the company adopt? Present your answer in a tabular form. Assume 360-days a year. Calculations should be made upto two digits after decimal.

Answer

Statement showing Evaluation of the Proposed Credit Policies

(Amount ₹ In Lakhs)

	Credit policies				
		Proposed			
	Present	I	II	III	IV
Average Collection Period (days)	(20 days)	(30 days)	(40 days)	(50 days)	(60 days)
Sales (Annual)	60.00	65.00	70.00	74.00	75.00
Less: Variable cost (70% of sales)	42.00	45.50	49.00	51.80	52.50
Contribution	18.00	19.50	21.00	22.20	22.50
Less: Fixed Costs	8.00	8.00	8.00	8.00	8.00
Profit	10.00	11.50	13.00	14.20	14.50
Increase in profit compared to present profit: (A)	-	1.50	3.00	4.20	4.50
Investments in debtors (Variable cost + Fixed cost)	50.00	53.50	57.00	59.80	60.50
Debtors turnover	18	12	9	7.2	6

(360 days/Average collection period)					
Average investment in debtors	2.78	4.46	6.33	8.3	10.08
(Investment in debtors/ Debtors turnover)					
Additional investment in debtors compared to present level	-	1.68	3.55	5.52	7.30
Required return on additional investment (40%): (B)	-	0.672	1.42	2.208	2.92
Incremental profit: (A)−(B)	-	0.828	1.58	**1.992**	1.58

Decision: The company should adopt the **credit policy III** (with collection period of 50 days) as it yields a maximum profit to the company.

Question 11

A bank is analysing the receivables of Jackson Company in order to identify acceptable collateral for a short-term loan. The company's credit policy is 2/10 net 30. The bank lends 80 percent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period. A schedule of Jackson's receivables has been prepared. How much will the bank lend on pledge of receivables, if the bank uses a 12 per cent allowance for cash discount and returns?

Account	Amount ₹	Days Outstanding in days	Average Payment Period historically
74	25,000	15	20
91	9,000	45	60
107	11,500	22	24
108	2,300	9	10
114	18,000	50	45
116	29,000	16	10
123	14,000	27	48
	1,08,800		

Answer

Analysis of the receivables of Jackson Company by the bank in order to identify acceptable collateral for a short-term loan:
(i) The Jackson Company's credit policy is 2/10 net 30.
    The bank lends 80 per cent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period i.e. thirty days. From the schedule of receivables of Jackson Company Account No. 91 and Account No. 114 are currently overdue and for Account No. 123 the average payment period exceeds 40 days. Hence Account Nos. 91, 114 and 123 are eliminated. Therefore, the selected Accounts are Account Nos. 74, 107, 108 and 116.

(ii) **Statement showing the calculation of the amount which the bank will lend on a pledge of receivables if the bank uses a 12 per cent allowances for cash discount and returns**

Account No.	Amount (₹)	88 % of amount (₹)	80% of amount (₹)
	(a)	(b)=88% of (a)	(c)=80% of (b)
74	25,000	22,000	17,600
107	11,500	10,120	8,096
108	2,300	2,024	1,619
116	29,000	25,520	20,416
		Total loan amount	47,731

Question 12

The credit manager of XYZ Ltd. is reappraising the company's credit policy. The company sells the products on terms of net 30. Cost of goods sold is 85% of sales and fixed costs are further 5% of sales. XYZ classifies its customers on a scale of 1 to 4. During the past five years, the experience was as under:

Classification	Default as a percentage of sales	Average collection period- in days for non-defaulting accounts
1	0	45
2	2	42
3	10	40
4	20	80

The average rate of interest is 18%. What conclusions do you draw about the company's Credit Policy? What other factors should be taken into account before changing the present policy? Discuss.

Answer

Since the amount of revenue generated from each category of customer is not given in the question. Let us consider ₹ 100 as the amount of revenue generated from each type of customer. Therefore, ₹ 100 shall be taken as the basis for reappraisal of Company's credit policy.

Classification	Gross profit @ 15%[*] (₹)	Bed debts (₹)	Interest Cost (Refer to Working note)(₹)	Total Cost (₹)	Net effect (₹)	Strategy
	(i)	(ii)	(iii)	(iv)=(ii)+(iii)	(v)=(i)–(iv)	
1	15	Nil	1.88	1.88	13.12	Accept
2	15	2	1.76	3.76	11.24	Accept
3	15	10	1.68	11.68	3.32	Accept
4	**15**	**20**	**3.35**	**23.35**	**(8.35)**	**Reject**

*It is given the cost of goods sold is 85%. Therefore Gross Profit is 15% of sales.

The reappraisal of company's credit policy indicates that the company either follows a lenient credit policy or it is inefficient in collection of debts. Even though the company sells its products on terms of net 30 days, it allows average collection period for more than 30 to all categories of its customer The net effect i.e. Gross Profit less Total Cost is favourable in respect of categories 1, 2 and 3 therefore these customers shall be taken into fold. For the customers covered in category 4 the net effect is unfavourable i.e. total cost is more than the gross profit. The company should try to reduce bad debt % for this category of customers at least by 7.8% (i.e. at 12.20%). If the company is able to do so, the company can allow the credit period of 80 days for at least increasing the market share.

The other factors to be taken into consideration before changing the present policy includes (i) past performance of the customers and (ii) their credit worthiness.

The information so required may be outsourced as well as insourced.

Working Note:

Computation of interest cost

$$\text{Interest Cost} = \frac{\text{Average rate of interest} \times \text{Cost of goods sold} \times \text{Average collection period in days for non-defaulting accounts}}{365 \text{ days}}$$

For Category 1 = $\dfrac{18\% \times ₹\,85 \times 45 \text{ days}}{365 \text{ days}}$ = ₹ 1.88

For Category 2 = $\dfrac{18\% \times ₹\,85 \times 42 \text{ days}}{365 \text{ days}}$ = ₹ 1.76

For Category 3 = $\dfrac{18\% \times ₹\,85 \times 40 \text{ days}}{365 \text{ days}}$ = ₹ 1.68

For Category 4 = $\dfrac{18\% \times ₹\,85 \times 80 \text{ days}}{365 \text{ days}}$ = ₹ 3.35

Question 13

A company has prepared the following projections for a year:

Sales	5,250 units
Selling Price per unit	₹160
Variable Costs per unit	₹100
Total Costs per unit	₹140
Credit period allowed	One month

The Company proposes to increase the credit period allowed to its customers from one month to two months. It is envisaged that the change in the policy as above will increase the sales by 8%. The company desires a return of 25% on its investment. You are required to examine and advise whether the proposed Credit Policy should be implemented or not.

Answer

Computation of contribution and extra funds blockage if the credit period allowed to customers is increased from one month to two months

Increase in sales units (5,250 units x 8%)	420
Contribution per unit (₹)	60
Total contribution on	25,200
increased sales units (₹) : (A)	
(₹420 units × ₹60)	
Total cost (₹)	7,35,000
5,250 units × ₹140	
Additional variable cost of 420 units (₹) (420 units x ₹100)	42,000
Total cost (₹)	7,77,000
Funds blocked for 2 months (₹)	1,29,500
(₹7,77,000 /12 months)× 2 month	
Less: Present blockage of funds for 1 month (₹)	61,250
(₹7,35,000 / 12 months) × 1 month	
Extra blockage of funds due to change in credit policy (₹)	68,250

$$\text{Return} \underset{(due\ to\ change\ in\ credit\ policy)}{=} \frac{\text{Contribution on increased sales}}{\text{Extra funds blockage}} \times 100 = \frac{₹\ 25,200}{₹\ 68,250} \times 100 = 36.92\%$$

Advise: The return due to a change in the credit policy comes to 36.92%, which is more than the desired return of 25%. Hence, the proposal of increasing the credit period from one month to two months should be accepted.

Question 14

A firm is considering offering 30-day credit to its customers. The firm likes to charge them an annualized rate of 30 %. The firm wants to structure the credit in terms of a cash discount for immediate payment. How much would the discount rate have to be?

Answer

Interest @ 30 % p.a. for a period of 30 days (year 365 days) = $0.30 \times \dfrac{30}{365}$ = 0.024568

$$= 2.4658\ \%.$$

Hence the principal of ₹ 1 , including the interest after 30 days will become 1.024568.

The present value as on zero date will be $\dfrac{1}{1.024568}$ = 0.97594

Hence discount which can be offered to receivables as on zero date = 1 – 0.97594

$$= 0.02406 = 2.41\ \%.$$

Question 15

JKL Ltd. is considering the revision of its credit policy with a view to increasing its sales and profit. Currently all its sales are on credit and the customers are given one month's time to settle the dues. It has a contribution of 55% on sales and it can raise additional funds at a cost of 20% per annum. The marketing manager of the company has given the following options along with estimates for considerations:

Particulars	Current Position	I Option	II Option	III Option
Sales (₹ in lakhs)	200	210	220	250
Credit period (in months)	1	1½	2	3
Bad debts (% of sales)	3	4	5	7
Cost of Credit administration (₹ in lakhs)	1.20	1.30	1.50	6.80

You are required to advise the company for the best option.

Answer

Evaluation of the Different Options in Credit Policy of JKL Ltd.

(₹ in lakhs)

Credit period	1 month Current position	1.5 months Option I	2 months Option II	3 months Option III
Sales	200	210	220	250
Contribution @ 55%	110	115.5	121	137.50
(A) Increase in contribution over current level	–	5.5	11	27.50
Debtors $= \dfrac{\text{Average Collection Period} \times \text{Credit Sales}}{12}$	$\dfrac{1 \times 200}{12} = 16.67$	$\dfrac{1.5 \times 210}{12} = 26.25$	$\dfrac{2 \times 220}{12} = 36.67$	$\dfrac{3 \times 250}{12} = 62.50$
Increase in debtors over current level	–	9.58	20.00	45.83
(B) Cost of funds for additional amount of debtors @ 20%	–	1.92	4.00	9.17
Credit administrative cost	1.20	1.30	1.50	6.80
(C) Increase in credit administration cost over present level	–	0.10	0.30	5.60
Bad debts	6.00	8.40	11.00	17.50
(D) Increase in bad debts over current levels	–	2.40	5.00	11.50
Net gain/loss A – (B + C + D)	–	1.08	1.70	1.23

Advise: It is suggested that the company JKL Ltd. should implement Option II which has a credit period of 2 months.

Question 16

A Company has sales of ₹ 50,00,000. Average collection period is 25 days, bad debt losses are 5% of sales and collection expenses are ₹ 25,000. The cost of funds is 15%. The Company has two alternative Collection Programmes:

	Programme I	Programme II
Average Collection Period reduced to	20 days	15 days
Bad debt losses reduced to	4% of sales	3% of sales
Collection Expenses	₹ 50,000	₹ 80,000

Evaluate which Programme is viable. Consider 1 Year = 365 days.

Answer

(a) Evaluation of Alternative Collection Programmes

	Present Programme ₹	1st Programme ₹	2nd Programme ₹
Sales revenues	50,00,000	50,00,000	50,00,000
Average collection period (days)	25	20	15
Receivables (₹)	3,42,466	2,73,973	2,05,479
	$\left(50,00,000 \times \dfrac{25}{365}\right)$	$\left(50,00,000 \times \dfrac{20}{365}\right)$	$\left(50,00,000 \times \dfrac{15}{365}\right)$
Reduction in receivables from present level (₹)	–	68,493	1,36,987
(A) Savings in interest @ 15% p.a.	–	₹ 10,274	₹ 20,548
% of bad debt loss	5%	4%	3%
Amount (₹)	2,25,000	2,00,000	1,50,000
(B) Reduction in bad debts from present level	–	50,000	1,00,000
(C) Incremental benefits from present level = (A) + (B)	–	60,274	₹1,02,548
Collection expenses (₹)	25,000	50,000	80,000
(D) Incremental collection expenses from present level	–	25,000	55,000
Increment net benefit (C – D)	–	₹ 35,274	₹ 65,548

Conclusion: From the analysis it is apparent that Programme I has a benefit of ₹ 35,274 and Programme II has a benefit of ₹ 65,548 over present level. Whereas Programme II has a benefit of ₹ 35,274 more than Programme I. Thus, benefits accrue at a diminishing rate and hence Programme II is more viable.

CASH MANAGEMENT

Question 17

The annual cash requirement of A Ltd. is ₹ 10 Lakhs. The company has marketable securities in lot sizes of ₹ 50,000, ₹ 1,00,000, ₹ 2,00,000, ₹ 2,50,000 and ₹ 5,00,000. Cost of conversion of marketable securities per lot is ₹ 1,000. The company can earn 5% annual yield on its securities.

You are required to prepare a table indicating which lot size will have to be sold by the company.

Also show that the economic lot size can be obtained by the Baumal Model.

Answer

Table indicating lot size of securities

Total annual cash requirements =T= ₹ 10,00,000

Lot Size (₹) =C	50,000	1,00,000	2,00,000	2,50,000	5,00,000
Number of Lots (T/C)	20	10	5	4	2
Conversion Cost (₹)=(T/C) b	20,000	10,000	5,000	4,000	2,000
Where b = cost of conversion per lot.					
Interest charges ₹ =(C/2)I	1,250	2,500	5,000	6,250	12,500
Total Cost ₹=	21,250	12,500	10,000	10,250	14,500

Economic lot size is ₹ 2,00,000 at which total costs are minimum.

William J. Baumal Model: Cash management model of William J. Baumal assumes that the concerned company keeps all its cash on interest yielding deposits form which it withdraws as and when required. It also assumes that cash usage is linear over time. The amount of money is withdrawn from deposits in such a way that the cost of withdrawal are optimally balanced with those of interest foregone by holding cash. The model is almost same as economic stock order quantity model.

Formula Economic lot size = $\sqrt{\dfrac{2 \times Tb}{I}}$

Where   T = Projected cash requirement   = ₹ 10,00,000

        b = Conversion cost per lot   = ₹ 1000

        I = Interest earned on marketable securities per annum. = 5%

By substituting the figures in the formula

Economic lot size   = $\sqrt{\dfrac{2 \times 10,00,000 \times 1000}{0.05}}$

                      = ₹ 2,00,000

INVENTORY MANAGEMENT

Question 18

(a) The experience of the firm being out of stock is summarised below:

(1)

Stock out (No. of units)	No. of times	
500	1	(1)
400	2	(2)
250	3	(3)
100	4	(4)
50	10	(10)
0	80	(80)

Figures in brackets indicate percentage of time the firm has been out of stock.

(2) Stock out costs are ₹ 40 per unit.

(3) Carrying cost of inventory per unit is ₹ 20

Determine the optimal level of stock out inventory.

(b) A firm has 5 different levels in its inventory. The relevant details are given. Suggest a breakdown of the items into A, B and C classifications:

Item No.	Avg. No. of units inventory	Avg. Cost per unit
1	20,000	₹ 60
2	10,000	₹ 100
3	32,000	₹ 11
4	28,000	₹ 10
5	60,000	₹ 3.40

Answer

(a)

Safety stock level (units)	Stock out (units)	Stock out cost @ ₹ 40 per unit ₹	Probability of stock out	Expected stock out at this level	Total expected stock out cost
500	0	0	0	0	0
400	100	4000	0.01	40	40
250	250	10,000	0.01	100	
	150	6000	0.02	120	260
100	400	16,000	0.01	160	
	300	12,000	0.02	240	
	150	6,000	0.03	180	840
50	450	18,000	0.01	180	
	350	14,000	0.02	280	

	200	8,000	0.03	240	
	50	2,000	0.04	80	1,620
0	500	20,000	0.01	200	
	400	16,000	0.02	320	
	250	10,000	0.03	300	
	100	4,000	0.04	160	
	50	2,000	0.10	200	2,800

Safety stock level (units)	Expected stock out costs	Carrying cost at ₹ 20 per unit ₹	Total safety stock cost
0	2,800	0	2,800
50	1,620	1,000	2,620
100	840	2,000	2,840
250	260	5,000	5,260
400	40	8,000	8,040
500	0	10,000	10,000

Optimum safety stock where the total cost is the least is at 50 units level.

(b)

Item No.	Units	% of total Units	Unit cost ₹	Total cost ₹	% of total cost
1	20,000	13.3	60.00	12,00,000	39.5] A
2	10,000	6.7	100.00	10,00,000	32.9]
3	32,000	21.3	11.00	3,52,000	11.6] B
4	28,000	18.7	10.00	2,80,000	9.2]
5	60,000	40.0	3.40	2,04,000	6.8
	1,50,000	100.0		30,36,000	100.0

Item Nos. I and II being very valuable are to be controlled first though in quantity are hardly 20% of the total, hence can be classified as A. Next priority is for items 3 and 4, though quantity wise 40% to be classified as B and last priority item 5 though in quantity bulk but value is less hence to be classified as C.

Question 19

A Ltd uses inventory turnover as one performance measure to evaluate its production manager. Currently, its inventory turnover (based on cost of goods sold ÷inventory) is 10 times per annum, as compared with industry average of 4. Average sales are ₹ 4,50,000 p.a. variable costs of inventory have consistently remained at 70% of sales with fixed costs of ₹ 10,000. Carrying costs of inventory (excluding financing costs) are 5% per annum. Sales force complained that low inventory levels are resulting in lost-sales due to stock outs. Sales manager has made an estimate based on stock out reports as under:

Inventory Policy	Inventory Turnover	Sales in ₹
Current	10	4,50,000
A	8	5,00,000
B	6	5,40,000
C	4	5,65,000

On the basis of above estimates, assuming a 40% tax rate and an after tax required return of 20% on investment in inventory, which policy would you recommend?

Answer

Calculation of Cost of Goods Sold

Policy	Variable Cost (₹)	Fixed Cost (₹)	Total Cost (₹)
Current	4,50,000 × .7 = 3,15,000 +	10,000	3,25,000
A	5,00,000 × .7 = 3,50,000 +	10,000	3,60,000
B	5,40,000 × .7 = 3,78,000 +	10,000	3,88,000
C	5,65,000 × .7 = 3,95,500 +	10,000	4,05,500

Investment Level in Various Policies

		(₹)
Current	3,25,000 ÷10	32,500
A	3,60,000 ÷ 8	45,000
B	3,88,000 ÷ 6	64,667
C	4,05,500 ÷ 4	1,01,375

Evaluation of Inventory Policies

Policy	Current ₹	A ₹	B ₹	C ₹
Sales	4,50,000	5,00,000	5,40,000	5,65,000
Cost of Goods sold	3,25,000	3,60,000	3,88,000	4,05,500
Contribution	1,25,000	1,40,000	1,52,000	1,59,500
Less: Carrying cost @ 5%	1,625	2,250	3,233	5,069
Profit before tax	1,23,375	1,37,750	1,48,767	1,54,431
Incremental Profit (Before tax)		14,375	11,017	5,664
Incremental Profit (After tax)		8,625	6,610	3,398
Incremental Investment		12,500	19,667	36,708
Incremental Rate of Return (%)		69	33.6	9.26

Conclusion: Since the incremental rate of return is highest with inventory policy A, therefore, policy A should be followed.

Question 20

A publishing house purchases 72,000 rims of a special type paper per annum at cost ₹ 90 per rim. Ordering cost per order is ₹ 500 and the carrying cost is 5 per cent per year of the inventory cost. Normal lead time is 20 days and safety stock is NIL. Assume 300 working days in a year:

You are required:

(i)   Calculate the Economic Order Quantity (E.O.Q).

(ii)   Calculate the Reorder Inventory Level.

(iii)   If a 1 per cent quantity discount is offered by the supplier for purchases in lots of 18,000 rims or more, should the publishing house accept the proposal?

Answer

(i) $EOQ = \sqrt{\dfrac{2\,SC_0}{ic_1}}$

Where,

S   = Annual consumption

C_0 = Ordering cost per order

ic_1 = Stock carrying cost per unit per annum

$$= \sqrt{\dfrac{2 \times 72,000 \times 500}{5\% \text{ of } ₹\ 90}} \quad = \sqrt{1,60,00,000}$$

= 4,000 Rims.

(ii)   Re-order Level = Normal Lead Time × Normal Usage

= 20 × 240

= 4,800 Rims.

Note:

$$Normal\,Usage = \dfrac{Annual\,usage}{Normal\,working\,days\,in\,a\,year}$$

$$= \dfrac{72,000}{300} = 240 \text{ Rims.}$$

(iii) Evaluation of Quantity Discount Offer:

	EOQ	Discount Offer
Size of order	4,000 Rims	18,000 Rims
No. of orders in a year	18	4
Average inventory $\left(\dfrac{\text{Order size}}{2}\right)$	2,000 Rims	9,000 Rims
Cost:	₹	₹
Ordering Cost @ ₹ 500 per order	9,000	2,000
Inventory carrying cost		
At EOQ – (4,000/2) × ₹ 4.5	9,000	-
At Discount offer – (18,000/2) × ₹ 4.455	-	40,095
Purchases Cost		
At EOQ – 72,000 × ₹ 90	64,80,000	–
At discount offer – 72,000 × ₹ 89.10	—	64,15,200
Total Cost	**64,98,000**	**64,57,295**

The total cost is less in case of quantity discount offer. Hence, quantity discount offer should be accepted.

5

TOOLS FOR FINANCIAL ANALYSIS & PLANNING

CASH BUDGET, FUND FLOW STATEMENT & CASH FLOW STATEMENT

Question 1

The following information is available in respect of ABC Ltd.:

(1) Materials are purchased and received one month before being used and payment is made to suppliers two months after receipt of materials.

(2) Cash is received from customers three months after finished goods are sold and delivered to them.

(3) No time lag applies to payments of wages and expenses.

(4) The following figures apply to recent and future months:

Month	Materials received ₹	Sales ₹	Wages and Expenses ₹
January	20,000	30,000	9,500
February	22,000	33,000	10,000
March	24,000	36,000	10,500
April	26,000	39,000	11,000
May	28,000	42,000	11,500
June	30,000	45,000	12,000
July	32,000	48,000	12,500
August	34,000	51,000	13,000

(5) Cash balance at the beginning of April is ₹ 10,000.

(6) All the products are sold immediately they have been made and that materials used and sums spent on wages and expenses during any particular month relate strictly to the sales made during that month.

Prepare cash budget for the period April to July, profit and loss forecast for four months (April-July) and a movement of funds statement for the four months period (April-July).

Answer:

Cash Budget for the period April to July

Amount in ₹

	April	May	June	July
Opening Balance	10,000	7,000	4,500	2,500
Collections from debtors	30,000	33,000	36,000	39,000
	40,000	40,000	40,500	41,500
Payments:				
Wages and Expenses	11,000	11,500	12,000	12,500
Payment to suppliers	22,000	24,000	26,000	28,000
	33,000	35,500	38,000	40,500
Closing balance	7,000	4,500	2,500	1,000

Profit and Loss forecast for the period April-July

		₹
Sales (April to July)		1,74,000
Closing Stock (July Purchase)		32,000
		2,06,000
Less: Opening stock- (March purchase)	24,000	
Purchases (April to July)	1,16,000	
Wages and Expenses (April to July)	47,000	
		1,87,000
Profit for the 4 months period		19,000

Statement showing movement of funds

Stock (Opening)	April	March purchase		24,000
Receivables (Opening)	April	Credit allowed 3 months		
		January Sales	30,000	
		February Sales	33,000	
		March Sales	36,000	
				99,000
Creditors (Opening)	April	Credit received 2 months		
		February Purchase	22,000	
		March Purchase	24,000	
				46,000
Closing stock (end of July), July Purchase				32,000
Receivable (end of July), May to July Sales				1,35,000
Creditors (end of July), June and July Purchase				62,000

Sources:		₹
Profit earned during 4 months	19,000	
Add: Increase in creditors (62,000 - 46,000)	16,000	
		35,000

Application:

Less**:** Increase in receivables	36,000	
(1,35,000-99,000)		
Less**:** Increase in stock	8,000	
(32,000-24,000)		
	44,000	
	(-)9,000	
Opening Cash balance	10,000	
Hence closing cash balance	1,000	

Question 2

The following are the Balance Sheets of Gama Limited for the year ending March 31, 2010 and March 31, 2011:

Balance Sheet as on 31st March

	2010	2011
	₹	₹
Capital and Liabilities		
Share Capital	6,75,000	7,87,500
General Reserves	2,25,000	2,81,250
Capital Reserve (Profit on Sale of investment)	-	11,250
Profit & Loss Account	1,12,500	2,25,000
15% Debentures	3,37,500	2,25,000
Accrued Expenses	11,250	13,500
Creditors	1,80,000	2,81,250
Provision for Dividends	33,750	38,250
Provision for Taxation	78,750	85,500
Total	**16,53,750**	**19,48,500**
Assets		
Fixed Assets	11,25,000	13,50,000
Less: Accumulated depreciation	2,25,000	2,81,250
Net Fixed Assets	9,00,000	10,68,750
Long-term Investments (at cost)	2,02,500	2,02,500
Stock (at cost)	2,25,000	3,03,750
Debtors (net of provision for doubtful debts of ₹45,000 and ₹ 56,250 respectively for 2010 and 2011 respectively)	2,53,125	2,75,625
Bills receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
Miscellaneous Expenditure	16,875	11,250
	16,53,750	**19,48,500**

Additional Information:

(i)   During the year 2010-11, fixed assets with a net book value of ₹ 11,250 (accumulated depreciation, ₹ 33,750) was sold for ₹ 9,000.

(ii) During the year 2010-11, Investments costing ₹ 90,000 were sold, and also Investments costing ₹ 90,000 were purchased.

(iii) Debentures were retired at a Premium of 10%.

(iv) Tax of ₹ 61,875 was paid for 2009-10.

(v) During the year 2010-11, bad debts of ₹ 15,750 were written off against the provision for Doubtful Debt account.

(vi) The proposed dividend for 2009-10 was paid in 2010-11.

Required:

Prepare a Funds Flow Statement (Statement of changes in Financial Position on working capital basis) for the year ended March 31, 2011.

Answer

Computation of Funds from Operation	₹
Profit and loss balance on March 31, 2011	2,25,000
Add: Depreciation	90,000
Loss on Sale of Asset	2,250
Misc. Expenditure written off	5,625
Transfer to Reserves	56,250
Premium on Redemption of debentures	11,250
Provision for Dividend	38,250
Provision for Taxation	68,625
	4,97,250
Less: P/L balance on March 31, 2010	1,12,500
Funds from operations	3,84,750

Accumulated Depreciation Account

To Fixed Asset A/c	33,750	By Bal. b/d	2,25,000
		By P/L A/c	90,000
To Bal. c/d	2,81,250	(Pro (Prov. for dep.)	
		(Bal. Fig.)	
	3,15,000		3,15,000

Fixed Assets Account

To Bal. b/d	11,25,000	By Accumulated Depreciation A/c	33,750
		By Cash	9,000
To Bank (Purchase of Fixed Asset) (Bal. fig.)	2,70,000	By P/L (Loss on sale)	2,250
		By Bal. c/d	13,50,000
	13,95,000		13,95,000

Provision for Tax Account

To Cash (tax paid)	61,875	By Bal. b/d	78,750
		By P/L A/c (Prov.)	
To Bal. c/d	85,500	(Bal. fig.)	68,625
	1,47,375		1,47,375

Statement of Changes in Working Capital

	March31,2010	March 31, 2011	Change in W/C +	−
Current Assets				
Stock	2,25,000	3,03,750	78,750	
Debtors	2,53,125	2,75,625	22,500	
Bills Receivables	45,000	73,125	28,125	
Prepaid Expenses	11,250	13,500	2,250	
	5,34,375	6,66,000	1,31,625	−
Less: Current liabilities				
Accrued Expenses	11,250	13,500	−	2,250
Creditors	1,80,000	2,81,250	−	1,01,250
	1,91,250	2,94,750	1,31,625	1,03,500
Working Capital	3,43,125	3,71,250	−	−
Increase in Working Capital				28,125
			1,31,625	1,31,625

Funds Flow Statement for the year ended March 31, 2011

Sources	₹
Working Capital from Operations	3,84,750
Sale of Fixed Assets	9,000
Sale of Investments	1,01,250
Share Capital Issued	1,12,500
Total Funds Provided (A)	**6,07,500**

Application	₹
Purchase of Fixed Assets	2,70,000
Purchase of Investments	90,000
Payment of Debentures (at a premium of 10%)	1,23,750
Payment of Dividends	33,750
Payment of Taxes	61,875
Increase in Working Capital	**28,125**
Total Funds Applied (B)	**6,07,500**

Question 3

Following are the financial statements of Zed Ltd.:

Balance Sheet as on

Capital and Liabilities:	March 31, 2011 ₹	March 31, 2010 ₹
Share capital, ₹ 10 par value	1,67,500	1,50,000
Share premium	3,35,000	2,37,500
Reserves and Surplus	1,74,300	1,23,250
Debentures	2,40,000	–
Long-term loans	40,000	50,000
Creditors	28,800	27,100
Bank Overdraft	7,500	6,250
Accrued expenses	4,350	4,600
Income-tax payable	48,250	16,850
	10,45,700	6,15,550

Assets:	March 31, 2011 ₹	March 31, 2010 ₹
Land	3,600	3,600
Building, net of depreciation	6,01,800	1,78,400
Machinery, net of depreciation	1,10,850	1,07,050
Investment in 'A' Ltd.	75,000	–
Stock	58,800	46,150
Prepaid expenses	1,900	2,300
Debtors	76,350	77,150
Trade Investments	40,000	1,05,000
Cash	77,400	95,900
	10,45,700	6,15,550

Income Statement for the year ended March 31, 2011

	₹
Net Sales	13,50,000
Less: Cost of goods sold and operating expenses (including depreciation on buildings of ₹ 6,600 and depreciation on machinery of ₹ 11,400)	12,58,950
Net operating profit	91,050
Gain on sale of trade investments	6,400

Gain on sale of machinery		1,850
Profits before tax		99,300
Income-tax		48,250
Profits after tax		51,050

Additional information:

(i)   Machinery with a net book value of ₹ 9,150 was sold during the year.

(ii)   The shares of 'A' Ltd. were acquired by issue of debentures.

Required:

Prepare a Funds Flow Statement (Statement of changes in financial position on Working capital basis) for the year ended March 31, 2011.

Answer

Schedule of Changes in Working Capital

	March 31, 2011	March 31, 2011	Impact on Working Capital	
			Increase	Decrease
Current Assets				
Stock	58,800	46,150	12,650	–
Prepaid expenses	1,900	2,300	–	400
Debtors	76,350	77,150	–	800
Trade Investments	40,000	1,05,000	–	65,000
Cash	77,400	95,900	–	18,500
	2,54,450	3,26,500	12,650	84,700
Current Liabilities				
Creditors	28,800	27,100	–	1,700
Bank overdraft	7,500	6,250	–	1,250
Accrued expenses	4,350	4,600	250	–
Income tax payable	48,250	16,850	–	31,400
	88,900	54,800	250	34,350
Net Working Capital	1,65,550	2,71,700	12,900	1,19,050
Decrease in net working capital	1,06,150	–	1,06,150	–
	2,71,700	2,71,700	1,19,050	1,19,050

Machinery Account

	₹		₹
Balance b/d	1,07,050	Sale of machinery (given)	9,150
Purchase of machinery (plug)	24,350	Depreciation (given)	11,400
		Balance c/d	1,10,850
	1,31,400		1,31,400

Trade Investments Account

	₹		₹
Balance b/d	1,05,000	Cash (sale of trade investments)	65,000
		Balance c/d	40,000
	1,05,000		1,05,000

Estimation of Funds flow from Operations

		₹
Profits after tax		51,050
Add: Depreciation on Buildings	6,600	
Depreciation on Machinery	11,400	18,000
		69,050
Less: Gain on sale of machinery		1,850
Funds from Operations		67,200

Gain on sale of trade investments has been considered as an operating income. Trade investments have been considered as part of current assets.

Statement of Changes in Financial Position (Working Capital basis) for the year ended March 31, 2007

	₹
Sources:	
Funds from operations	67,200
Sale of machinery on gain (9,150 + 1,850)	11,000
Debentures issued (₹ 2,40,000 – 75,000)	1,65,000
Investment in 'A' Ltd. financial transaction and hence not affecting working capital	
Issue of share capital (including share premium)	1,15,000
Net Decrease in Working Capital	1,06,150
Total Funds Available	**4,64,350**
Application of Funds:	
Purchase of building (6,01,800 + 6,600 – 1,78,400)	4,30,000
Purchase of machinery	24,350
Payment of long-term loan	10,000
Financial Resources Applied	**4,64,350**

Question 4

XYZ Ltd. Company's Comparative Balance Sheet for 2002 and the Company's Income Statement for the year are as follows:

XYZ Ltd.

Comparative Balance Sheet
December 31, 2011 and 2010

(₹ in crores)		2011			2010
Sources of funds:					
Shareholder's funds					
	140		140		
	110	250	92		232
Loan funds					
		135			40
		385			**272**
Application of funds:					
Fixed Assets					
Plant and Equipment	430		309		
Less: Accumulated depreciation	(218)	212	(194)		115
Investments		60			75
Current Assets					
	205		160		
	180		270		
	17		20		
	26	428	10	460	
Less : Current liabilities and provisions					
	230		310		
	70		60		
	15	315	113	8	378	82
		385			**272**

XYZ Ltd.

Income Statement

for the year ended December 31, 2011 (₹ in crores)

Sales	1,000
Less : Cost of goods sold	530
Gross margin	470
Less : Operating expenses	352
Net operating income	118
Non-operating items:	
Loss on sale of equipment	(4)
Income before taxes	114
Less : Income-taxes	48
Net income	66

Additional information:

(i)   Dividends of ₹48 crores were paid in 2011.

(ii) The loss on sale of equipment of ₹4 crore reflects a transaction in which equipment with an original cost of ₹12 crore and accumulated depreciation of ₹5 crore were sold for ₹3 crore in cash.

Required:

Using the indirect method, determine the net cash provided by operating activities for 2011 and construct a statement of cash flows.

Answer

Statement of net cash flows provided by operating activities

by using indirect method for the year ended December 31, 2011

(₹ in crores)

Operating Activities	
Net Income	66
Adjustment to convert net income to a cash basis	
Depreciation and amortization charges	29
Decrease in accounts receivable	90
Increase in inventory	(45)
Decrease in pre-paid expenses	3
Decrease in accounts payable	(80)
Increase in accrued liabilities	10
Increase in deferred income tax	7
Loss on sale of equipment	4
Net cash provided by operating activities	84

Cash Flow from Investing Activities

Additions to property, building & equipment	(133)
Decrease in long term investments	15
Proceeds from sale of equipment	3
Net cash used in investing activities	(115)

Cash Flows from Financing Activities

Increase in bonds payable	95
Cash dividends paid	(48)
Net cash used in financing activities	47

Net increase in cash & cash equivalents [84 + (115) + 47]	**16**
Cash & cash equivalents at the beginning of year	**10**
Cash & cash equivalents at the end of year	**26**

Question 5

From the information contained in Income Statement and Balance Sheet of 'A' Ltd., prepare Cash Flow Statement:

Income Statement for the year ended March 31, 2011

		₹
Net Sales	(A)	2,52,00,000
Less:		
Cash Cost of Sales		1,98,00,000
Depreciation		6,00,000
Salaries and Wages		24,00,000
Operating Expenses		8,00,000
Provision for Taxation		8,80,000
	(B)	2,44,80,000
Net Operating Profit (A − B)		7,20,000
Non-recurring Income – Profits on sale of equipment		1,20,000
		8,40,000
Retained earnings and profits brought forward		15,18,000
		23,58,000
Dividends declared and paid during the year		7,20,000
Profit and Loss Account balance as on March 31, 2011		**16,38,000**

Balance Sheet as on

Assets:	March 31, 2010	March 31, 2011
	(₹)	(₹)
Fixed Assets:		
Land	4,80,000	9,60,000
Buildings and Equipment	36,00,000	57,60,000
Current Assets:		
Cash	6,00,000	7,20,000
Debtors	16,80,000	18,60,000
Stock	26,40,000	9,60,000
Advances	78,000	90,000
	90,78,000	1,03,50,000

Liabilities and Equity:	March 31, 2010	March 31, 2011
	(₹)	(₹)
Share Capital	36,00,000	44,40,000
Surplus in Profit and Loss Account	15,18,000	16,38,000
Sundry Creditors	24,00,000	23,40,000
Outstanding Expenses	2,40,000	4,80,000
Income-tax payable	1,20,000	1,32,000
Accumulated Depreciation		
on Buildings and Equipment	12,00,000	13,20,000
	90,78,000	1,03,50,000

The original cost of equipment sold during the year 2010-11 was ₹ 7,20,000.

Answer

Cash Flow Statement of Company A Ltd. for the year ending March 31, 2011

Cash flows from Operating Activities

	₹
Net Profits before Tax and Extra-ordinary Item	16,00,000
Add: Depreciation	6,00,000
Operating Profits before Working Capital Changes	22,00,000
Increase in Debtors	(1,80,000)
Decrease in Stock	16,80,000
Increase in Advances	(12,000)

Decrease in Sundry Creditors	(60,000)
Increase in Outstanding Expenses	2,40,000
Cash Generated from Operations	38,68,000
Income tax Paid	8,68,000
Net Cash from Operations	30,00,000

Cash flows from Investment Activities

	₹
Purchase of Land	(4,80,000)
Purchase of Buildings and Equipment	(28,80,000)
Sale of Equipment	3,60,000
Net Cash used in Investment Activities	(30,00,000)

Cash flows from Financing Activities

	₹
Issue of Share Capital	8,40,000
Dividends Paid	(7,20,000)
Net Cash from Financing Activities	1,20,000

Net increase in Cash and Cash Equivalents	**1,20,000**
Cash and Cash Equivalents at the beginning	**6,00,000**
Cash and Cash Equivalents at the end	**7,20,000**

Buildings and Equipment Account

	₹		₹
Balance b/d	36,00,000	Sale of Asset	7,20,000
Cash/Bank (purchase) (Balancing figure)	28,80,000	Balance c/d	57,60,000
	64,80,000		64,80,000

Accumulated Depreciation on
Buildings and Equipment Account

	₹		₹
Sale of Asset (Accumulated depreciation)	4,80,000	Balance b/d	12,00,000
		Profit and Loss (Provisional)	6,00,000
Balance c/d	13,20,000		
	18,00,000		18,00,000

Statement showing Sale of Asset

	₹
Original Cost	7,20,000
Less: Accumulated Depreciation	4,80,000
Net Cost	2,40,000
Profit on Sale of Asset	1,20,000
Sale Proceeds from Asset Sales	3,60,000

Question 6

X Ltd. has the following balances as on 1st April 2011:

	₹
Fixed Assets	11,40,000
Less; Depreciation	3,99,000
	7,41,000
Stocks and Debtors	4,75,000
Bank Balance	66,500
Creditors	1,14,000
Bills payable	76,000
Capital (Shares of ₹ 100 each)	5,70,000

The Company made the following estimates for financial year 2011-12:
(i)   The company will pay a free of tax dividend of 10% the rate of tax being 25%.
(ii)   The company will acquire fixed assets costing ₹1,90,000 after selling one machine for ₹ 38,000 costing ₹ 95,000 and on which depreciation provided amounted to ₹ 66,500.
(iii)   Stocks and Debtors, Creditors and Bills payables at the end of financial year are expected to be ₹ 5,60,500 ; ₹ 1,48,200 and ₹ 98,800 respectively.
(iv)   The profit would be ₹ 1,04,500 after depreciation of ₹ 1,14,000.
Prepare the projected cash flow statement and ascertain the bank balance of X Ltd. at the end of financial year 2011-12.

Answer

Working:

(i)   Cash Flow from operations

	₹
Profit for the year	1,04,500
Add: Depreciation (non cash item)	1,14,000
	2,18,500
Less: Profit on sale of machine	9,500
	2,09,000

Add increase in:

Creditors (₹ 1,48,200 – ₹ 1,14,000) = ₹ 34,200

Bills payable (₹ 98,800 – ₹ 76,000) = ₹ 22,800   57,000

                                               2,66,000

Less: Increase in stocks & debtors (₹ 5,60,500 – ₹ 4,75,000)   85,500

Cash from operations   1,80,500

(ii) Payment of Dividend

10% on capital ₹ 5,70,000 = ₹ 57,000

Gross up Amount $= \left(\dfrac{₹\,57,000}{75} \times 100 \right) = ₹\,76,000$

Total Dividend   ₹ 76,000

Tax 25%   ₹ 19,000

Payment of Dividend ₹ 57,000

Note: Income Tax on Company's Profit Ignored

Projected Cash Flow Statement for the year ending on 31st March, 2012

		₹
Bank Balance as on 1st April, 2011		66,500
Add: Inflow of Cash		
Sale of Machine	₹ 38,000	
Cash From operation	₹ 1,80,500	2,18,500
Less: Outflow of Cash		2,85,000
Purchase of Fixed Assets	₹ 1,90,000	
Payment of Dividend	₹ 57,000	
Tax Paid	₹ 19,000	2,66,000
Bank Balance on 31st March, 2011		**19,000**

RATIO ANALYSIS

Question 7

From the following information, prepare a summarised Balance Sheet as at 31st March, 2011:

Working Capital	₹ 2,40,000
Bank overdraft	₹ 40,000
Fixed Assets to Proprietary ratio	0.75
Reserves and Surplus	₹ 1,60,000
Current ratio	2.5
Liquid ratio	1.5

Answer

Working notes:

1. **Current assets and Current liabilities computation:**

$$\frac{\text{Current assets}}{\text{Current liabilities}} = \frac{2.5}{1} \text{ or } \frac{\text{Current assets}}{2.5} = \frac{\text{Current liabilities}}{1} = k \text{ (say)}$$

Or Current assets	= 2.5 k and Current liabilities = k
Or Working capital	= (Current assets − Current liabilities)
Or ₹2,40,000	= k (2.5 − 1) = 1.5 k
Or k	= ₹ 1,60,000
∴ Current liabilities	= ₹ 1,60,000
Current assets	= ₹1,60,000 × 2.5 = ₹4,00,000

2. **Computation of stock**

Liquid ratio		=	$\dfrac{\text{Liquid assets}}{\text{Current liabilities}}$
Or	1.5	=	$\dfrac{\text{Current assets - Stock}}{₹1,60,000}$
Or	1.5 × ₹1,60,000	=	₹4,00,000 − Stock
Or	Stock	=	₹1,60,000

3. **Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors**

Proprietary ratio	=	$\dfrac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75$

∴ Fixed assets	=	0.75 Proprietary fund
and Net working capital	=	0.25 Proprietary fund
Or ₹2,40,000/0.25	=	Proprietary fund

Or	Proprietary fund	=	₹9,60,000
and	Fixed assets	=	0.75 proprietary fund
		=	0.75 × ₹9,60,000
		=	₹7,20,000
	Capital	=	Proprietary fund − Reserves & Surplus
		=	₹9,60,000 − ₹1,60,000
		=	₹8,00,000
	Sundry creditors	=	(Current liabilities − Bank overdraft)
		=	(₹1,60,000 − ₹40,000)
		=	₹1,20,000

Balance Sheet

	₹		₹
Capital	8,00,000	Fixed assets	7,20,000
Reserves & Surplus	1,60,000	Stock	1,60,000
Bank overdraft	40,000	Current assets	2,40,000
Sundry creditors	1,20,000		
	11,20,000		**11,20,000**

Question 8

Using the following data, complete the Balance Sheet given below:

Gross Profits	₹ 54,000
Shareholders' Funds	₹ 6,00,000
Gross Profit margin	20%
Credit sales to Total sales	80%
Total Assets turnover	0.3 times
Inventory turnover	4 times
Average collection period (a 360 days year)	20 days
Current ratio	1.8
Long-term Debt to Equity	40%

Balance Sheet

Creditors	....	Cash	....
Long-term debt	....	Debtors	....
Shareholders' funds	....	Inventory	....
		Fixed assets	....

Answer

Gross Profits   ₹ 54,000

Gross Profit Margin   20%

∴   Sales $= \dfrac{\text{Gross Profits}}{\text{Gross Profit Margin}} = ₹\,54,000 / 0.20$

       = ₹ 2,70,000

Credit Sales to Total Sales   = 80%

∴   Credit Sales   = ₹ 2,70,000 × 0.80

               = ₹ 2,16,000

Total Assets Turnover   = 0.3 times

∴   Total Assets $= \dfrac{\text{Sales}}{\text{Total Assets Turnover}}$

                   $= \dfrac{₹\,2,70,000}{0.3}$

                  = ₹ 9,00,000

Sales – Gross Profits = COGS

∴   COGS = ₹ 2, 70,000 – 54,000

          = ₹ 2, 16,000

Inventory turnover = 4 times

Inventory $= \dfrac{\text{COGS}}{\text{Inventory turnover}} = \dfrac{2,16,000}{4}$

       = ₹ 54,000

Average Collection Period = 20 days

∴   Debtors turnover $= \dfrac{360}{\text{Average Collection Period}}$

          = 360/20=18

∴   Debtors $= \dfrac{\text{Credit Sales}}{\text{Debtors turnover}}$

            $= \dfrac{₹\,2,16,000}{18}$

           = ₹ 12,000

Current ratio   = 1.8

$$1.8 = \frac{\text{Debtors} + \text{Inventory} + \text{Cash}}{\text{Creditors}}$$

1.8 Creditors = (₹ 12,000 + ₹ 54,000 + Cash)

1.8 Creditors = ₹ 66,000 + Cash

Long-term Debt to Equity = 40%

Shareholders Funds = ₹ 6, 00,000

∴   Long-term Debt= ₹ 6, 00,000×40%

= ₹ 2, 40,000

Creditors (Balance figure)   = 9, 00,000 – (6, 00,000 + 2, 40,000)

= ₹ 60,000

∴   Cash = (60,000×1.8) – 66,000

= ₹ 42,000

Balance Sheet (in ₹)

Creditors (Bal. Fig)	60,000	Cash	42,000
		Debtors	12,000
Long- term debt	2,40,000	Inventory	54,000
Shareholders' funds	6,00,000	Fixed Assets (Bal fig.)	7,92,000
	9,00,000		**9,00,000**

Question 9

The following accounting information and financial ratios of PQR Ltd. relate to the year ended 31st December, 2010:

Gross Profit 15% of Sales; Net Profit 8% of Sales; Raw Materials consumed 20% of works cost, Direct wages 10% of works cost, Stock of Raw materials equals to 3 months usage; stock of finished goods is 6% of works Cost , debt collection period 60 days. All sales are on credit.

Fixed Assets to Sales 1:3 ; Fixed Assets to Current Assets 13:11 ; Current ratio 2:1 ; Long term loans to current liabilities 2:1 ; Capital to Reserves & Surplus 1:4.

If value of fixed assets as on 31st December, 2009 amounted to ₹ 26 lakhs, prepare a summarised Profit and Loss Account of the company for the year ended 31st December, 2010 and also the Balance Sheet as on 31st December, 2010.

Answer

(a)   Working Notes:

    (i)   Calculation of Sales

$$\frac{\text{Fixed Assets}}{\text{Sales}} = \frac{1}{3}$$

$$\therefore \frac{26,00,000}{\text{Sales}} = \frac{1}{3} \Rightarrow \text{Sales} = \text{Rs.}78,00,000$$

(ii) Calculation of Current Assets

$$\frac{\text{Fixed Assets}}{\text{Current Assets}} = \frac{13}{11}$$

$$\therefore \frac{26,00,000}{\text{Current Assets}} = \frac{13}{11} \Rightarrow \text{Current Assets} = \text{Rs.}22,00,000$$

(iii) Calculation of Raw Material Consumption and Direct Wages

	₹
Sales	78,00,000
Less: Gross Profit	11,70,000
Works Cost	66,30,000
Raw Material Consumption (20% of Works Cost) ₹ 13,26,000	
Direct Wages (10% of Works Cost) ₹ 6,63,000	

(iv) Calculation of Stock of Raw Materials (= 3 months usage)

$$= 13,26,000 \times \frac{3}{12} = ₹ 3,31,500$$

(v) Calculation of Stock of Finished Goods (= 6% of Works Cost)

$$= 66,30,000 \times \frac{6}{100} = ₹ 3,97,800$$

(vi) Calculation of Current Liabilities

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$$

$$\frac{22,00,000}{\text{Current Liabilities}} = 2 \Rightarrow \text{Current Liabilities} = ₹ 11,00,000$$

(vii) Calculation of Debtors

$$\text{Average collection period} = \frac{\text{Debtors}}{\text{Credit Sales}} \times 365$$

$$\frac{\text{Debtors}}{78,00,000} \times 365 = 60 \Rightarrow \text{Debtors} = ₹ 12,82,191.78 \text{ or } ₹ 12,82,192$$

(viii) Calculation of Long term Loan

$$\frac{\text{Long term Loan}}{\text{Current Liabilities}} = \frac{2}{1}$$

$$\frac{\text{Long term loan}}{11,00,000} = \frac{2}{1} \Rightarrow \text{Long term loan} = ₹ 22,00,000.$$

(ix) Calculation of Cash Balance

		₹
Current assets		22,00,000
Less: Debtors	12,82,192	
Raw materials stock	3,31,500	
Finished goods stock	3,97,800	20,11,492
Cash balance		1,88,508

(x) Calculation of Net worth

Fixed Assets		26,00,000
Current Assets		22,00,000
Total Assets		48,00,000
Less: Long term Loan	22,00,000	
Current Liabilities	11,00,000	33,00,000
Net worth		15,00,000

Net worth = Share capital + Reserves = 15,00,000

$$\frac{\text{Capital}}{\text{Reserves and Surplus}} = \frac{1}{4} \Rightarrow \text{Share Capital} = 15,00,000 \times \frac{1}{5} = ₹ 3,00,000$$

$$\text{Reserves and Surplus} = 15,00,000 \times \frac{4}{5} = ₹ 12,00,000$$

Profit and Loss Account of PQR Ltd for the year ended 31st December, 2010

Particulars	₹	Particulars	₹
To Direct Materials	13,26,000	By Sales	78,00,000
To Direct Wages	6,63,000		
To Works (Overhead) Balancing figure	46,41,000		
To Gross Profit c/d (15% of Sales)	11,70,000		
	78,00,000		78,00,000
To Selling and Distribution Expenses (Balancing figure)	5,46,000	By Gross Profit b/d	11,70,000
To Net Profit (8% of Sales)	6,24,000		
	11,70,000		**11,70,000**

Balance Sheet of PQR Ltd.as at 31st December, 2010

Liabilities	₹	Assets	₹
Share Capital	3,00,000	Fixed Assets	26,00,000
Reserves and Surplus	12,00,000	Current Assets:	
Long term loans	22,00,000	Stock of Raw Material	3,31,500
Current liabilities	11,00,000	Stock of Finished Goods	3,97,800
		Debtors	12,82,192
		Cash	1,88,508
	48,00,000		**48,00,000**

Question 10

A company has a profit margin of 20% and asset turnover of 3 times. What is the company's return on investment? How will this return on investment vary if?
Profit margin is increased by 5%?
Asset turnover is decreased to 2 times?
Profit margin is decreased by 5% and asset turnover is increase to 4 times?

Answer:
Net profit ratio = 20% (given)
Assets turnover ratio = 3 times (given)

Return on Investment (ROI) = Net Profit ratio x Assets turnover ratio
= 20% x 3 times = 60%

If net profit ratio is increased by 5 %:
Then Revised Net Profit Ratio = 20 + 5 = 25%
Asset Turnover Ratio (as before) = 3 times

∴ ROI = 25 % x 3 times = 75%

If assets turnover ratio is decreased to 2 times:
NP Ratio (as before) = 20%
Revised Asset Turnover Ratio = 2 times

∴ ROI = 20% x 2 times = 40 %

If net profit ratio falls by 5% and assets turnover ratio raises to 4 times:
Then Revised NP Ratio = 20 – 5 = 15%
Revised Asset Turnover Ratio = 4 times
∴ ROI = 15% x 4 = 60%

6

DIVIDEND POLICIES

Question 1

The Beta Co-efficient of Target Ltd. is 1.5. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹ 4 per share. Return on Government securities is 10%. Return on market portfolio is 15%. The current market price of one share of Target Ltd. is ₹ 36.

(i)   What will be the equilibrium price pr share of Target Ltd.?

(ii)   Would you advise purchasing the share?

Answer

(i)   CAPM formula = $E(R_s) = R_f + b [E (R_m) - R_f]$.

Where,

$E(R_s)$ = Expected rate of return of the security (OR) the cost of equity

R_f = risk free returns

$E(R_m)$ = market rate of return

b = Beta co-efficient given 1.5

     Substituting the values

$E(R_s)$ = 10 + 1.5 (15% − 10%)

$E(R_s)$ = 17.5%

$\text{Dividend Growth Model} = \dfrac{D_1}{P_0} + g$, Where D_1, is dividend per share in year 1, g is growth rate of

dividends, P_0 = Market price/share in year 0.

$E(R_s)$ being . 17.5, we can make the equation as

$$.175 = \frac{4\,(1.08)}{P_0} + 0.08$$

$$.095 = \frac{4\,(1.08)}{P_0}$$

$$P_0 = \frac{4\,(1.08)}{.095}$$

= ₹ 45.47

Question 2

Z Ltd. is foreseeing a growth rate of 14% per annum in the next 2 years. The growth rate is likely to fall to 10% for the third year and fourth year. After that the growth rate is expected to stabilize at 8% per annum. If the last dividend paid was ₹ 1.50 per share and the investors' required rate of return is 16%, find out the intrinsic value per share of Z Ltd. as of date. You may use the following table:

Years	0	1	2	3	4	5
Discounting Factor at 16%	1	0.86	0.74	0.64	0.55	0.48

Answer

Present value of dividend stream for first 2 years

₹ 1.50 (1.14) × .86 + 1.50 (1.14)^2 × .74

₹ 1.71 × .86 + 1.95 × .74

₹ 1.47 + 1.44 = 2.91   (A)

Present value of dividend stream for next 2 years

₹ 1.95 (1.1) × .64 + 1.95 (1.1)^2 × .55

₹ 2.145 × .64 + 2.36 × .55

₹ 1.373 + 1.30 = 2.673   (B)

Market value of equity share at the end of 4th year computed by using the constant dividend growth model, would be:

$$P_4 = \frac{D_5}{K_s - g_n}$$

Where D_5 is dividend in the fifth year, g_n is the growth rate and K_s is required rate of return.

Now $D_5 = D_4 (1 + g_n)$

∴ D_5 = ₹ 2.36 (1 + 0.08)

= ₹ 2.55

∴ $P_4 = \dfrac{₹\, 2.55}{0.16 - 0.08}$

= ₹ 31.88

Present market value of P_4 = 31.88 × .55 = ₹ 17.534   (C)

Hence, the intrinsic value per share of Z Ltd. would be

A + B + C = ₹ 2.91 + 2.673 + 17.534 = ₹ 23.12

Question 3

Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has a share price of ₹ 15.00. If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend-discount model approach?

Answer

(i) Firm's expected or required return on equity

(Using a dividend discount model approach)

According to Dividend discount model approach the firm's expected or required return on equity is computed as follows:

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

Where,

K_e = Cost of equity share capital or (Firm's expected or required return on equity share capital)

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of the share.

g = Expected growth rate of dividend.

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

$$\text{Therefore, } K_e = \frac{₹ 1.12}{₹ 15} + 12\%$$

or K_e = ₹ 19.47%

Question 4

X Ltd., has 8 lakhs equity shares outstanding at the beginning of the year 2011. The current market price per share is ₹ 140. The Board of Directors of the company is contemplating ₹ 6.4 per share as dividend.   The rate of capitalisation, appropriate to the risk-class to which the company belongs, is 9.6%:

(i) Based on M-M Approach, calculate the market price of the share of the company, when the dividend is – (a) declared; and (b) not declared.

(ii) How many new shares are to be issued by the company, if the company desires to fund an investment budget of ₹ 3.20 crores by the end of the year assuming net income for the year will be ₹ 1.60 crores?

Answer

Modigliani and Miller (M-M) – Dividend Irrelevancy Model:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where P_o = Existing market price per share i.e. ₹ 120

P_1 = Market price of share at the year end (to be determined)

D_1 = Contemplated dividend per share i.e. ₹ 6.4

K_e = Capitalisation rate i.e. 9.6%.

(i)   (a)   Calculation of share price when dividend is declared:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$140 = \frac{P_1 + 6.4}{1 + 0.096}$$

140 × 1.096 = P_1 + 6.4

P_1 = 140 × 1.096 − 6.4

= 147.04

(b)   Calculation of share price when dividend is not declared:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$140 = \frac{P_1 + 0}{1 + 0.096}$$

140 × 1.096 = P_1 + 0

P_1 = 156.04

(ii)   Calculation of No. of shares to be issued:

		(₹ in lakhs)
Particulars	If dividend declared	If dividend not declared
Net Income	160	160
Less: Dividend paid	51.20	—
Retained earnings	108.80	160
Investment budget	320	320
Amount to be raised by issue of new shares (i)	211.20	160
Market price per share (ii)	147.04	153.44
No. of new shares to be issued (i) ÷ (ii)	1,43,634.38	1,04,275.28
Or say	1,43,635	1,04,276

Question 5

Capital structure of Xerox Ltd., as at 31.3.2011 was as under:

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

Xerox Ltd., earns a profit of ₹ 32 lakhs annually on an average before deduction of income-tax, which works out to 35%, and interest on debentures.

Normal return on equity shares of companies similarly placed is 9.6% provided:

(a) Profit after tax covers fixed interest and fixed dividends at least 3 times.
(b) Capital gearing ratio is 0.80.
(c) Yield on share is calculated at 50% of profits distributed and at 5% on undistributed profits.

Xerox Ltd., has been regularly paying equity dividend of 8%.

Compute the value per equity share of the company.

Answer

Calculation of Profit after tax (PAT)

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

Calculation of Interest and Fixed Dividend Coverage

$$= \frac{PAT + Debenture\ interest}{Debenture\ interest + Preference\ dividend}$$

$$= \frac{15,80,800 + 7,68,000}{7,68,000 + 3,20,000} = \frac{23,48,800}{10,88,000} = 2.16\ times$$

Calculation of Capital Gearing Ratio

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

$$= \frac{Preference\ Share\ Capital + Debentures}{Equity\ Share\ Capital + Reserves}$$

$$= \frac{40,00,000 + 64,00,000}{80,00,000 + 32,00,000} = \frac{1,04,00,000}{1,12,00,000} = 0.93$$

Calculation of Yield on Equity Shares:

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

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

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

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

Calculation of Expected Yield on Equity shares

Note: There is a scope for assumptions regarding the rates (in terms of percentage for every one time of difference between Xerox Ltd. and Industry Average) of risk premium involved with respect to Interest and Fixed Dividend Coverage and Capital Gearing Ratio. The below solution has been worked out by assuming the risk premium as:
(i)   1% for every one time of difference for Interest and Fixed Dividend Coverage.
(ii)   2% for every one time of difference for Capital Gearing Ratio.

    (i)   Interest and fixed dividend coverage of Xerox Ltd. is 2.16 times but the industry average is 3 times. Therefore, risk premium is added to Xerox Ltd. Shares @ 1% for every 1 time of difference.
Risk Premium = 3.00 – 2.16 (1%)
= 0.84 (1%) = 0.84%

    (ii)   Capital Gearing ratio of Xerox Ltd. is 0.93 but the industry average is 0.80 times. Therefore, risk premium is added to Xerox Ltd. shares @ 2% for every 1 time of difference.
Risk Premium = 0.80 – 0.93 (2%)
= 0.13 (2%)
= 0.26%

	(%)
Normal return expected	9.60
Add: Risk premium for low interest and fixed dividend coverage	0.84
Add: Risk premium for high interest gearing ratio	0.26
	10.70

Value of Equity Share

$$= \frac{\text{Actual yield}}{\text{Expected yield}} \times \text{Paid-up value of share}$$

$$= \frac{4.39}{10.70} \times 100 \qquad = ₹ \ 41.03$$

Question 6

Mr. A is contemplating purchase of 1,000 equity shares of a Company. His expectation of return is 10% before tax by way of dividend with an annual growth of 5%. The Company's last dividend was ₹ 3 per share. Even as he is contemplating, Mr. A suddenly finds, due to a budget announcement dividends have been exempted from tax in the hands of the recipients. But the imposition of dividend Distribution tax on the Company is likely to lead to a fall in dividend of 40 paise per share. A's marginal tax rate is 30%.

Required:

Calculate what should be Mr. A's estimates of the price per share before and after the Budget announcement?

Answer

The formula for determining value of a share based on expected dividend is:

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

Where

P_0 = Price (or value) per share

D_0 = Dividend per share

g = Growth rate expected in dividend

k = Expected rate of return

Hence,

Price estimate before budget announcement:

$$P_0 = \frac{3 \times (1+0.05)}{(0.10-0.05)} = ₹\,63.00$$

Price estimate after budget announcement:

$$P_0 = \frac{2.60 \times (1.05)}{(.07-.05)} = ₹\,136.50$$

Question 7

A Company pays a dividend of ₹ 2.00 per share with a growth rate of 7%. The risk free rate is 9% and the market rate of return is 13%. The Company has a beta factor of 1.60. However, due to a decision of the Finance Manager, beta is likely to increase to 1.75. Find out the present as well as the likely value of the share after the decision.

Answer

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

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

Where,

K_e = Cost of equity

R_f = Risk free rate of return

β = Portfolio Beta i.e. market sensitivity index

K_m = Expected return on market portfolio

By substituting the figures, we get

K_e = 0.09 + 1.6 (0.13 − 0.09)

= 0.154 or 15.4%

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

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

Where,

P_0 = Price of a share

D_1 = Dividend at the end of the year 1

K_e = Cost of equity

G   = growth

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

$$P_0 = \frac{2.00}{0.154 - 0.07}$$

= ₹ 23.81

However, if the decision of finance manager is implemented, the beta (β) factor is likely to increase to 1.75 therefore, K_e would be

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

= 0.09 + 1.75 (0.13 − 0.09)

= 0.16 or 16%

The value of share is

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

$$P_0 = \frac{2.00}{0.16 - 0.07}$$

= ₹ 22.22

Question 8

The following figures are collected from the annual report of XYZ Ltd.:

	₹
Net Profit	30 lakhs
Outstanding 12% preference shares	100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of Equity	16%

What should be the approximate dividend pay-out ratio so as to keep the share price at ₹ 48 by using Walter's model?

Answer

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = ₹ 6.00

Let, the dividend pay out ratio be X and so the share price will be:

$$P = \frac{D}{K_e} + \frac{\frac{r(E-D)}{K_e}}{K_e}$$

Here D = 6x; E = ₹ 6; r = 0.20 and K_e = 0.16 and P = ₹ 48

$$\text{Hence } ₹\ 48 = \frac{6x}{0.16} + \frac{0.2\,(6-6x)}{0.16 \times 0.16}$$

or ₹ 48 = 37.50X + 46.875 (1 −x)

or, 9.375x = 1.125

or, x = 0.12

So, the required dividend payout ratio will be = 12%

Question 9

The following information pertains to M/s XY Ltd.

Earnings of the Company	₹ 5,00,000
Dividend Payout ratio	70%

No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

(i) What would be the market value per share as per Walter's model?

(ii) What is the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

Answer

(a) <u>M/s X Y Ltd.</u>

    (i) Walter's model is given by

$$P = \frac{D + (E - D)(r/k_e)}{K_e}$$

        Where   P   =   Market price per share.

                   E   =   Earnings per share = ₹5

                   D   =   Dividend per share = ₹3.50

                   r   =   Return earned on investment = 15%

                   K_e =   Cost of equity capital = 12%

$$P = \frac{3.50 + (5-3) \times \dfrac{0.15}{0.12}}{0.12} = \frac{3.50 + 2.0 \times \dfrac{.15}{.12}}{0.12}$$

           = ₹ 50.00

    (ii) According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

        So, at a pay-out ratio of zero, the market value of the company's share will be:

$$\frac{0 + (5-0)\dfrac{0.15}{0.12}}{0.12} = ₹ 52.08$$

Question 10

M Ltd. belongs to a risk class for which the capitalization rate is 10%. It has 25,000 outstanding shares and the current market price is ₹ 100. It expects a net profit of ₹ 2,50,000 for the year and the Board is considering dividend of ₹ 5 per share. M Ltd. requires to raise ₹ 5,00,000 for an approved investment expenditure. Show, how does the M-M approach affect the value of M Ltd., if dividends are paid or not paid.

Answer

(1) When dividend is paid

(a) Price per share at the end of year 1

$$100 = \frac{1}{1.10}(Rs.5 + P_1)$$

$$110 = ₹5 + P_1$$

$$P_1 = 105$$

(b) Amount required to be raised from issue of new shares

₹5,00,000 – (2,50,000 – 1,25,000)

₹5,00,000 – 1,25,000 = ₹3,75,000

(c) Number of additional shares to be issued

$$\frac{3,75,000}{105} = \frac{75,000}{21} \text{ shares or say 3572 shares}$$

(d) Value of M Ltd.

(Number of shares × Expected Price per share)

i.e., (25,000 + 3,572) × ₹105 = ₹30,00,060

(2) When dividend is not paid

(a) Price per share at the end of year 1

$$100 = \frac{p_1}{1.10} \qquad P_1 = 110$$

(b) Amount required to be raised from issue of new shares

₹5,00,000 – 2,50,000 = 2,50,000

(c) Number of additional shares to be issued

$$\frac{2,50,000}{110} = \frac{25,000}{11} \text{ shares or say 2273 shares.}$$

(d) Value of M Ltd.,

(25,000 + 2273) × ₹110

= ₹30,00,030

Whether dividend is paid or not, the value remains the same.

7
COST OF CAPITAL

Question 1

Avon Electrical Ltd wishes to determine the weighted average cost of capital for evaluating capital budgeting projects. You have been supplied with the following information to calculate the value of K_o for the company.

BALANCE SHEET as on March 31			
Liabilities		*Assets*	
Current liabilities	₹ 9,00,000	Sundry assets	₹ 39,00,000
Debentures	9,00,000		
Preference shares	4,50,000		
Equity Shares	12,00,000		
Retained earnings	4,50,000		
	₹39,00,000		**₹ 39,00,000**

Anticipated external financing information:

    (i)   20 years, 8% Debentures of ₹ 2,500 face value, redeemable at 5% premium, sold at par, 2 % flotation costs.

    (ii)   10% Redeemable Preference Shares: Sale price ₹ 100 per share, 2% flotation costs.

    (iii)   Equity shares: Sale price ₹ 115 per share; flotation costs would be ₹ 5 per share.

    (iv)   The corporate tax rate is 35% and expected equity dividend growth is 5% per year. The expected dividend at the end of the current financial year is ₹ 11 per share. Assume that the company is satisfied with its present capital structure and intends to maintain it.

Answer

    <u>**Marginal cost of capital / Cost of capital of additional finance:**</u>

    <u>**Step 1: Specific cost of capital:**</u>

a)

$$K_d = \frac{I\,(1-t) + \dfrac{RV - NS}{N}}{\dfrac{RV + NS}{2}} \times 100$$

$$K_d = \frac{200\,(1 - 0.35) + \dfrac{2625 - 2450}{20}}{\dfrac{2625 + 2450}{2}} \times 100 = 5.47\ \%$$

b)

$$K_p = \frac{Preference\ dividend\ (1 + dividend\ tax)}{\dfrac{RV + NS}{2}} \times 100$$

$$K_p = \frac{10}{\frac{100 + 98}{2}} \times 100 = 10.10 \%$$

c)

$$K_e(constant\ growth\ model) = \frac{D_1}{Net\ Sale\ Proceeds} + Growth\ (g)$$

$$= \frac{11}{110} + 0.05 = 0.15\ (or)\ 15\%$$

d)

$$K_r = \frac{D_1}{Sale\ Price} + Growth\ (g)$$

$$K_r = \frac{11}{115} + 0.05 = 0.1456\ (or)\ 14.56\ \%$$

Note: Since flotation cost are not considered for reserves, net sale proceeds = Rs. 115.

Step2: **Calculation of overall cost of capital (book value basis):**

Source	₹	Weight	Specific cost of capital (%)	K$_O$
Debentures	900000	0.30	5.47	1.641
Preference shares	450000	0.15	10.10	1.515
Equity	1200000	0.40	15.00	6.000
Retained earnings	450000	0.15	14.56	2.184
	3000000			11.34 %

Question 2

Determine the cost of capital for Hindustan Paper Ltd using the book (BV) and market value (MV) weights from the following information:

Equity Shares:	₹ 1,20,00,000 (₹ 2,00,00,000, MV)
Retained earnings:	₹ 30,00,000
Preference Shares:	₹ 9,00,000 (₹ 10,40,000, MV)
Debentures:	₹ 36,00,000 (₹ 33,75,000, MV)

Additional information:

(i)   **Equity**: Equity shares are quoted at ₹ 130 per share and a new issue priced at ₹ 125 will be fully subscribed; flotation costs will be ₹ 5 per share.

(ii)   **Dividend**: During the previous 5 years, dividends have steadily grown from ₹ 10.60 to ₹ 14.19. Dividend at the current year-end is expected to be ₹ 15 per share.

(iii)   **Preference shares**: 15% Irredeemable Preference shares with face value of ₹ 100 would realise ₹ 105 per share.

(iv)   **Debentures**: The company proposes to issue 11 year 15% Debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is, 2 %.

(v)   **Tax**: Corporate tax rate is 35%. Ignore dividend tax.

Answer

Specific cost of capital:

$$K_e = \frac{D_1}{Net\ Sale\ Proceeds} \times 100 + Growth\ (g)$$

$$K_e = \frac{15}{120} \times 100 + 6\% = 18.5\%$$

Where

$$[10.6 \times (1 + g)^5 = 14.19, g = 6\%]$$

$$K_p = \frac{Dividend\ D_0}{Net\ Sale\ Proceeds} \times 100$$

$$K_p = \frac{15}{105} \times 100 = 14.29\%$$

In order to earn 16% yield the company has to issue debentures at discount which is calculated as follows:
(100 x 15) / 16 = ₹ 93.75 ➔ issue price

$$K_d = \frac{I(1-t) + \frac{RV - NS}{N}}{\frac{RV + NS}{2}} \times 100$$

$$K_d = \frac{15(1 - 0.35) + \frac{100 - 91.75}{11}}{\frac{100 + 91.75}{2}} \times 100 = 10.95\%\ (or)\ 11\%$$

$$K_r = \frac{D_1}{Sale\ Price} + Growth\ (g)$$

$$K_r = \frac{15}{125} \times 100 + 6\% = 18\%$$

Calculation of K_O (WACC)
Book value basis:

Source	₹	Weight	Cost of capital	K_O
Equity	12000000	0.6154	18.50%	11.38
Reserves	3000000	0.1538	18.00%	2.76
Preference	900000	0.0462	14.29%	0.66
Debentures	3600000	0.1846	11.00%	2.03
	19500000			16.84 %

Market value basis:

Source	₹	Weight	Cost of capital	K_O
Equity	16000000	0.6553	18.50%	12.12
Reserves	4000000	0.1638	18.00%	2.95
Preference	1040000	0.0426	14.29%	0.61
Debentures	3375000	0.1383	11.00%	1.52
	24415000			17.20%

Question 3

From the following capital structure of XYZ Ltd, determine appropriate weighted average cost of capital.

Equity shares (1,00,000)	₹ 38,00,000
Preference shares	8,00,000
Debentures	50,00,000
Bank loan (long-term)	18,00,000
Bank loan (short-term)	14,00,000
Trade creditors	6,00,000

Additional information:

(i)   Equity shares include the existing 60,000 shares having current market value of ₹ 40 per share and the balance is net proceeds from the new issue in the current year (issue price of the share, ₹ 40; flotation cost per share ₹ 5). The projected EPS and DPS for the current year are ₹ 8 and Rs. 5 respectively.

(ii)   Dividend indicated on preference shares is 16%.

(iii)   Pre-tax cost of debentures - 15.5 per cent.

(iv)   Interest on bank loan - 15 % (long-term) and 14% (short-term).

(v)   Corporate tax: 35%. Dividend tax: 10%.

(vi)   Market value of preference shares is ₹ 8,50,000.

Answer

<u>XYZ Ltd</u>

Specific cost of capital:

For Existing Shares:

$$K_e = \frac{D_1}{Net\ Sale\ Proceeds} \times 100 + Growth\ (g)$$

$$K_e = \frac{5}{40} \times 100 + 6.25\% = 18.75\ \%$$

Where,

D_1 = 5, NS = 40

g = b x r

b = (2.5 / 8) x 100 = 31.25%

r = (8 / 40) x 100 = 20%

g = 31.25 % x 20% = 6.25%

For New shares:

$$K_e = \frac{D_1}{Net\ Sale\ Proceeds} \times 100 + Growth\ (g)$$

$$K_e = \frac{5}{35} \times 100 + 6.25\ \% = 20.54\ \%$$

Where

NS = 40 − 5 = 35

$$K_p = \frac{Preference\ dividend\ (1 + dividend\ tax)}{Market\ value} \times 100$$

$$K_p = \frac{8,00.000 \times 16\% \ (1 + 0.1)}{8,50,000} \times 100 = 16.56\%$$

$K_d = I(1-t)$

$K_d = 15.5 (1 - 0.35) = 10.075\%$

$K_l = I(1-t)$

$K_l = 15\% (1 - 0.35) = 9.75\%$

WACC (Market value basis):

Source	₹	Weight	Cost of capital	K_O
Equity (existing)	2400000	0.2096	18.75%	3.93
New Equity	1400000	0.1222	20.54%	2.51
Preference	850000	0.0742	16.56%	1.23
Debentures	5000000	0.4367	10.075%	4.40
Loan	1800000	0.1572	9.75%	1.53
	11450000			13.60%

Question 4
Assuming the corporate tax rate of 35%, compute the after tax cost of capital in the following situations:

(i)   Perpetual 15% Debentures of ₹ 1,000, sold at a premium of 10% with no flotation costs.
(ii)   10-year 14% Debentures of ₹ 2,000, redeemable at par, with 5% flotation costs.
(iii)   10-year 14% Preference shares of ₹ 100, redeemable at a premium of 5% with 5% flotation costs. Dividend tax is 10%.
(iv)   An equity share selling at ₹ 50 and paying a dividend of ₹ 6 per share, which is expected to continue indefinitely.
(v)   The above equity share if dividends are expected to grow at the rate of 5%.
(vi)   An equity share of a company is selling at ₹ 120 per share. The earnings per share is ₹ 20 of which 50% is paid in dividends. The shareholders expect the company to earn a constant after tax rate of 10% on its investment of retained earnings.

Answer
a)

$$K_d = \frac{I(1-t) + \dfrac{RV - NS}{N}}{\dfrac{RV + NS}{2}} \times 100$$

Where,
    t = tax rate
    RV = Redemption value of debenture
    NS = net sale proceeds
    N = no of years

$$K_d = \frac{150 \ (1-0.35)}{1100} \times 100 = 8.86 \ \%$$

b)

$$K_d = \frac{I \ (1-t) + \dfrac{RV-NS}{N}}{\dfrac{RV+NS}{2}} \times 100$$

$$K_d = \frac{280 \ (1-0.35) + \dfrac{2000-1900}{10}}{\dfrac{2000+1900}{2}} \times 100 = 9.85 \ \%$$

c)

$$K_p = \frac{Preference \ dividend \ (1 + dividend \ tax) + \dfrac{RV-NS}{N}}{\dfrac{RV+NS}{2}} \times 100$$

$$K_p = \frac{14 \ (1+0.1) + \dfrac{105-95}{10}}{\dfrac{105+95}{2}} \times 100 = 16.4 \ \%$$

d)

$$K_e \ (no \ growth \ model) = \frac{Dividend}{Net \ Sale \ Proceeds} \times 100$$

$$K_e = \frac{6}{50} \times 100 = 12 \ \%$$

e)

$$K_e \ (constant \ growth \ model) = \frac{D_1}{Net \ Sale \ Proceeds} + Growth \ (g)$$

$$K_e = \frac{6.3}{50} + 0.05 = 0.176 \ (or) \ 17.6 \ \%$$

f)   Market price = ₹ 120
        EPS = ₹ 20

        Dividend pay out ratio = 50% & DPS = ₹ 10
                r =10%

        g = Rate of return on retention funds = b x r =10% x 50% = 5%

        where,
                b = 1 – payout ratio
                r = return on investment

$$K_e = \frac{D_1}{Net \ Sale \ Proceeds} \times 100 + Growth \ (g)$$

$$K_e = \frac{10}{120} \times 100 + 5 \ \% = 13.33 \ \%$$

Question 5

Determine the weighted average cost of capital using (i) book value weights; and (ii) market value weights based on the following information:

Book value structure:	₹
Debentures (Rs. 100 per debenture)	8,00,000
Preference share (Rs.100 per share)	2,00,000
Equity shares (Rs. 10 per share)	10,00,000
	20,00,000

Recent market prices of all these securities are:

Debentures: ₹ 110 per debenture;
Preference share: ₹ 120 per share; and
Equity shares: ₹ 22 per share

External financing opportunities are:

₹ 100 per debenture redeemable at par, 10 year maturity, 13% coupon rate, 4% flotation cost and sale price ₹ 100;

₹ 100 per preference share redeemable at par, 10 year maturity, 14% dividend rate, 5% flotation cost and sale price ₹ 100; and

Equity share – ₹ 2 per share flotation costs and sale price ₹ 22 Dividend expected on equity share at the end of the year is ₹ 2 per share; anticipated growth rate in dividend is 7%. Company pays all its earnings in the form of dividends. Corporate tax rate is 50%.

Answer

Specific cost of capital

$$K_d = \frac{I(1-t) + \frac{RV - NS}{N}}{\frac{RV + NS}{2}} \times 100$$

$$K_d = \frac{13(1-0.5) + \frac{100 - 96}{10}}{\frac{100 + 96}{2}} \times 100 = 7.04\%$$

$$K_p = \frac{Preference\ dividend + \left(\frac{RV - NS}{N}\right)}{\frac{RV + NS}{2}} \times 100$$

$$K_p = \frac{14 + \left(\frac{100 - 95}{10}\right)}{\frac{100 + 95}{2}} \times 100 = 14.87\ \%$$

$$K_e = \frac{D_1}{Net\ Sale\ Proceeds} \times 100 + Growth\ (g)$$

$$K_e = \frac{2}{20} \times 100 + 7\% = 17\%$$

WACC:

Book value basis:

Source	₹	Weight	Cost of capital	K$_O$
Debentures	800000	0.40	7.04%	2.816
Preference	200000	0.10	14.87%	1.487
Equity	1000000	0.50	17.00%	8.500
	2000000			12.803%

Market value basis:

Source	₹	Weight	Cost of capital	K$_O$
Debentures	880000	0.2650	7.04%	1.865
Preference	240000	0.0722	14.87%	1.074
Equity	2200000	0.6627	17.00%	11.270
	3320000			14.209%

Question 6

The present capital structure of a company is as follows:

	₹ (million)
Equity share (Face value = ₹ 10)	240
Reserves	360
11% Preference Shares (Face value = ₹ 10)	120
12% Debentures	120
14% Term Loans	360
	1,200

Additionally the following information are available:

Company's equity beta		1.06
Yield on long-term treasury bonds		10%
Stock market risk premium		6%
Current ex-dividend equity share price		₹ 15
Current ex-dividend preference share price		₹ 12
Current ex-interest debenture market value	₹ 102.50 per	₹ 100
Corporate tax rate		40%

The debentures are redeemable after 3 years and interest paid annually. Ignoring flotation costs, calculate the company' weighted average cost of capital (WACC)

Answer

Specific cost of capital:

K_e (CAPM) = $R_f + \beta (R_m - R_f)$ 16.36%
  $R_m - R_f$ = 6%
  R_f = 10%, R_m = 16% , β = 1.06

K_p = (Dividend / NS) x 100   = (1.1 / 12) x 100 = 9.17%

$$K_d = \frac{12(1-0.4) + \dfrac{100-102.5}{3}}{\dfrac{100+102.5}{2}} \times 100 = 6.29\%$$

Alternatively,

$$K_d = \left[\frac{12 + \dfrac{100-102.5}{3}}{\dfrac{100+102.5}{2}} \times 100\right] \times (1-0.4) = 6.61\%$$

$K_l = 14\%\ (1-0.4) = 8.4\%$

$K_r = K_e = 16.36\%$ (as there is no flotation costs)

WACC

Book value basis:

Source	₹ in millions	Weight	cost of capital	K_O
Equity capital	240	0.20	16.36%	3.272
Reserves	360	0.30	16.36%	4.908
Preference	120	0.10	9.17%	0.917
Debentures	120	0.10	6.61%	0.661
Term loans	360	0.30	8.40%	2.520
	1200			12.28%

Market value basis:

Source	₹ in millions	Weight	cost of capital	K_O
Equity	360	0.3647	16.36%	5.967
Preference	144	0.1459	9.17%	1.338
Debentures	123	0.1246	6.61%	0.824
Term loans	360	0.3647	8.40%	3.063
	987			11.19%

8
CAPITAL STRUCTURE

Question 1

The HLL has Rs.8.00 crore of 10% mortgage bonds outstanding under an open-end scheme. The scheme allows additional bonds to be issued as long as all of the following conditions are met:

1) Pre-tax interest coverage $\left(\dfrac{\text{Income before} + \text{Bond Interest}}{\text{Bond interest}} \right)$ remains greater than 4.

2) Net depreciated value of mortgage assets remains twice the amount of the mortgage debt.

3) Debt-to-equity ratio remains below 5.

The HLL has net income after taxes of Rs. 2 crore and a 40% tax-rate, Rs. 40 crore in equity and Rs. 30 crore in depreciated assets, covered by the mortgage.

Assuming that 50% of the proceeds of a new issue would be added to the base of mortgaged assets and that the company has no Sinking Fund payments until next year, how much more 10% debt could be sold under each of the three conditions? Which protective covenant is binding?

Answer

It is given:

            10% mortgage bonds = 8 Cr
            EAT = 2Cr
            EBT = 3.33Cr
            Equity = 40Cr
            Assets = 30Cr
            Debt = 8Cr

       Calculation of maximum permissible debt to be raised under given conditions:

       Condition 1:
          Interest coverage ratio > 4times
          Interest coverage ratio = (EBIT / Interest) > 4

          Let x be the additional 10% mortgage bonds issued.

          After the issue,
          EBT   3.33Cr
       (+) Interest   0.8 + 0.1x
          EBIT   4.13+0.1x

      Interest coverage ratio = [(4.13 + 0.1x) / (0.8 + 0.1x)] > 4
            4   = (4.13 + 0.1x) / (0.8 + 0.1x)
            x   = 3.10Cr
      Therefore maximum permissible bonds that can be issued should be less than 3.1Cr.

Condition 2:
Net depreciated value of mortgage assets twice the amount of mortgage debt
(Assets / Debt) > 2

Let x be the additional bonds to be issued.
After issue,
Assets = 30 + 0.5x Cr
30+0.5x = 2 (8 + x)
➜ x = 9.33Cr

Therefore maximum permissible bonds that can be issued should be less than 9.33Cr

Condition 3:
Debt to equity < 5

Let x be the additional bonds to be issued.
(8 + x) / 40 = 5
➜ x =192Cr

Therefore maximum permissible bonds that can be issued should be less than 192Cr

➢ **Therefore the maximum amount of debt needed to satisfy all the three conditions is less than 3.1Cr**

Question 2

The Balance Sheet of Smart Ltd. as on March 31, 2010 is as follows:

			(Figures in lakhs of rupees)
Liabilities	Amount	Assets	Amount
Share Capital	200	Fixed Assets	500
Reserves	140	Inventories	300
Long-Tem Loans	360	Receivables	240
Short-Term Loans	200	Cash and Bank	60
Payables	120		
Provisions	80		
	1,100		1,100

Sales for the year were 600 lakhs. For the year ending March 31,2011 sales are expected to increase by 20%. The profit margin and dividend payout ratio are expected to be 4% and 50% respectively.

You are required to:
    i) Quantify the amount of external funds required
    ii) Determine the mode of raising the funds, given the following parameters:
        a) Current ratio should at least be 1.33
        b) Ratio of fixed assets to long-term loans should be 1.5.
        c) Long-term debt to equity ratio should not exceed 1.05
    iii) The funds are to be raised in the order of short-term bank borrowings, long-term loans and equalities.

Answer

<u>SMART Ltd</u>

Sales in the last year   600

Capital employed   1100 -200 = 900

Additional funds ➜ (900 / 600) x 120 = 180

<u>External funds required:</u>

Additional funds	180.00
(-) Internal (720 x 0.5 x 4%)	<u>14.40</u>
	<u>165.60</u>

$$\text{EFR } = [(A / S) - (L / S)]\Delta S - MS_1(1\text{-}d)$$

Where,

A = All Assets

L = Spontaneous Liabilities (Payables / provisions)

ΔS = Change in Sales

M = Net profit margin

S_1 = Expected sales

d = Dividend payout

(i)   EFR = [(1100 / 600) − (200 / 600)]120 − 0.04(720)(1-0.5) =   165.60

(ii) **Calculation of maximum permissible borrowings to**

a.   **Maintain current ratio to 1.33**

Current ratio   = (CA / CL) = (600 x 120%)/ [(200 x 120%) + STB]}

1.33 = [720 / (240 + STB)]

STB = 301.35

(-) Existing <u>200.00</u>

Additional <u>101.35</u>

b.   **Maximum permissible long term borrowings to maintain (Fixed assets / Long term borrowings) = 1.5**

Let x be the long term borrowings.

1.5 = (500 / x) 120%

➜ x =   400

(-) Existing<u>360</u>

<u>40</u>

c.   **(Long term debt / Equity) = 1.05**

External funds required	165.60
(-) Short term loans	101.35
(-) Long term loans	<u>40.00</u>
Balance by Equity funds	<u>24.25</u>
(LT Debt / Equity) =	1.05

$$\frac{400}{200 + 24.25 + (140 \, x \, 120\%)} = 1.02 < 1.05$$

Hence it is False.

Liabilities		Assets	
Capital	224.25	Fixed assets	600.00
Reserves (b/f)	154.40	Current assets	720.00
Long term loans	400.00		
Short term loans	301.35		
Spontaneous (200 x 120%)	240.00		
	1320.00		1320.00

➔ [400 / (200 + 24.25 + 154.4)] = 1.05

Question 3

From the books of Bharati Ltd. the following information are available as on 1.4.2009 and 1.4.2010:

1. Equity Shares of ₹ 10 each	1,00,000
2. Party paid Equity Shares of ₹ 10 each, ₹ 5 paid	1,00,000
3. Options outstanding at an exercise price of ₹ 60 for one equity share ₹ 10 each. Average Fair Value of equity share during both years ₹57	10,000
4. 10% convertible preference shares of ₹ 100 each Conversion Ratio: 2 equity shares for each preference share	80,000
5. 12% Convertible debentures of ₹ 100. Conversion ratio 4 equity shares for each debenture	10,000
6. 10% dividend tax is payable for the years ending 31.3.2011 and 31.3.2010	
7. On 1.10.2010 the partly paid shares were fully paid up	
8. On 1.1.2011 the company issued 1 bonus share for 8 shares held on that date.	

Net Profit attributable to the equity shareholders for the years ending 31.3.2011 and 31.3.2010 were ₹ 10,00,000.

Calculate:

a) Earnings per share for years ending 31.3.2011 and 31.3.2010.
b) Diluted earnings per share for years ending 31.3.2003 and 31.3.2010
c) Adjusted earnings per share and diluted EPS for the year ending 31.3.2010, assuming the same information for previous year, also assume that partly paid shares are eligible for proportionate dividend only.

Answer

a. **Calculation of basic EPS**

	2009-10	2010-11
Equity earnings	10,00,000	10,00,000
Weighted average no of equity shares	(100000 + 100000 x 5 /10)= 150000	100000 + 50000 x (6 / 12) + 100000 x (6 / 12) = 200000
Basic EPS	₹ 6.67	₹ 5.00

$$Basic\ EPS = \frac{Equity\ earnings}{Weighted\ average\ no\ of\ equity\ shares}$$

b. **Calculation of Diluted EPS**

		2009 – 10		2010-11	
	Equity earnings	No of shares	EPS	No of shares	EPS
	1000000	150000	6.67	200000	5.00
Options	-	2000	↓ diluted	2000	↓ diluted
	1000000	152000	6.58	202000	4.95
Debentures	78000	40000	↓ diluted	40000	↓ diluted
	1078000	192000	5.61	242000	4.45
Preference shares	880000	160000	↓ diluted	160000	↑ anti – diluted
	1958000	352000	5.56	402000	4.87

c. **Calculation of adjusted EPS(2009-10)**

$$Adjusted\ EPS = \frac{10,00,000}{1,50,000 + 25,000} = ₹\ 5.71$$

Question 4

The following information are available for Sunshine Ltd.:

A/S = 0.8, ΔS = ₹ 60 lacs, L/S = 0.5

m = 4.04, S_1 = ₹ 500 lacs, d = 0.6

Where,   A/S   = current and fixed assets as a proportion of sales

ΔS   = expected increase in sales

L/S   = current liabilities, provisions and bank borrowings as a proportion of sales

m   = net profit margin

S_1 = projected sales for the next year

d   =dividend payout ratio

There will be no change in the level of investments and no repayment of the term loans in the next year.

a) Estimate the external funds requirement for the next year.

b) Suppose the growth rate of net profit margin is 10% for Sunshine Ltd. for the next year in the above case, when will be the external funds requirement?

Answer

a. External funds required = [(A / S) – (L / S)] x ΔS – mS_1 (1-d)

Where,

A   =   All assets

S   =   Sales

L   =   Spontaneous Liabilities (Payables & Provisions)

ΔS   =   Change in sales

m   =   Margin

S1   =   Expected sales

d   =   Dividend pay-out ratio

External funds required   =   (0.8 – 0.5) x 60 – (0.04) 500 x 0.4 =   1000000

b. External funds required = ΔS{[(A/S) – (L/S)] – [m(1+g)(1-d) / g]} = 744000

Question 5

CIMA Corporation is expected to grow at a higher rate for 4 years; thereafter the growth rate will fall and stabilize at a lower level. The following information has been assembled:

Base Year (Year 0) Information

Revenues	₹ 3000 million
EBIT	₹ 500 million
Capital expenditure	₹ 350 million
Depreciation	₹ 250 million
Working Capital as a percentage of revenues	25%
Corporate tax rate (for all time)	30%
Paid-up equity capital (₹ 10 par)	₹ 400 million
Market value of debt	₹ 1200 million

Inputs for the High Growth Phase

Length of high growth phase	4 years
Growth rate in revenues, depreciation, EBIT and capital expenditure	20%
Working capital as a percentage of revenues	25%
Cost of debt (pre-tax)	13%
Debt-equity ratio	1:1
Risk-free rate	11%
Market risk premium	7%
Equity beta	1.129

Inputs for the Stable Growth Period

Expected growth rate in revenues and EBIT	10%
Capital expenditure are offset by depreciation	
Working capital as a percentage of revenues	25%
Cost of debt (pre-tax)	12.14%
Risk-free rate	10%
Market risk premium	6%
Equity beta	1.0
Debt-equity ratio	2:3

i) What is the WACC for the high growth phase and the stable growth phase?
ii) What is the value of the firm?

Answer

CIMA CORPORATION

1. **Calculation of WACC**

High growth
   K_d = 13% (1 - 0.3) = 9.1%
   K_e = R_f + β (R_m − R_f) = 11% + 1.129(7%) = 18.903%
   WACC (K_O) = (9.1 x 0.5) + (18.903 x 0.5) = 14%

Low growth
   K_d = 12.14 x (1-0.3) = 8.498%
   K_e = 10% + 1(6%) = 16%
   WACC = 8.498 (2/5) + 16(3/5) = 13%

2. **Calculation of value of Firm(Two stage Growth model)**

Present value of FCFF during High growth period
&
Present value of terminal value of firm

Present value of FCFF during the high growth period   (₹ in millions)

	1	2	3	4	Terminal
Sales	3600	4320	5184	6220.8	6842.88
EBIT	600	720	864	1036.8	1140.48
EBIT(1-t)	420	504	604.8	725.8	798.34
Net fixed assets	(120)	(144)	(172.8)	(207.36)	-
Working capital@25%	(150)	(180)	(216)	(259.2)	(155.52)
FCFF	150	180	216	259.2	642.82
Pv @ 14%	0.8772	0.7695	0.675	0.5921	-
Present value	131.58	138.51	145.8	153.47	

Total of FCFF   = ₹ 569.36 millions

Present value of terminal cash Inflow (Gordan)

$$Terminal\ Value = \frac{FCFF\ 5}{Ko-g}$$

=   642.82 / 3%

=   21427.33

Present value of terminal value   = 21427.33 x 0.5921
= 12687 millions
Present value of total cash inflows   = 12687 + 569.2
= 13256.2 millions

Question 6
You are looking at the valuation of a stable firm, Vihari Limited, done by an investment analyst. Based on an expected free cash flow of ₹ 54 million for the following year and an expected growth rate of 9%, the analyst has estimated the value of the firm to be ₹ 1800 million. However, he committed a mistake of using the book values of debt and equity. You do not know the book value weights employed by him but you know that the firm has a cost of equity of 20% and a post-tax cost of debt of 10%. The market 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 the firm?
Answer

VIHARI MILLS LTD

Expected FCFF$_1$ = ₹54 millions

Growth   = 9%

$$Current\ value\ of\ firm = \frac{FCFF1}{Ko - g}$$

$$\begin{aligned} 1800 &= 54 / (K_O - 9\%) \\ \Rightarrow K_O &= 12\% \end{aligned}$$

Calculation of Weights employed

Let 'W' be the Weight of Debt

Ke =20%, Kd = 10%, Ko = 12%

12% = 10% (W) + 20 %(1-W)

W = 0.8.

Therefore Debt = 0.8, Equity =0.2

Market value of Equity = (20%x3) = 60%

Market value of Debt = (80%x0.9) = 72%

Given, Ke = 20%, Kd = 10%,

K_O (market base) = 20x0.6 / (0.6 + 0.72) + 10 x 0.72 / (0.6+0.72)

= 14.55%

Revised Market value of firm =54 / (14.55%-9%) = ₹ 972.97 millions

Question 7

The following is the Balance Sheet as at 31st March, 2011 of S. Co. Ltd.

Share Capital:		
10,000 equity shares of Rs. 100 each fully paid up	10,00,000	
25,000 11% cum preference shares of Rs. 10 each fully paid up	2,50,000	12,50,000
Reserves and surplus		25,00,000
Secured loans		20,00,000
Unsecured loans		12,00,000
Trade creditors		18,00,000
Outstanding expenses		7,50,000
		95,00,000
Represented by:		
Fixed assets	55,00,000	
Current assets	37,00,000	
Advanced and deposits	3,00,000	**95,00,000**

The company plans to manufacture a new product in line with its current production, the capital cost of which is estimated to be ₹25 lakhs. The company desires to finance the new project to the extent of ₹16 lakhs by issue of equity shares at a premium of ₹ 100 per share or by issue of 12% debentures and the balance to be raised from internal sources.

Additional informations made available to you are:

a) Rate of dividends declared in the past five years i.e. year ended 31st March, 2011, 31st March, 2010, 31st March, 2009, 31st March, 2008 and 31st March, 2007 were 24%, 24%, 20%, 20% and 18% respectively.

b) Normal earning capacity (net of tax) of the business is 10%.

c) Turnover in the last three years was ₹ 80 lakhs (31.3.2011), ₹ 60 lakhs (31.3.2010) and ₹ 50 lakhs (31.3.2009).

d) Anticipated additional sales from the new project ₹ 30 lakhs annually.

e) Net profit before tax from the existing business which was 10% in the last three years is expected to increase to 12% on account of new product sales.

f) Income-tax rate is 35%.

g) The trend of market price of the equity share of the company quoted on the Stock Exchange was:

Year	High	Low
2010-11	300	190
2009-10	250	180
2008-09	240	180

You are required to examine whether the company's proposal is justified. Do you have any suggestions to offer in this regard? All workings must form part of your answer.

Answer

Analysis of present position :

SALES (31.03.2011)	80,00,000.00
PBT (80, 00,000 X 10%)	8,00,000.00
(-)TAX 35%	2,80,000.00
PAT	5,20,000.00
(-)PREFERENCE DIVEDEND (2, 50,000 x 11%)	27,500.00
EQUATIY EARNINGS	4,92,500.00
NO. OF EQUATY SHARES	10,000
EPS (4,92,000/10,000)	49.25
AVG MPS (RS.) (300 + 190/2) (2010-11)	245.00
P/E RATIO(TIMES) 245/49.25	4.97 or 5

Book value of each equity shares = $\dfrac{\text{Equity capital + reserves}}{\text{No. of equity shares}}$

= $\dfrac{10,00,000 + 25,00,000}{10,000}$

= 350/- per equity share

From the above calculations, book value of each equity share is ₹ 350/-.but, it is offered to the outsiders for ₹ 200/-(INCLUDING PREMIUM ₹ 100/-). So, it is beneficial to the outside investors and harmful to the existing shareholders .The price quoted at stock exchange is high as ₹ 300/-, which is less than the book value. Hence, it is suggested to raise the required funds of ₹ 16,00,000/-by issue of 12% debentures.

Expected Market price of share, after "diversification" through issue of 12% debentures :

SALES (80,00,000 + 30,00,000)	110,00,000.00
PBIT (110, 00,000 x 12%)	13,20,000.00
(-)interest on 12% debentures (16, 00,000)	1,92,000.00
PBT	11,28,000.00

(-)TAX (11, 28,000 x 35%)	3,94,800.00
PAT	7,33,200.00
(-) PREFERENCE DIVIDEND (2, 50,000 x 11%)	27,500.00
EQUITY EARNINGS	7, 05,700.00
NO. OF EQUITY SHARES	10,000
EPS (7,05,700/10,000)	70.57
P/E RATIO (TIMES)	5.00
MARKET PRICE OF SHARE	352.85

After the project is financed by issue of 12% debentures, MPS is ₹ 352.85/- which is more than the book value, ₹ 350/- .

So, the proposal of new project is acceptable through 12% debentures issue.

Question 8

Harbour Company, is a medium-sized producer of chemicals and vinyl coatings used in a variety of industrial processes.

Last year, the company recorded over ₹ 1,500 lakhs in sales, showed net income after tax of ₹ 250 lakhs and concluded a very successful year. For the year coming up, the firm expects a 12% improvement in its sales and operating income figures. Other relevant details – Total assets ₹ 2,200 lakhs, Debts Asset Ratio (i.e., Total Debts including current liabilities) 31.8%, Earnings per share ₹ 3.16 (No. of equity shares of ₹ 10 paid up 80 lakhs); Dividend per share ₹ 1.50 (These all relate to the last year).

Harbour Co. has been invited to bid on a long-term contract to produce a line of plastics for a large chemical company. It appears that the firm can easily get ₹ 600 lakhs contract, which will yield an additional ₹ 180 lakhs in operating income (EBIT). These figures are for next year only and the firm estimates even higher sales and profits in future years.

The production manager knows of a small plastics company located about three kilometers away from the present factory and has all the equipment needed to produce the new line of plastics and the company is presently for sale with a ₹ 1,050 lakhs asking price (which represents largely the value of the assets). The company is available at the negotiated price of ₹ 900 lakhs.

Harbour Co. has sufficient working capital to add the new plastic line, but does not have the cash to buy ₹ 900 lakhs for machinery and equipment. The following financing options are available:

i) Harbour Co. can borrow ₹ 400 lakhs through a 12% mortgage on its main facilities. A mortgage company has indicated that it would help finance the plastic machinery with a ₹ 500 lakhs, 12% mortgage. Harbour as per its policy wants to keep debt asset ratio below 40%.

ii) The company can probably issue upto ₹ 1,000 lakhs in 13% preferred stock or class A equity shares. If equity shares are issued, it could not below ₹ 50 per share.

Harbour Co. shares has traditionally traded at a 15/1 price-earnings multiple and it is expected that this will hold in the future. (Corporate Income-tax 50%)

Required:

1 Analysis needed to decide whether to accept the plastic project;

2. Recommendation on the financing method of the project.

Answer

Cost of preference shares:

K$_p$ (**A**fter tax)	13%
k$_p$ (Before tax)	26%
Cost of equity (K$_e$) = (EPS / MPS) X 100 (3.16/50)x 100	6.32%

Comment:

ROI of the new project is 10% (after tax). But, the cost of prefence shares (K$_p$) is 13% (after tax). ROI is less than K$_p$, which implies financing the project by issue of prefence shares is not viable and hence, not acceptable.

By comparing K$_e$ and K$_d$, we find that the cost of debt is cheaper than the cost of equity.

So, it is advisable to raise the maximum permissible debt for financing and to issue equity shares for the remaining balance.

Calculation of maximum permissible debt to maintain debt assets ratio below 40% :

₹ (IN LAKS)

TOTAL ASSETS (PRESENT)	2200
(+) ADDITIONAL INVESTMENT	900
TOTAL ASSETS (AFTER PROPOSAL)	3100

Debt-assets ratio below 40% maximum permissible:

DEBT (TOTAL) SAY 39% (SINCE BELOW 40%)	3100X39%= 1209	1200 (SAY)
(-) EXISTING DEBT		700
MAXIMUM PREMMISABLE "ADDITIONAL DEBT"		500

Therefore, the remaining balance ₹ 400 lakhs (900-500) can be obtained by the issue of equity shares at ₹ 50/- each.

No. of equity shares to be issued 400/50 = 8 lakhs

Calculation of MPS- After Proposal is implemented:

	₹ (in lakhs)
EBIT (FROM NEW PROJECT)	180.00
(-) INTEREST 500 x 12%	60.00
PBT	120.00
(-) TAX 50%	60.00
PAT (FROM NEW PROJECT)	60.00
(+)PAT (AT PRESENT)	250.00
TOTAL	310.00
NO.OF SHARES (80+8)	88
EPS (Rs) 310/88	3.52
P/E RATIO (TIMES)	15.00
MPS(Rs) (15 x 3.52)	52.80/-

DEBT-ASSETS RATIO = (TOTAL DEBT / TOTAL ASSETS) X 100

= (1200/3100) x 100 = 38.71 % (< 40% AS REQUIRED)

COMMENT:

EPS and MPS are better than existing. Debt asset ratio is 38.71% which is less than 40% as per company policy. Hence, financing the new project worth 900 lakhs by a 12% loan of   ₹ 500 lakhs and raising of equity, ₹ 400 lakhs at ₹ 50/-each is recommended.

9
LEVERAGE

Question 1

Calculate the operating leverage and financial leverage under situation A, B and C and financial plans I, II and III respectively from the following information relating to the operational and capital structure of XYZ Co. Also find out the combinations of operating and financial leverage which give the highest value.

Installed Capacity	1200 units
Actual production and sales	800 units
Selling price per unit	₹ 15
Variable cost per unit	₹ 10
Fixed cost Situation A	₹ 1000
Situation B	₹ 2000
Situation C	₹ 3000

Capital Structure	Financial Plan		
Equity	5,000	7,500	2,500
Debt	5,000	2,500	7,500
Cost of debt 12%			

Answer

Calculation of Leverages under various Situations and Financial Plans:

	A	B	C
Sales	12000	12000	12000
(-) variable cost	8000	8000	8000
Contribution	4000	4000	4000
(-) fixed cost	1000	2000	3000
EBIT	3000	2000	1000
DOL (Degree of Operating Leverage) (C / EBIT)	1.33	2	4

	1	2	3
Situation A			
EBIT	3000	3000	3000
(-) interest	600	300	900
EBT	2400	2700	2100
DFL (EBIT / EBT)	1.25	1.11	1.43
Situation B			
EBIT	2000	2000	2000
(-) interest	600	300	900
EBT	1400	1700	1100
DFL (EBIT / EBT)	1.43	1.18	1.82
Situation C			
EBIT	1000	1000	1000
(-)Interest	600	300	900
EBT	400	700	100
DFL	2.5	1.43	10

Situation C in plan 3 is 40 times variation gives maximum value.

Question 2

The following is the balance sheet of a company:

BALANCE SHEET

Liabilities	₹	Assets	₹
Equity Capital (Rs.10 per share)	60,000	Net Fixed Assets	1,50,000
10% long term debt	80,000	Current Assets	50,000
Retained earnings	20,000		
Current liabilities	40,000		
	2,00,000		2,00,000

The Company's total assets turnover ratio is 3.0 its fixed operating costs are ₹ 1,00,000 and its variable operating cost ratio is 40%. The income-tax rate is 50%.

i) Calculate for the Company the different types of leverages.
ii) Determine the likely level of EBIT if EPS is a) ₹ 1; b) ₹ 3; c) ₹ 0

Answer

	i.	Sales	600000
		(-) variable cost	240000
		Contribution	360000
		(-) fixed cost	100000
		EBIT	260000
		(-) Interest	8000
		EBT	252000
		(-) Tax	126000
		EAT	126000

Degree of Operating Leverage (DOL)   = (C / EBIT) = (360000 / 260000) = 1.3846
Degree of Financial Leverage   = (EBIT / EBT) = (260000 / 252000) = 1.0317
Degree of Combined Leverage   = (C / EBT) = 1.4285

ii.	No of shares	6000	6000	6000
	EPS	1	3	0
	PAT	6000	18000	0
	PBT	12000	36000	0
	(+)Interest	8000	8000	8000
	EBIT	20000	44000	8000

Question 3

The selected financial data for A, B & C companies for the year ended Dec.31, 2011 are as follows:

	A	B	C
Variable expenses as a percentage of sales	66 2/3	75	50
Interest expenses	₹ 200	₹ 300	₹ 1,000
Degree of operating leverage	5—1	6—1	2—1
Degree of financial leverage	3—1	4—1	2—1
Income-tax rate	0.50	0.50	0.50

Prepare income statements for A, B & C Cos.

Answer

	A	B	C
Financial leverage			
(EBIT /EBT) = (EBIT/EBIT –I)	3	4	2
EBIT	300	400	2000
Operating leverage (C/EBIT)	5	6	2
Contribution	1500	2400	4000
Sales	4500	9600	8000

INCOME STATEMENT:

		A	B	C
	Sales	4500	9600	8000
(-)	variable cost	3000	7200	4000
	Contribution	1500	2400	4000
(-)	Fixed cost	1200	2000	2000
	EBIT	300	400	2000
	(-) interest	200	300	1000
	EBT	100	100	1000
	EAT	50	50	500

Question 4

A firm's sales, variable costs and fixed cost amount to ₹ 75,00,000, ₹ 42,00,000 and ₹ 6,00,000 respectively. It has borrowed ₹ 45,00,000 at 9% and its equity capital totals ₹ 55,00,000.

        a) What is the firm's ROI?
        b) Does it have favourable financial leverage?
        c) If the firm belongs to an industry whose asset turnover is 3, does it have a high or low asset leverage?
        d) What are the operating, financial and combined leverages of the firm?
        e) If the sales drop to ₹ 50,00,000, what will the new EBIT be?

Answer

Sales	7500000
Variable cost	4200000
Contribution	3300000
Fixed cost	600000
EBIT	2700000
(-) interest	405000
EBT	2295000

a. $\text{ROI} = \dfrac{\text{EBIT}}{\text{Capital employed}} = \dfrac{2700000}{10000000} \times 100 = 27\%$

b.   ROI > K_d the firm has favourable financial leverage i.e., trading on equity

c.   Asset turnover ratio = (sales / total assets)
                     = (7500000 / 10000000) = 0.75
   Much lower than the industry average

d.   DOL = (C / EBIT) = (33 / 27) = 1.2222
       DFL = (EBIT / EBT) = (27 / 22.95) = 1.18

DCL = 1.222 x 1.18 = 1.44

e. Using leverages

Sales	5000000
DOL [1.2222 x (2 /3)]	0.81874
New EBIT = 2700000 x (1-0.407062) =	1600000

[EBIT dropped by 1.222 x (1/3) = 40.7062]

Question 5

A plastic manufacturing company is planning to expand its assets by 50%. All financing for this expansion will come from external sources. The expansion will generate additional sales of ₹ 3 lakh with a return of 25% on sales before interest and taxes. The finance department of the company has submitted the following plans for the consideration of the Board.

Plan 1: Issue of 10% debentures.

Plan 2: Issue of 10% debentures for half the required amount and balance in equity shares to be issued at 25% premium.

Plan 3: Issue equity shares at 25% premium.

BALANCE SHEET OF THE COMPANY AS ON MARCH 31

Liabilities	₹	Assets	₹
Equity capital (Rs.10 per share)	4,00,000	Total assets	12,00,000
8% Debentures	3,00,000		
Retained earnings	2,00,000		
Current liabilities	3,00,000		
	12,00,000		12,00,000

Income statement for the year ending March 31

Sales	19,00,000
Operating costs	16,00,000
EBIT	3,00,000
Interest	24,000
Earning after interests	2,76,000
Taxes	96,000
EAT	1,80,000
EPS	4.50

a) Determine the number of equity shares that will be issued if financial plan 3 is adopted.

b) Determine indifference point between (i) plans 1 and 2, (ii) plans 1 and 3, and (iii) plans 2 and 3.

c) Assume that the price earnings ratio is expected to remain unchanged at 8 if plan 3 is adopted, but is likely to drop to 6 if either plan 1 or 2 is used to finance the expansion. Determine the expected market price of the shares in each of the situations.

Answer

a)   Additional funds required 1200000 x 50% = 600000

No of shares issued under plan 600000 x (100 / 125) (0.1) = 48000

b)

1. Indifference point i.e., EBIT at which EPS is same under two alternatives

X be the EBIT

$$\{EBIT - I_1 - I_2\}(1-t) = EBIT - I_1 (1-t)$$
$$\overline{\qquad n \qquad} \qquad \overline{\qquad n + \Delta n \qquad}$$

$$\frac{x - 24000 - 60000}{40000} = \frac{x - 24000 - 30000}{64000}$$

(x -84000) x 64 = 40 (x-54000)

➔ x = 134000

2. Plan 1 & 3

$$\frac{x - 84000}{40000} = \frac{x - 24000}{88000}$$

➔ x = 134000

3. Plan 2 & 3

$$\frac{x - 54000}{64000} = \frac{x - 24000}{88000}$$

➔ x = 134000

➔ EBIT = 134000

	Plan 1	Plan 2	Plan 3
EBIT	1,34,000	134000	134000
(-)interest	84,000	54000	24000
EBT	50,000	80000	110000
Tax @34.784%	17392	27826	38260
PAT	32608	52174	71740
No of shares	40000	64000	88000
EPS	0.81	0.81	0.81

c)

	Plan1	Plan2	Plan3
P/E ratio	6	6	8
EPS(working notes)	4.74	3.27	2.60
Market price	28.44	19.62	20.80

➔ Working notes:

	Plan1	Plan2	Plan3
EBIT	375000	375000	375000
(-) interest	84000	54000	24000
EBT	291000	321000	351000
EAT	189783	209340	228913
No of shares	40000	64000	88000
EPS	4.74	3.27	2.60

10

LEASING

Question 1

ABC Company Ltd. is faced with two options as under in respect of acquisition of an asset valued ₹1,00,000/-

EITHER

a) to acquire the asset directly by taking a Bank Loan of ₹1,00,000/- repayable in 5 year-end instalments at an interest of 15%.

OR

b) to lease in the asset at yearly rentals of ₹320 per ₹1,000 of the asset value for 5 years payable at year end.

The following additional information are available.

a) The rate of depreciation of the asset is 15% W.D.V.
b) The company has an effective tax rate of 50%.
c) The company employees a discounting rate of 16%.

You are to indicate in your report which option is more preferable to the Company. Restrict calculation over a period of ten years

The present value of one Rupee due at the end of each year is

End of year	1	2	3	4	5	6	7	8	9	10
Present Value	0.86207	0.74316	0.64066	0.55229	0.47611	0.41044	0.35313	0.30503	0.26295	0.22668

Answer: :   ABC Company Ltd :

a)   Appraisal of Buying Decision: PV of Cash Out Flows   (fig in ₹)

Year	Principal repayment	Interest	Out flow	Tax savings on dep	Tax savings on int	Net cash out flow	PV factor @ 16%	Present value
1	20000	15000	35000	7500	7500	20000	0.86207	17241.4
2	20000	12000	32000	6375	6000	19625	0.74316	14584.5
3	20000	9000	29000	5420	4500	19080	0.64066	12223.8
4	20000	6000	26000	4606	3000	18394	0.55229	10158.8
5	20000	3000	23000	3915	1500	17585	0.47611	8372.4
6	-	-	-	3328	-	(3328)	0.41044	(1366)
7	-	-	-	2829	-	(2829)	0.35313	(999.0)
8	-	-	-	2405	-	(2405)	0.30503	(733.6)
9	-	-	-	2044	-	(2044)	0.26295	(537.5)
10	-	-	-	1737	-	(1737)	0.22668	(393.7)
								58,552

Net present value of out flows ₹ 58,552

b)   Appraisal of Leasing Decision: Present Value of Cash outflows under Lease Alternative

Lease rent per year is 320/1000X100000= ₹ 32,000

Year	Lease rent	Tax savings	Net out flow	Pvcf @ 16%	Present value
1-5	32000	16000	16000	3.27429	52390

From "a" and "b" ,it is Advise to lease ,Since the net cash outflow is lower under Lease alternative. However , It is not wise to compare the two project with different life periods. So,consider   equivalent annual cash out flows ,which is calculated as follows,

  Leasing : 52,390/3.27429 = ₹ 16,000
  Buying   : 58,552/4.83252 = ₹ 12,115   .   **So advised to Buy the Asset.**

Question 2

Elite Builders has been approached by a foreign embassy to build for it a block of six flats to be used as guest houses. As per the terms of the contract, the foreign embassy would provide Elite Builders the plans and the land costing ₹ 25 lakhs. Elite Builders would build the flats at their own cost and lease them to the foreign embassy for 15 years. At the end of which the flats will be transferred tot the foreign embassy for a nominal value of ₹ 8 lakh. Elite Builders estimates the cost of constructions as follows:

Area per flat, 1,000 sq. feet ; Construction cost, ₹ 400 per sq. feet ; Registration and other costs, 2.5 per cent of cost of construction; Elite Builders will also incur ₹ 4 lakhs each in years 14 and 15 towards repairs. Elite Builders proposes to charge the lease rentals as follows:

Years	Rentals
1 - 5	Normal
6 – 10	120 per cent of normal
11 - 15	150 per cent of normal

Elite builders present tax rate averages at 35 per cent which is likely to be the same in future. The full cost of construction and registration will be written off over 15 years at a uniform rate and will be allowed for tax purposes.

You are required to calculate the normal lease rental per annum per flat. For your exercise you may assume: (a) Minimum desired return of 10 per cent, (b) Rentals and repairs will arise on the last day of the year, and, (c) Construction, registration and other costs will be incurred at time= 0.

Answer:

Calculation of present value of Cash out flow:

Cost of construction	400x1000x6	24,00,000
Registration and other costs	@ 2.5%	60,000
Cost of Repairs	400000	
(-) tax savings @ 35%	140000	

	260000	

At t_{14} = Present value = 260000 x 0.26333 = 68466
At t_{15} = present value = 260000 x 0.23939 = 62241

---------------	1,30,707

	25,90,707 (Rounded of to 25, 90, 700)

Let 'X' be Normal lease rent per 6 flats per annum. P/V of Recurring Cash Inflow for 15 years

Particulars	1-5 years	6-10 years	11-15 years
Lease Rent p.a.	X	1.2 X	1.5 X
Depreciation $\dfrac{24,60,000}{15}$	164,000	164,000	164,000
PBT	X-164,000	1.2X-164000	1.5X-164,000
PAT 65 %	0.65X-106600	0.78X-106600	0.975X-106600
CIAT = PAT + Dep.	0.65X + 57400	0.78X + 57400	0.975X + 57400
PVCF	3.7908	2.3538	1.4615
PV	2.4635X + 217592	1.836X + 135108	1.42X + 83890

Total = 5.7195 X + 436590

P/V of Terminal Cash Inflows:

Nominal value of flats after 15 years	800,000
Less: Tax on Profit [800000x35%]	280,000
	520,000

P/V = 520,000 x 0.239 = ₹124,280

At 10% Rate of Return: P/V of Cash Inflows = P/V of Cash outflows

5.719X + 436,590 + 124,280 = 2590700

$\qquad$ X = ₹ 3,54,896 .

Lease Rent per Flat = 354896/6 = ₹59,150

Question 3

The Sharda Beverages Ltd has taken a plant on lease, valued at ₹ 20 crore. The lease arrangement is in the form of a leveraged lease. The Kuber Leasing Limited is the equity participant and the Hindusthan Bank Ltd. (HBL) is the loan participant. They fund the investment in the ratio of 2:8. The loan from HBL carries a fixed rate of interest of 19 percent, payable in 6 equated annual installments. 'The lease term is 6 years, with lease rental payable annually in arrear.

a) Compute the equated annual installment from the point or view of HBL.

b) If the lease rate is unknown, and HBL's per-tax yield is 25 percent, what is the minimum lease rake that must be quoted'?

Answer:

Cost of the asset	₹ 20cr
Debt Equity ratio	2: 8
Loan raised (20 x 8 / 10)	₹ 16cr
Rate of interest	19%

$\quad$ a. $\quad$ <u>Computation of annual installment</u>

$\qquad$ X + PVCF$_{6yr19\%}$ = Rs16cr

$\qquad$ X = 46923573

$\quad$ b. $\quad$ Let the lease rent be X

$\qquad$ Net out flow = Lease rent – Loan installment

$\qquad\qquad$ = X – 46923573

$\qquad$ Then,

$\qquad$ (X – 46923573) PVCF$_{6yr25\%}$ = 40000000

$\qquad\qquad$ X = 60476463.

Question 4

Basic Information:

i) Asset related: Cost ₹ 120 lacs; Tax depreciation 40%; Useful life 4 years; RV after three years ₹ 25.92 lacs.

ii) Leasing: Full pay out; Three year lease; Lease Quote ₹ 434 per 1000; Payment annually in arrears

iii) Borrow and buy Three-year loan; Interest rate 15%; Quantum to be determined, such that annual repayment of principal will be equal to annual lease rental payment.

iv) Other: Tax Rate is 40%, and opportunity cost of capital is 11%.

Based on information given above, determine the preferred option as between leasing and buying.

Answer:

<u>Appraisal of Leasing decision</u>

	(₹ in lakhs)
<u>Benefits of leasing</u>	
1. Saving in Investment	120.00
2. PV of tax shield on lease rentals	50.91

	<u>170.91</u>

Cost of leasing

Present Value of lease rentals	118.91
PV of tax shield on depreciation	31.70
PV of tax shield on Interest	12.54
PV of terminal cash inflows (25.92X0.7312)	18.95

	182.10

Net advantage of leasing =170.91 -182.1 = (11.19). Hence, it is better to purchase the asset than to lease.

Working notes :

1. Cal of present value of lease rentals

Lease rent per year	434/1000X120	52.08
Present value lease rent	52.08XPVCF$_{3yr15\%}$	118.91

2. Present value of tax shield on lease rentals

Year	Lease rental	Tax saving	PV @ 11%	Present value
1	52.08	20.83	0.9009	18.7657
2	52.08	20.83	0.8116	16.9056
3	52.08	20.83	0.7312	15.2308
	TOTAL		=	50.9100

3. Present value of depreciation tax shield

Year	Book value	Depreciation	Tax savings	PV @11%	Present value
1	120	48	19.20	0.9009	17.2972
2	72	28.8	11.52	0.8116	9.3496
3	43.2	17.28	6.91	0.7312	5.0526
4	25.92	10.368	4.147	0.6587	2.7316

4. Calculation of interest tax shield

Year	o/s loan	Interest	Installment	Principal	PV @ 11%	Present value
1	118.91	17.835	52.08	34.245	0.9009	6.427
2	84.655	12.698	52.08	39.382	0.8116	4.122
3	45.263	6.817	52.08	45.263	0.7312	1.995
					Total	12.54

Present value of terminal cash inflows = 25.92X0.7312= 18.95

Present value of lease rental =118.91

Interest rate @ 15% ; No of installments =3

Installment amount = 118.91/PVCF $_{3yr15\%}$ = 52.08

Question 5

HB Finance Ltd is considering to enter the computer leasing business. Mainframe computers can be purchased for ₹ 2,00,000 each and, in turn, be leased out at ₹ 50,000 per year for 8 years with the initial payment occurring at the end of first year. You may ignore taxes3s and depreciation.
   (a) Estimate the annual before tax expenses and internal rate of return (IRR) for the company.
   (b) What should be the yearly lease payment charged by the company in order to earn a 20 percent annual compounded rate of return before expenses and taxes?

(c) Assume that the firm uses the straight-line method of depreciation, there is no salvage value , the annual expenses are ₹ 20,000, and the tax rate is 35%. Calculate the yearly lease payment in order to enable the firm to earn 20 percent after tax annual compound rate of return.

(d) Further, assume that computer has a resale value of ₹40,000. Determine the revised lease rental to enable the firm to earn 20 per cent.

Answer:

a) Cost of the Asset   200000
    Life   8 years
    Lease rent   50000 p.a
    $(50000)PVCF_{8yrIRR}$ = 200000
         $PVCF_{8yrIRR}$ = 4
         IRR   = 18.63%

b) Calculation of yearly lease rent to be charged to earn 20% return
    Let the yearly lease rent be x
    $xPVCF_{5yr20\%}$ = 200000
              x = 200000 / 3.8372
              x = Rs52120

c) Let x be the yearly lease rent
    Computation of cash inflows per annum
    Lease rent   x
    (-) annual expenses   20000
       Depreciation   25000

       PBT   x-45000

       PAT@ (1-35%)   0.65x – 29250
       CIAT   0.65x – 4250
    Present value for 8years @ 20% = (0.65x – 4250) 3.8372 = 200000
    Yearly lease rent   x = ₹ 86725

d) Present value of cash outflows
    Cost of computer   200000
    Present value of recurring cash inflows
    Lease rent   x
    (-) annual expenses   20000
       Depreciation   20000

       PBT   x – 40000
       PAT@ (1-35%) 0.65x - 26000
       CIAT   0.65x-6000
    Present value for 8years @20%   = (0.65x-6000)3.872
    Present value of terminal cash inflows
    Resale value   40000
    Its present value (40000 x 0.23257) = ₹ 9303
    At 20%,
         Inflows = Outflows
         (0.65x – 6000) 3.8372 + 9303   = 200000; **Revised lease rent, x   = ₹ 85,687.**

Question 6

Beta Ltd is considering the acquisition of a personal computer costing ₹50, 000. The effective life of the computer is expected to be five years. The company plans to acquire the same either by borrowing ₹ 50, 000 from its bankers at 15% interest p.a. or on lease. The company wishes to know the lease rentals to be paid annually, which match the loan option. The following further information is provided to you:

    (a) The principal amount of loan will be paid in five annual equal installments.

    (b) Interest, lease rentals, principal repayment are to be paid on the last day of each year.

    (c) The full cost of the computer will be written off over the effective life of computer on a straight-line basis and the same will be allowed for tax purposes

    (d) The company's effective tax rate is 40% and the after-tax cost of capital is 9%

    (e) The computer will be sold for ₹1, 700 at the end of the 5th Year. The commission on such sales is 9% on the sale value.

You are required to compute the annual lease rentals payable by Beta Ltd, which will result in indifference to the loan option.

Answer:

Computation of Net Cash outflow if the Asset is Purchased by Borrowing

Year	Principal repayment	Interest	Installment	Tax savings on interest	Tax savings on dep	Net cash out flow	PV @ 9%	Present value
1	10000	7500	17500	3000	4000	10500	0.91743	9633
2	10000	6000	16000	2400	4000	9600	0.84168	8080
3	10000	4500	14500	1800	4000	8700	0.77218	6718
4	10000	3000	13000	1200	4000	7800	0.70843	5526
5	10000	1500	11500	600	4000	6900	0.64993	4485

Present Value of Total out flow   =   34,442

Less: Present value of terminal cash inflows

        Sale value of asset   1700

        (-) Commission   153

                    1547

        (-)Tax on profit @ 40%   619

                    928

        Its Present value (928 x 0.64993)   603

        Net cash out flow   **33,839**

Since we are required to find the annual lease rental payable , which will result in indifference to loan option. The present value of net cash out flow will be the same in each case.

    Computation of break even lease rent :

        Let x be the break even lease rent

          Present value of cash out flow

          Lease rent   x

          (-) Tax saving   (x @ 40%)   0.4x

          Lease rent after tax per year   0.6x

      Present value of lease rental for five years = (0.6x) x (3.8896)   = 33,839

                    x = ₹14,500 .

Question 7

ABC leasing Ltd. is in the process of making out a proposal to lease certain equipment. The cost of the equipment is ₹10,00,000 and the period of lease is 10 years. The following additional information is available. You are required to determine the equated annual rent to be charged for the proposal.

a) The machine can be depreciated fully over the 10 years on straight-line basis
b) The current effective tax rate is 40% and expects to go down to 30% from the beginning of the 6th year of the lease.
c) It is the normal objective to make a 10% post-tax return in its lease pricing
d) Lease management fee of 1% of the value of the assest is usually collected from the lessees upon signing of the contract of lease, to cover the overhead costs related to processing of the proposal.
e) Annual lease rents are collected at the beginning of every year.

Answer:

TVS Leasing Company

Present value of cash out flow

Cost of equipment ₹ 10,00,000
=>let X be the equated annual lease rent

Present value of lease rentals after tax

Year	Lease rent	Tax	Net cash in flow	Pv @ 10%	Present value
0	X	-	X	1.0000	X
1-5	X	0.4X	0.6X	3.7908	2.2745X
6-9	X	0.3X	0.7X	1.9680	1.3776X
10	0	0.3X	(0.3X)	0.3855	(0.1158X)

Present value of total recurring cash inflows = 4.5364X

Calculation of tax shield on depreciation

Year	Depreciation	Tax benefit	Pv @ 10 %	Present value
1-5	100000	40000	3.7908	151600
6-10	100000	30000	2.3540	70620
				222220

At 10%, Inflows = Outflows
⇨ 1000000 = 4.5364X + 222220
X = ₹1,71,453. Therefore, Equated annual rent is ₹ 1,71,453

11
INTERNATIONAL FINANCE

Question 1

Mr. Srinadh proposes visiting U.K. He wish to carry travellers' cheques with him. Mr. Srinadh go to ICICI bank. The exchange rate quoted by the bank appear as under:

Traveler's Cheques

	Buying Rate	Selling Rate
GBP sterling	72.70	73.25

a) Explain the quote. b) Compute the spread c) How much would he pay for purchasing £250 in TCs? d) If on his return from London he has a balance of £ 23 in travellers cheques, how many rupees would he receive if the bank in India quotes 73.65 – 73.92?

Answer

Spot rate = ₹/£ = 72.70 – 73.25

a) The quotation is direct quote in India

   i.e. ₹ – variable & £ fixed

b) Spread is the difference between Bid and Ask Rates

   Spread = 73.25 – 72.70 =0.55

c) Cost of 250£ = 250 x 73.25= ₹ 18,312.50

d) Amount received at the time of return = 23 x 73.65 = ₹ 1,693.95

Question 2

The following rates appear in the foreign exchange market:

Re / 1 US $	Spot Rate	2 month forward
	₹ 48.80/49.05	₹ 49.50/50.00

a) How many dollars should a firm sell to get Rs.49.50 million after 2 months?

b) How many rupees is the firm required to pay to obtain US $ 2,00,000 in the spot market?

c) Assume the firm has US $ 50,000. How many rupees does the firm obtain in exchange for the US $?

d) Are forward rates at premium or discount? Determine the percentages also.

Answer

Spot rate = ₹/$ = 48.80 – 49.05. Two months forward rate (₹/$) = 49.50 – 50.00

a) No of $ to be sold to get ₹ 49.50 million

   = 49.50 millions / 49.5 = $ 1million

b) Cost of $ 200000 = 200000 x 49.05 = ₹ 98,10,000

c) Amount obtained = 50000 x 48.80 = ₹ 24,40,000

d) Forward rates are at premium as F > S

   Bid Premium = [(49.50 – 48.80) / 48.80]x (12 / 2) x 100 = 8.6 %

   Ask Premium = [(50.00 – 49.05) / 49.05] x (12 / 2) x 100 = 11.62%

Question 3

On 1st April, 3 months interest rate in the US and Germany are 6.5% and 4.5% per annum respectively. The $/DM spot rate is 0.6560. What would be the forward rate for DM for delivery on 30th June?

Answer:

Interest in US   =   6.5% p.a ;

Germany   =   4.5% p.a

Spot Rate = ($ /DM) = 0.6560

$$\text{3 months Forward rate} = S_0 \left(\frac{1+ r_n}{1 + r_f}\right)$$
$$= 0.6560 \{[1 + (6.5 / 4)] / [1+ (4.5 / 4)]\}$$
$$= 0.6560 (1.11625 / 1.01125) = 0.65924$$

Question 4

AA Ltd exports software for an invoice value $ 100 M. Sport rate is Rs. 45. Forward is Rs. 46. If the forward rate is an indicator of future spot rate, in which currency should AA Ltd invoice? What will be its approach, it the forward rate were to Rs. 44? Will the position change if it were importing, and not exporting, software for a value of $ 100 M?

Answer

<u>Calculation of operating profits:</u>

Cost of raw material = 500000 x 50 =	25000000	
Conversion expenses =	5000000	
	30000000	
Other selling expenses	1000000	
	31000000	
Operating profit (b/f)	25250000	
Sales 1250000$ x 45	56250000	

<u>Effect of Forex changes on operating profit:</u>

Operating profit	25250000	
(-) loss due to change in EURO rate	1000000	[2 x 500000]
Loss due to change in US currency	1250000	[1 x 1250000]
	23000000	

Transaction is involved here.

Question 5

A Indian Business House opened its subsidiaries in all over the world. The company has subsidiaries in US, UK, and Japan. As on 31.03.2011 the position of inter company indebtedness stood as follows:

Creditors	Debtors	Amount in lakhs
US	UK	US $ 500
Japan	UK	¥ 12000
US	Japan	$ 200
UK	US	£ 75
Japan	US	¥ 12000

Indian Business house follows multi-lateral netting policy. On 31.03.2011 the forex units as follows:

1 US $ = Rs.50; 1 UK £ = ₹ 75; 1 ¥ = 0.80 paisa

Show Net Position after Netting off.

Answer:

Working Note 1: For convince, it is necessary to convert all cash flow into common currency as follows:

Debtors	Creditors	Amount in Foreign Currency	Amount in ₹
UK	US	$ 500	500 x 50 = 25000
UK	Japan	¥ 12000	12000 x 0.80 = 9600
Japan	US	$ 200	200 x 50 = 10000
US	UK	£ 75	75 x 75 = 5625
US	Japan	¥ 12000	12000 x 0.80 = 9600

Working Note 2

S.No.	Particulars	Received by			Total Payables
		UK	Japan	US	
1.	UK will pay to	--	9600	25000	34600
2.	Japan will pay to	--	--	10000	10000
3.	US will pay to	5625	9600	--	15225
4.	Receivable Total (1+2+3)	5625	19200	35000	
5.	Less: Total Payables	34600	10000	15225	
6.	Net Receivable (4 – 5)	--	9200	19775	
7.	Net Payable (4 – 5)	(28975)	--	--	

Net Receipts by Japan = ₹ 9,200 ; Net Receipts by US = ₹ 19,775; Net Payable by UK = ₹ 28,975

Question 6

Exporter is a UK based company, Invoice amount $350,000/- Credit period three months, Exchange rates in London.

$/£   Spot 1.5865 – 1.5905; 3 months forward 1.6100 – 1.6140

Money market rates

	Deposit	Loan
$	7%	9%
£	5%	8%

    i)   Compute and show how a money market hedge can be put in place.

    ii)   Identify whether it would have been advantageous to do forward cover instead?

Answer

$ / £ = 1.5865 – 1.5905

3 months forward = $ / £ = 1.6100 – 1.6140 ; Amount receivable = $350000

Money market rates:

	Deposits	Loan
$	7%	9%
£	5%	8%

Money market hedging:

Step 1: Identification   FC is an Asset

Step 2: Create a Liability ➔ by borrowing an amount equal to Present value of $350000

        Present value of $350000 = 350000 x (100 / 102.25) = $342298

Step 3: convert the $ into £ by spot rate

        Relevant rate is Ask rate i.e. 1£ = 1.5905$

        ➔ 342298 x (1/ 1.5905) = 215214£

Step 4: Invest the pounds in UK for 3 months

        215214 x 1.0215 = 219841 £

Step 5: Settlement: The $ Loan together with Interest equals to the Invoice amount receivable which is sufficient to discharge the $ loan.

Hedging through forward contract

        Amount receivable after 3 months = 216850

        1.6140$ - 1£

        350000$ - ?

Comparison	Now	After 3months
Forward	-	216850
Money market	215214	219841

Therefore the Hedge efficiency in money market is greater than forward.

Question 7

Endalco Ltd. (EL) of India is planning to set up a subsidiary in the USA (where hitherto it was exporting) in view of the growing demand for its product and the competition from other MNCs.

The initial project cost (consisting of plant and machinery including installation) is estimated to be US dollar 400 millions; working capital requirements are estimated at US dollar 40 million.

The Indian company follows the straight line method of depreciation.

The General Manager (Finance) of EL estimated data in respect of the project as follows:

    i)   Vairable cost of production and sales: $25 per unit

    ii)   Fixed cost per annum are estimated at $ 30 million

    iii)   The plant will be producing and selling 5 million units at $ 100 per unit.

    iv)   The expected economic useful life of the plant is 5 years will no salvage value.

The subsidiary of the Indian company is subject to 40% corporate tax rate in the USA and the required return of such a project is 12%. The current exchange rate between the two countries is ₹ 48/US dollar and the rupee is expected to depreciate by 2% p.a. for the next 5 years.

The subsidiary will be allowed to repatriate 70% of the CFAT every year along with the accumulated arrears of blocked funds at the year-end 5. The withholding taxes are 10%. The blocked funds will be invested in the USA money market by the subsidiary, earning 4% (free of tax) per year. Advise EL regarding financial viability of having a subsidiary company in the USA, assuming no tax liability in India on earnings received by EL from the US subsidiary.

Note:

Extract from the table:

    i)   Future value in year 5 of Re. 1 each during 1 to 4 years invested at 4% per year = 4.246;

    ii)   The present value factor at 12% discount rate are

Year	0	1	2	3	4	5
P.V.	1.000	0.8929	0.7972	0.7118	0.6355	0.5674

Answer

ENDALCO LTD

Analysis of financial viability: (fig in millions)

Cash outflows at t_0	
Cost of plant and machinery including installation	$400
Working capital	$40
	$440
cash out flow in rupees [440 x 48]	₹21120
Cash inflows after taxes: [CFAT]	
Sales revenue [5million units x $100]	$500
(-) costs	
Variable costs (5 million units x $ 25) $125	
Fixed cost $30	
Depreciation ($400 millions / 5 years) $80	$235
EBT	$265
(-) taxes @ 40%	$106
EAT	$159
(+) depreciation	$ 80
Cash inflows after taxes from t_1 to t_4	$239
Cash inflows after tax at t_5:	
Operating CFAT $239	
(+) release of working capital $ 40	$279

Determination of working capital:

(fig in $millions)

Particulars	Year1	Year2	Year3	Year4	Year5
Operating CFAT	239.00	239.00	239.00	239.00	239.00
(-) Retained earnings	71.70	71.70	71.70	71.70	
Repatriation made	167.30	167.30	167.30	167.30	239.00
(-) Withholding tax	16.70	16.70	16.70	16.70	23.90
Accessible funds to parent country	150.60	150.60	150.60	150.60	215.10
(+) Repatriation of blocked funds (WN)					274.00
(+)Rrecovery of working capital					40.00
Rs/$ exchange rate	48.96	49.9392	50.9380	51.9567	52.9959
Rupee equivalent	7373	7521	7671	7825	28040
PV Factor @ 12%	0.8929	0.7972	0.7118	0.6355	0.5674
Present value in Rs	6583	5996	5460	4973	15910

NPV:

Total present value of inflows   = 38922

(-) Out flows   = 21120

NPV   ₹   17802 millions

Working notes

Repatriation of blocked funds after withholding taxes:

Future value in t_5 of blocked funds of 71.7million each during t_1 to t_4 .invested at 4 %per annum

                     = 4.246 x 71.7 = $304.44 millions

(-) withholding tax   = $ 30.44 millions = $274.00 millions

Question 8

A company in UK will need to make a payment of $250,000 in six month's time. Following market information is available

	Forex (indirect quote)	FX Options
Spot	$1.5617 – 1.5773	
Six months forward	$1.5455 – 1.5609	
Exercise price		1.70
Six months Call		$ 0.037 c per Pound
Six months Put		$ 0.096 c per Pound
Contract size		Assume: Pound 12,500

Money Market Rates

	Deposit	Borrow
US $	4.50	6
UK Pounds	5.50	7

The company is considering, forward rates, money market hedge and Options. Give your Reason and recommendations on the best alternative.

Answer

Evaluation of Hedge Efficiencies:

Alternative 1: Forward cover:

Calculation amount payable under forward cover after 6 months

                            Bid   Ask

6 months forward rate ($/£) =   1.5455   1.5609

Bid rate is applicable ➔ 1.5455$ - 1£, 250000$ - ?

Amount payable = (250000 / 1.5455) x 1 = £161760

Alternative 2: money market:

   i.   Identification: Forward Cover is a liability.

   ii.   Create an asset by depositing an amount whose maturity value equals to $250000

           Amount deposited = 250000 x (100 / 102.25) = $244499

   iii.   To deposit $244499 the pounds required to purchase the same is (244499 / 1.5617) =£156560

   iv.   After 6 months together with interest the loan becomes 156560 x 1.035 = £162040

   v.   The $ deposit matures an amount equal to $250000 and is sufficient to discharge dollar liability.

Alternative 3: Option:

Strike Price = ($ / £) = 1.70

In Order to sell the Pounds and buy dollars, we have to select put option.

$ received for each contract   1£ - 1.7$

                               12500£ - ?

                            ➔ 21250$

No of contracts taken = (250000 / 21250) = 11.76

Therefore No of Contracts to be taken is 12.

Calculation of amount payable on exercise of 12 contracts:

Premium paid = (0.096 x 150000) / 100 = $14400

Value of 12 contracts = 12500 x 12 = 150000£

Premium paid in £ = 9221£ [1.56174 - 1£, 14400$ - ?]

£ Payable on exercise   150000£

$ received on exercise   150000 x 1.7 = 255000$

          (-) Loan   250000$

          Remained   5000$

Conversion value of 5000$ = 3203£ [1.5609$ - 1£, 5000$ - ?]

Net cost:

Premium paid   9221

Amount paid   150000

                  159221

(-) Remained   3203

                  156018

Comparison:

	Now	After 6 months
Forward	-	161760
Money market	-	162040
Options	-	156018

Out of the above alternatives, cash flows under Options is Less and Payable.

INTEREST RATE SWAPS

Question 1

A treasury manager after five months will need to borrow Rs.300,000 for months. The current rates are as follows:

Duration	Borrowing rates [per cent]	Lending rates [per cent]
3-months	9.5	10.0
6-months	9.8	10.2
8-months	10.0	10.5
9-months	10.2	10.8

The manager wants to ensure the rate that he would have to pay on his borrowings. What should he do and what is the rate he can lock in?

Answer

Since he has to borrow after 5 months for a period of 3 months, the rates that concern him are those corresponding to 5 months and 8 months.

He should borrow for 8 months at 10.5 per cent and lend this sum immediately for 5 months at 9.8 per cent. Let us say his effective rate is I.

Then,

$$\left(1 + 0.098 X \frac{5}{12}\right)\left(1 + \frac{i}{100} X \frac{3}{12}\right) = \left(1 + 0.0105 X \frac{8}{12}\right)$$

Or

I = 11.2 per cent

Thus, the treasury manager has been able to lock in an effective rate of 11.2 per cent. The interest on his borrowings would amount to:

$$300,000 \ X \ 0.112 \ X \ \frac{3}{12} = ₹ 8,400$$

Question 2

A company will need to buy after 4 months a forward rate agreement [FRA] from a bank to borrow for 3 months. The 4/7 FRA is quoted at 6.5. What will the company do if after 4 months, the rate

      a. Rises to 7 per cent
      b. Falls to 6 per cent
      c. Remains at 6.5 per cent

Answer

    a. Since the rate has risen, the counter-party [the bank in this case] will pay the difference to the company. Say, the borrowing is planned for 1 million. Then the counter-party is to pay to the company:

$$(0.07 - 0.06) \times 1,000,000 \times \frac{3}{12} = 2500$$

    b. Since the rate has fallen to 6 per cent, the company will pay to the bank, an amount:

$$(0.065 - 0.06) \times 1,000,000 \times \frac{3}{12} = 1250$$

    c. Since there has been no change in the rate, neither the bank nor the company pays or receives.

Question 3

Two companies have the following borrowing rate applicable to them:

Company	Euro-bond Market (fixed rate)	Euro-money market (variable rate)
X	T	LIBOR + 0.2
Y	T + 1.5	LIBOR + 0.75

The Co. X wants to borrow at variable rate while the Co. Y at fixed rate. However, through a bank as intermediary, the two companies reverse their choices. The bank signs two swap contracts stipulating that Co. X will pay to the bank LIBOR + 0.25 while Co. Y will pay to it T + 0.70. The bank wants to have 0.30 per cent profit. What are the costs of debt to the two companies respectively, if the bank's profit is contributed (i) equally by the two; (ii) in ratio of 2:1 from X and Y respectively?

Answer

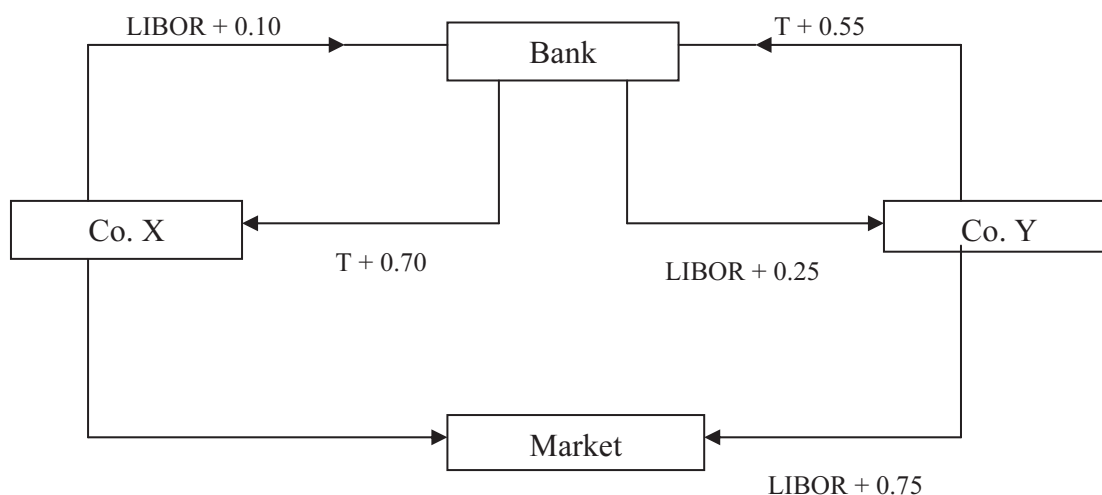| Company	Fixed Rate	Variable Rate
X	T	LIBOR + 0.20
Y	T + 1.5	LIBOR + 0.75

i.   Net Cost:

$$X = T + LIBOR + 0.25 - LIBOR - 0.55$$
$$Y = LIBOR + 0.75 + T + 0.70 - LIBOR - 0.10$$
$$X = LIBOR - 0.3$$
$$Y = T + 1.35$$

Bank Profit:

$$LIBOR + 0.25 + T + 0.70 - T - 0.55 - LIBOR - 0.10 = 0.30$$

Question 4

ABC Housing Finance Ltd. lends money to individuals @ 12% p.a. and accepts deposits from investors at FR + 1% (where FR is a floating rate). As the interest payment to investors is floating, it wants to hedge its risk, and has approached a swap dealer.

Another company XYZ Ltd. has also approached the swap dealer. XYZ Ltd. has to pay 12% to the depositors but charges FR + 2.25% from its borrowers. You are required to devise a swap so that ABC Ltd. XYZ Ltd. and the dealer, all the three participants are benefited.

Answer

ABC Housing Finance Ltd. wants to hedge against the floating rate liability and XYZ wants to hedge against 12 % payable to the depositors. So, ABC Ltd. would be ready to swap its 12% income against the interest liability plus some profit, say .80%. Similarly, XYZ Ltd. would be ready to swap its floating income FR + 2.25% against the receipt of 12% from the dealer. It also wants to gain, say 20% out of swap. The swap arrangement can be structured as shown below:

	ABC	XYZ
Receipts	12%	FR + 2.25%
Payments	FR + 1%	12%

Net Gain = 1.25% [assumption]