

LEASING DECISIONS

BASIC CONCEPTS AND FORMULAE

1. Introduction

Lease can be defined as a right to use an equipment or capital goods on payment of periodical amount. Two principal parties to any lease transaction are:

- *Lessor*: The actual owner of equipment permitting use to the other party on payment of periodical amount.
- *Lessee*: One who acquires the right to use the equipment on payment of periodical amount.

2. Types of Leasing

(a) **Operating Lease**: In this type of lease transaction, the primary lease period is short and the lessor would not be able to realize the full cost of the equipment and other incidental charges thereon during the initial lease period. Besides the cost of machinery, the lessor also bears insurance, maintenance and repair costs etc. Agreements of operating lease generally provide for an option to the lessee/lessor to terminate the lease after due notice.

(b) **Financial Lease**: It is a long-term arrangement, which is irrevocable during the primary lease period which is generally the full economic life of the leased asset. Under this arrangement lessor is assured to realize the cost of purchasing the leased asset, cost of financing it and other administrative expenses as well as his profit by way of lease rent during the initial (primary) period of leasing itself. Financial lease involves transferring almost all the risks incidental to ownership and benefits arising therefrom except the legal title to the lessee. The variants of financial lease are as follows:

- **Leveraged lease**: Though a type of financial lease, however, here the lessor may not be a single individual but a group of equity participants and the group borrows a large amount from financial institutions to purchase the leased asset.

- **Sales and Lease Back Leasing:** Under this arrangement an asset which already exists and is used by the lessee is first sold to the lessor for consideration in cash. The same asset is then acquired for use under financial lease agreement from the lessor. The lessee continues to make economic use of asset against payment of lease rentals while ownership vests with the lessor.
- **Sales-Aid-Lease:** When the leasing company (lessor) enters into an arrangement with the seller, usually manufacturer of equipment, to market the latter's product through its own leasing operations, it is called a 'sales-aid-lease'. The leasing company usually gets a commission on such sales from the manufacturer and doubles its profit.

3. Financial Evaluation of Leasing Arrangement

Lessee Perspective

Calculation of NPV (L) / NAL:

Cost of Asset

Less: PV of Lease rentals (LR)

Add: PV of tax shield on LR

Less: PV of debt tax shield

Less: PV of interest tax shield on displaced debt

Less: PV of salvage value.

If NAL/NPV (L) is +, the leasing alternative to be used, otherwise borrowing alternative would be preferable.

- **Method I (Normal method)**
Discount lease rentals at pre-tax rates and discount rest of cash flows at post tax rates.
- **Method II (Alternatively)**
Discount all cash flows at post tax rates ignoring the cash flow on account of interest tax shield on displaced debt.

4. Evaluation of Lease Methods

- (a) **Present Value Analysis:** In this method, the present value of the annual lease payments (tax adjusted) is compared with that of the annual loan repayments adjusted for tax shield on depreciation and interest, and the alternative which has the lesser cash outflow will be chosen.

- (b) **Internal Rate of Return Analysis:** This method seeks to establish the rate at which the lease rentals, net of tax shield on depreciation are equal to the cost of leasing. In other words, the result of this analysis is the after tax cost of capital explicit in the lease compared with that of the other available sources of finance.
- (c) **Bower-Herringer-Williamson Method:** This method segregates the financial and tax aspects of lease financing. The evaluation procedure under this method is as follows:
 - Compare the present value of debt with the discounted value of lease payments (gross), the rate of discount being the gross cost of debt capital. The net present value is the financial advantage (or disadvantage).
 - Work out the comparative tax benefit during the period and discount it at an appropriate cost of capital. The present value is the operating advantage (or disadvantage) of leasing.
 - If the net result is an advantage, select leasing.

5. Cross-Border Leasing

Cross-border leasing is a leasing arrangement where lessor and lessee are situated in different countries. This raises significant additional issues relating to tax avoidance and tax shelters.

Objectives of Cross-Border Leasing

- Reduce the overall cost of financing through utilization by the lessor of tax depreciation allowances to reduce its taxable income.
- The lessor is often able to utilize non-recourse debt to finance a substantial portion of the equipment cost. The debt is secured by among other things, a mortgage on the equipment and by an assignment of the right to receive payments under the lease.
- Also, depending on the structure, in some countries the lessor can utilize very favourable "leveraged lease" financial accounting treatment for the overall transaction.
- In some countries, it is easier for a lessor to repossess the leased equipment following a lessee default because the lessor is an owner and not a mere secured lender.
- Leasing provides the lessee with 100% financing.

6. Differences between Lease and Hire Purchase

In Hire-purchase transaction the person using the asset on hire-purchase basis is the owner of the asset and full title is transferred to him after he has paid the agreed installments. The asset will be shown in his balance sheet and he can claim depreciation and other allowances on the asset for computation of tax during the currency of hire-purchase agreement and thereafter.

Whereas, on the other hand, in a lease transaction, the ownership of the equipment always vests with the lessor and lessee only gets the right to use the asset. Depreciation and other allowances on the asset will be claimed by the lessor and the asset will also be shown in the balance sheet of the lessor. The lease money paid by the lessee can be charged to his Profit and Loss Account. However, the asset as such will not appear in the balance sheet of the lessee. Such asset for the lessee is, therefore, called off the balance sheet asset.

Question 1

What are the characteristic features of Financial and Operating Lease?

Answer

Salient features of Financial Lease

- (i) It is an intermediate term to long-term arrangement.
- (ii) During the primary lease period, the lease cannot be cancelled.
- (iii) The lease is more or less fully amortized during the primary lease period.
- (iv) The costs of maintenance, taxes, insurance etc., are to be incurred by the lessee unless the contract provides otherwise.
- (v) The lessee is required to take the risk of obsolescence.
- (vi) The lessor is only the Financier and is not interested in the asset.

Salient features of Operating Lease

- (i) The lease term is significantly less than the economic life of the equipment.
- (ii) It can be cancelled by the lessee prior to its expiration date.
- (iii) The lease rental is generally not sufficient to fully amortize the cost of the asset.
- (iv) The cost of maintenance, taxes, insurance are the responsibility of the lessor.
- (v) The lessee is protected against the risk of obsolescence.
- (vi) The lessor has the option to recover the cost of the asset from another party on cancellation of the lease by leasing out the asset.

Question 2

Agrani 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 Rs. 40,00,000 having a useful life of 5 years with the salvage value of Rs. 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 Rs. 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 14% cost of capital (Detailed working notes should be given. Calculations can be rounded off to Rs. lakhs).

Answer

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

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

Cash Outflow under borrowing option

5 equal instalments

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

Tax Advantage

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	<u>6,23,644</u>
						<u>31,91,981</u>

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

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	-

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 View Point of Lessor

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.	<u>10,00,000</u>	<u>7,50,000</u>	<u>5,62,500</u>	<u>4,21,875</u>	<u>3,16,406</u>
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 @ 14%	.877	.760	.675	.592	.519
PV	9,91,010	7,92,300	6,59,391	5,49,172	4,62,295
Total P.V. =			34,54,168		
Add: Tax Saving on sale of asset			<u>27,106</u>		
Total PV of cash inflow			34,81,274		
Cost of Machine			<u>40,00,000</u>		
NPV			<u>(5,18,726)</u>		

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

Question 3

Armada Leasing Company is considering a proposal to lease out a school bus. The bus can be purchased for Rs. 5,00,000 and, in turn, be leased out at Rs. 1,25,000 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 Rs. 50,000; and
 - (iv) Resale value Rs. 1,00,000 after the turn.

Answer

(i) Payback period = $\frac{5,00,000}{1,25,000} = 4.00$

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

Thus IRR = 18%

Note: Students 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:

$$\text{Lease Rent} = \frac{5,00,000}{\text{PVIFA } 8 \text{ yr, } 20\%} = \frac{5,00,000}{3.837} = \text{Rs. } 1,30,310.13 \text{ p.a.}$$

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

$$\text{PV factor } [(X - E - D)(1 - T) + D] + (\text{PV factor} \times \text{S.V.}) = \text{Co}$$

$$3.837 [(x - 50,000 - 50,000)(1 - .4) + 50,000] + (.233 \times 1,00,000) = 5,00,000$$

$$3.837 [.6x - 60,000 + 50,000] + 23,300 = 5,00,000$$

$$2.3022x = 5,15,070$$

$$x = 2,23,729.47$$

This may be confirmed as lease rental 2,23,729.47

Less: Expenses + Depreciation 1,00,000.00

EBT 1,23,729.47

Less tax 40% 49,491.79

PAT 74,237.68

Add: Depreciation 50,000.00

CFAT 1,24,237.68

$$\frac{\text{Co} - \text{PV of SV}}{\text{CFAT}} = \frac{5,00,000 - 23,300}{1,24,237.68} = 3.837 \text{ or } 20\%$$

Question 4

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

- (i) To purchase the computer for Rs. 22 lakhs.
- (ii) To lease the computer for three years from a leasing company for Rs. 5 lakhs as annual lease rent plus 10% of gross time-share service revenue. The agreement also requires an additional payment of Rs. 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 Rs. 10 lakhs at the end of third year.

Forecast Revenues are:

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

Annual operating costs excluding depreciation/lease rent of computer are estimated at Rs. 9 lakhs with an additional Rs. 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 (Rs.'000)	500	850	850
Interest (Rs.'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: Rs. 22,00,000 – 10,00,000/3 Rs. 4,00,000 p.a.

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- (b) Effective rate of interest after tax shield: $.16 \times (1 - .50) = .08$ 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

<i>Particulars</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Instalment Payment			
Principal	5,00,000	8,50,000	8,50,000
Interest	<u>3,52,000</u>	<u>2,72,000</u>	<u>1,36,000</u>
Total (A)	<u>8,52,000</u>	<u>11,22,000</u>	<u>9,86,000</u>
Tax shield @ 50%;			
Interest payment	1,76,000	1,36,000	68,000
Depreciation	<u>2,00,000</u>	<u>2,00,000</u>	<u>2,00,000</u>
Total (B)	<u>3,76,000</u>	<u>3,36,000</u>	<u>2,68,000</u>
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	<u>4,40,776</u>	<u>6,73,602</u>	<u>5,70,092</u>
Total PV of Cash outflows:			16,84,470
Less: PV of salvage value (Rs. 10 lakhs $\times$ 0.794)			<u>7,94,000</u>
Net PV of cash outflows			<u>8,90,470</u>

2. Alternative II: Lease of the Computer

<i>Particulars</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
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	—	—	<u>6,00,000</u>
Total Payment	7,25,000	7,50,000	13,75,000
Less: Tax shield @ 50%	<u>3,62,500</u>	<u>3,75,000</u>	<u>6,87,500</u>

Leasing Decisions

Net Cash outflows	<u>3,62,500</u>	<u>3,75,000</u>	<u>6,87,500</u>
PV of Cash outflows @ 8%	<u>3,35,675</u>	<u>3,21,375</u>	<u>5,45,875</u>
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 5

Fair finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is Rs. 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 10%.

Required:

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

Answer

Capital sum to be placed under Lease

		<i>Rs. in lakhs</i>
Cash Down price of machine		300.00
Less: Present value of depreciation		
Tax Shield		
	$100 \times .35 \times \frac{1}{(1.10)}$	31.82
	$100 \times .35 \times \frac{1}{(1.10)^2}$	28.93
	$100 \times .35 \times \frac{1}{(1.10)^3}$	<u>26.30</u>
		87.05
		<u>212.95</u>

Strategic Financial Management

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	$3x \times (1 - .35) = 1.95x$	$1.95 \times (1/1.10) = 1.7727x$
2	$2x \times (1 - .35) = 1.3x$	$1.30 \times [(1/(1.10)^2)] = 1.0743x$
3	$x \times (1 - .35) = 0.65x$	$0.65 \times [1/(1.10)^3] = 0.4884x$
		<u>$= 3.3354x$</u>

Therefore $3.3354x = 212.95$ OR $x = \text{Rs. } 63.8454 \text{ lakhs}$

Year-wise lease rentals:

	Rs. in lakhs
Year 1	$3 \times 63.8454 \text{ lakhs} = 191.54$
2	$2 \times 63.8454 \text{ lakhs} = 127.69$
3	$1 \times 63.8454 \text{ lakhs} = 63.85$

Question 6

ABC Ltd. is considering a proposal to acquire a machine costing Rs. 1,10,000 payable Rs. 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 Rs. 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 Rs. 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 50%.

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

Annual repayment = $\text{Rs. } 1,00,000 / 5.0188 = \text{Rs. } 19,925$

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

Year	Instalment	Interest	Repayment	Balance
	Rs.	Rs.	Rs.	Rs.
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. Rs. 19,925 – Rs. 17,329 = Rs. 2,596)

Year	Installment	Interest	Depreciation	Tax Shield 50% (2 + 3)	Net CF (1-4)	PVF	PV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.
0	10,000	-	-	-	-	1.000	10,000
1	19,925	15,000	11,000	13,000	6,925	.870	6,025
2	19,925	14,261	11,000	12,631	7,294	.756	5,514
3	19,925	13,412	11,000	12,206	7,719	.658	5,079
4	19,925	12,435	11,000	11,718	8,207	.572	4,694
5	19,925	11,311	11,000	11,156	8,769	.497	4,358
6	19,925	10,019	11,000	10,510	9,415	.432	4,067
7	19,925	8,533	11,000	9,767	10,158	.376	3,819
8	19,925	6,824	11,000	8,912	11,013	.327	3,601
9	19,925	4,859	11,000	7,930	11,995	.284	3,407
10	19,925	2,596	11,000	6,798	13,127	.247	<u>3,242</u>

Strategic Financial Management

	Present value of total outflows					- 53,806
10	Salvage value (after tax)	10,000	-	-	.247	<u>+2,470</u>
	Net present value of outflows					<u>- 51,336</u>

It may be noted that (i) depreciation of Rs. 11,000 has been provided for all the 10 years. This is 10% of the original cost of Rs. 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 Rs. 20,000, this would be capital gain and presuming it to be taxable at the normal rate of 50%, the net cash inflow on account of salvage value would be Rs. 10,000 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 Rs. 15,000 payable at the end of next 10 years. This lease rental is tax deductible, therefore, the net cash outflow would be only Rs. 7,500 (after tax). The PVAF for 10 years @ 15% is 5.0188. So, the present value of annuity of Rs. 7,500 is

Present value of annuity of outflow = Rs. 7,500 × 5.0188 = Rs. 37,641.

Advice: If the firm opts to buy the asset, the present value of outflow comes to Rs. 51,336; and in case of lease option, the present value of outflows comes to Rs. 37,641. Hence, the firm should opt for the lease option. In this way, the firm will be able to reduce its costs by Rs. 13,695 i.e. Rs. 51,336 – Rs. 37,641. This may also be referred to as Net Benefit of Leasing.

Note: Students may also discount cash flows under both alternatives at after tax cost i.e. 15% (1 – 05) = 7.5%. Discounting will not have any impact on this decision since any discount factor will lead to present value of lease to be less than that of present value of debt).

Question 7

Engineers Ltd. is in the business of manufacturing nut bolts. 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 Rs. 20,00,000 having a useful life of 5 years with the salvage value of Rs. 4,00,000 (consider short term capital loss/gain for the Income tax). The full purchase value of machine can be financed by bank loan at the rate of 20% interest 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 Rs. 6,00,000 per annum. The Company follows the written down value method of

depreciation at the rate of 25 per cent. Company's tax rate is 35 per cent and cost of capital is 14 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 14 per cent cost of capital.

Detailed working notes should be given.

Answer

Discounting Factor:

Cost of finance 20% - Tax 35% = 13%.

- (i) PV of cash outflows under leasing alternative

Year-end	Lease rent after taxes P.A.	PVIFA at 13%	Total P.V.
1 - 5	Rs. 3,90,000	3.517	Rs. 13,71,630

PV of cash outflows under buying alternative

Year end	Loan Instalment	Tax advantage on Interest	Tax advantage on Depreciation	Net Cash Outflow	PVIF at 13%	Total PV
1	6,68,673	1,40,000	1,75,000	3,53,673	0.885	3,13,001
2	6,68,673	1,21,193	1,31,250	4,16,230	0.783	3,25,908
3	6,68,673	98,624	98,438	4,71,611	0.693	3,26,826
4	6,68,673	71,542	73,828	5,23,303	0.613	3,20,785
5	6,68,673	38,819	55,371	5,74,483	0.543	<u>3,11,944</u>
Total PV outflows						15,98,464
Less: PV of Salvage Value (Rs. 4,00,000 * 0.543)						<u>2,17,200</u>
						13,81,264
Less: PV of tax saving on short term capital loss (4,74,609 – 4,00,000) * 35% * .543						14,179
NPV of Cash outflow						13,67,085

Working Notes:

(1) Schedule of Debt Payment

<i>Year-end</i>	<i>Opening balance</i>	<i>Interest @ 20%</i>	<i>Repayment</i>	<i>Closing Balance</i>	<i>Principal Amount</i>
1	20,00,000	4,00,000	6,68,673	17,31,327	2,68,673
2	17,31,327	3,46,265	6,68,673	14,08,919	3,22,408
3	14,08,919	2,81,784	6,68,673	10,22,030	3,86,889
4	10,22,030	2,04,406	6,68,673	5,57,763	4,64,267
5	5,57,763	1,10,910*	6,68,673	0	5,57,763

*Balancing Figure

(2) Schedule of Depreciation

<i>Year</i>	<i>Opening WDV</i>	<i>Depreciation</i>	<i>Closing WDV</i>
1	20,00,000	5,00,000	15,00,000
2	15,00,000	3,75,000	11,25,000
3	11,25,000	2,81,250	8,43,750
4	8,43,750	2,10,938	6,32,812
5	6,32,812	1,58,203	4,74,609

- (3) $EMI = Rs.20,00,000 / \text{Annuity for 5 years @ 20\%} = \text{i.e. } Rs.20,00,000 / 2.991 = Rs. 6,68,673.$

Advice: Company is advised to borrow and buy not to go for leasing as NPV of cash outflows is lower in case of buying alternative.

Note: Students may note that the cost of capital of the company given in the question is 14% at which cash flows may also be discounted; the question is however, silent whether this cost of capital is pre-tax or post tax. If it is assumed that this is after tax cost and the cash flows are discounted at this rate there is no change in the advice to the company i.e. borrow and buy. However, if it is assumed that the cost of capital is pre-tax and the same is adjusted with the tax rate to discount the cash flows, the advice to the company changes to leasing.

(ii) Evaluation from Lessor's Point of View

	(1)	(2)	(3)	(4)	(5)
Lease Rent	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000

Leasing Decisions

Less:	5,00,000	3,75,000	2,81,250	2,10,938	1,58,203
Depreciation					
EBT	1,00,000	2,25,000	3,18,750	3,89,062	4,41,797
Less: Tax @ 35%	35,000	78,750	1,11,563	1,36,172	1,54,629
EAT	65,000	1,46,250	2,07,187	2,52,890	2,87,168
Add:	5,00,000	3,75,000	2,81,250	2,10,938	1,58,203
Depreciation					
Cash Inflows	5,65,000	5,21,250	4,88,437	4,63,828	4,45,371
PV factor @ 14%	0.877	0.769	0.675	0.592	0.519
PV of inflows	4,95,505	4,00,841	3,29,695	2,74,586	2,31,148

Evaluation:

Aggregate PV of cash inflows	17,31,775
Add: PV of salvage value (4,00,000 × 0.519)	2,07,600
Add: Tax shelter on short-term capital loss (4,74,609 – 4,00,000) × 0.35 × 0.519	<u>13,553</u>
PV of all cash inflows	19,52,928
Cost of the machine	20,00,000
NPV	- 47,072

Hence, leasing at this rate is not feasible.

Working Note: Depreciation @ 25% WDV.

Cost = Rs. 20,00,000

			(Amount in Rs.)
		Depreciation	Balance
1	20,00,000	5,00,000	15,00,000
2	15,00,000	3,75,000	11,25,000
3	11,25,000	2,81,250	8,43,750
4	8,43,750	2,10,938	6,32,812
5	6,32,812	1,58,203	4,74,609

Question 8

ABC Company has decided to acquire a Rs.5,00,000 pulp control device that has a useful life of ten years. A subsidy of Rs.50,000 is available at the time the device is acquired and placed into service. The device would be depreciated on straight-line basis and no salvage value is expected. The company is in the 50% tax bracket. If the acquisition is financed with a lease, lease payments of Rs.55,000 would be required at the beginning of each year. The company can also borrow at 10% repayable in equal instalments. Debt payments would be due at the beginning of each year:

- (i) What is the present value of cash outflow for each of these financing alternatives, using the after-tax cost of debt?
- (ii) Which of the two alternatives is preferable?

Answer

Initial amount borrowed = Rs.5,00,000 – Rs.50,000 = Rs.4,50,000

This amount of Rs.4,50,000 is the amount which together with interest at the rate of 10% on outstanding amount is repayable in equal installments i.e., annuities in the beginning of each of 10 years. The PVAF at the rate of 10% for 9 years is 5.759 and for the year 0 it is 1.000. So, the annuity amount may be ascertained by dividing Rs.4,50,000 by (5.759 + 1.000).

So Annual payment = Rs.4,50,000/6.759 = Rs.66,578

Amount owed at time 0 = Rs.4,50,000 – Rs. 66,578 = Rs.3,83,422.

Schedule of Debt Payment

End of Year	Total Payment Rs.	Interest Rs.	Principal Amount Outstanding Rs.
0	66,578	0	3,83,422
1	66,578	38,342	3,55,186
2	66,578	35,519	3,24,127
3	66,578	32,413	2,89,962
4	66,578	28,996	2,52,380
5	66,578	25,238	2,11,040
6	66,578	21,104	1,65,566
7	66,578	16,557	1,15,545
8	66,578	11,555	55,023
9	66,578	5,502	NIL

Schedule of Cash Outflows: Debt Alternative

(Amount in Rs.)

(1) End of year	(2) Debt Payment	(3) Interest	(4) Dep	(5) Tax Shield [(3)+(4)]0.5	(6) Cash outflows (2) – (5)	(7) PV factors @ 5%	(8) PV
0	66,578	0	0	0	66,578	1.000	66,578
1	66,578	38,342	50,000	44,171	22,407	0.952	21,331
2	66,578	35,519	50,000	42,759	23,819	0.907	21,604
3	66,578	32,413	50,000	41,206	25,372	0.864	21,921
4	66,578	28,996	50,000	39,498	27,080	0.823	22,287
5	66,578	25,238	50,000	37,619	28,959	0.784	22,704
6	66,578	21,104	50,000	35,552	31,026	0.746	23,145
7	66,578	16,557	50,000	33,279	33,299	0.711	23,676
8	66,578	11,555	50,000	30,777	35,801	0.677	24,237
9	66,578	5,502	50,000	27,751	38,827	0.645	25,043
10	-	0	50,000	25,000	(-25,000)	0.614	(-15,350)

Total present value of Outflows = Rs.2,57,176

Schedule of Cash Outflows: Leasing Alternative

(Amount in Rs.)

End of year	Lease Payment	Tax Shield	Cash Outflow	PVIFA @ 5%	PV
0	55,000	0	55,000	1.000	55,000
1-9	55,000	27,500	27,500	7.109	1,95,498
10	0	27,500	-27,500	0.614	(-16,885)

Total Present value of Outflows =2,33,613

The present values of cash outflow are Rs.2,57,176 and Rs.2,33,613 respectively under debt and lease alternatives. As under debt alternatives the cash outflow would be more, the lease is preferred.

Note: (i) The repayment of loan as well as payment of lease rental is made in the beginning of the years. So, at the end of year 10, there will not be any

payment in either option, but the tax benefit of depreciation for the year 10 as well as of lease rentals paid in the beginning of year 10, will be available only at the end of year 10.

- (ii) Students may also calculate depreciation after subtracting the amount of subsidy from original cost, however, even in this situation, lease alternative is preferable.

Question 9

ABC Leasing Ltd. has been approached by a client to write a five years lease on an asset costing Rs.10,00,000 and having estimated salvage value of Rs.1,00,000 thereafter. The company has a after tax required rate of return of 10% and its tax rate is 50%. It provides depreciation @33 $\frac{1}{3}$ % on written down value of the asset. What lease rental will provide the company its after tax required rate of return?

Answer

- (a) In order to find out the annual lease rent, the cash flows from the asset must be evaluated as follows:

Year	Depreciation (Rs.)	Tax Shield (Rs.)	Cash flow (Rs.)	PVF(10%)	PV (Rs.)
1.	3,33,333	1,66,667	1,66,666	.909	1,51,500
2.	2,22,222	1,11,111	1,11,111	.826	91,778
3.	1,48,148	74,074	74,074	.751	55,630
4.	98,766	49,383	49,383	.683	33,728
5.	65,844	32,922	32,922	.621	20,444
6.	Salvage Value		1,00,000	.621	<u>62,100</u>
Present Value of Inflows					<u>4,15,180</u>
Outflow					<u>10,00,000</u>
Net Present value					<u>5,84,820</u>

The firm therefore, should have total recovery of Rs.5,84,820 through the lease rentals. The annual lease rental after tax may be calculated as follows:

$$\begin{aligned}
 \text{Lease rental (after tax)} &= \text{Total recovery required} \div \text{PVAF}_{(10\%n)} \\
 &= \text{Rs.5,84,820} \div 3.791 = \text{Rs.1,54,265} \\
 \text{Now, the lease rental before tax} &= \text{Rs.1,54,265} \div 0.5 \\
 &= \text{Rs.3,08,530}
 \end{aligned}$$

Therefore, the firm should charge a lease rental of Rs.3,08,530 in order to earn a required rate of return of 10% after tax.

Question 10

A Company is planning to acquire a machine costing Rs.5,00,000. Effective life of the machine is 5 years. The Company is considering two options. One is to purchase the machine by lease and the other is to borrow Rs.5,00,000 from its bankers at 10% interest p.a. The Principal amount of loan will be paid in 5 equal instalments to be paid annually. The machine will be sold at Rs.50,000 at the end of 5th year. Following further informations are given:

- (a) Principal, interest, lease rentals are payable on the last day of each year.
- (b) The machine will be fully depreciated over its effective life.
- (c) Tax rate is 30% and after tax. Cost of Capital is 8%.

Compute the lease rentals payable which will make the firm indifferent to the loan option.

Answer

- (a) *Borrowing option:*

Annual Instalment = Rs.50,00,000/- / 5 = Rs.1,00,000/-

Annual depreciation = Rs.50,00,000/- / 5 = Rs.1,00,000/-

Computation of net cash outflow:

Year	Principal	Interest	Total	Tax Saving Depn. & Interest	Net cash Outflow	PV @ 8%	Total PV
1	1,00,000	50,000	1,50,000	45,000	1,05,000	0.926	97,230
2	1,00,000	40,000	1,40,000	42,000	98,000	0.857	93,986
3	1,00,000	30,000	1,30,000	39,000	91,000	0.794	72,254
4	1,00,000	20,000	1,20,000	36,000	84,000	0.735	61,740
5	1,00,000	10,000	1,10,000	33,000	77,000	0.681	52,437
							3,67,647
Less: Present value of Inflows at the end of 5 th year (Rs.50,000/- x 0.7) or Rs.35,000 x 0.681 =							23,835
PV of Net Cash outflows							<u>Rs.3,43,812</u>

Calculation of lease rentals:

Therefore, Required Annual after tax outflow = $3,43,812/3.993$ = Rs.86,104/-.

Therefore, Annual lease rental = $86,104/0.70$ = Rs.1,23,006/-

Question 11

ABC Ltd. sells computer services to its clients. The company has recently completed a feasibility study and decided to acquire an additional computer, the details of which are as follows:

- (1) The purchase price of the computer is Rs.2,30,000; maintenance, property taxes and insurance will be Rs.20,000 per year. The additional expenses to operate the computer are estimated at Rs.80,000. If the computer is rented from the owner, the annual rent will be Rs.85,000, plus 5% of annual billings. The rent is due on the last day of each year.*
- (2) Due to competitive conditions, the company feels that it will be necessary to replace the computer at the end of three years with a more advanced model. Its resale value is estimated at Rs.1,10,000.*
- (3) The corporate income tax rate is 50% and the straight line method of depreciation is followed.*
- (4) The estimated annual billing for the services of the new computer will be Rs.2,20,000 during the first year, and Rs.2,60,000 during the subsequent two years.*
- (5) If the computer is purchased, the company will borrow to finance the purchase from a bank with interest at 16% per annum. The interest will be paid regularly, and the principal will be returned in one lump sum at the end of the year 3.*

Should the company purchase the computer or lease it? Assume (i) cost of capital as 12%, (ii) straight line method of depreciation, (iii) salvage value of Rs.1,10,000 and evaluate the proposal from the point of view of lessor also.

Answer

Alternative 1

1. Evaluation of ABC Ltd's position under buying option considered.

Cost of Capital 12% as per question.

$$\text{Depreciation p.a.} = \frac{2,30,000 - 1,10,000}{3} = 40,000$$

Particulars	Y	E	A	R
Recurrent Cash Flow	1	2	3	NPV
Service Charges Receivable	2,20,000	2,60,000	2,60,000	

Leasing Decisions

Tax, Insurance etc	(-)20,000	(-)20,000	(-)20,000	
Cost of operation	(-)80,000	(-)80,000	(-)80,000	
Depreciation	(-)40,000	(-)40,000	(-)40,000	
Interest on Loan @ 16%	(-)36,800	(-)36,800	(-)36,800	
Incremental PBT	43,200	83,200	83,200	
Corporate tax @ 50%	(-)21,600	(-)41,600	(-)41,600	
Incremental PAT	21,600	41,600	41,600	
Depreciation added back	40,000	40,000	40,000	
Incremental recurrent cash flow	61,600	81,600	81,600	
Terminal Cash Flow				
Repayment of Loan			(-)2,30,000	
Disposal of the computer			1,10,000	
Cash flows of buying option	61,600	81,600	38,400	
Discounting factors @ 12%	*0.893	*0.797	*0.712	
NPV of buying option	55,009	65,035	27,341	92,703

2. Evaluation of ABC Ltd's position under leasing option.

Particulars	Y	E	A	R
	1	2	3	NPV
Service Charges Receivable	2,20,000	2,60,000	2,60,000	
Cost of operation	(-)80,000	(-)80,000	(-)80,000	
Lease Rent	(-)96,000	(-)98,000	(-)98,000	
Incremental PBT	44,000	82,000	82,000	
Corporate tax @ 50%	(-)22,000	(-)41,000	(-)41,000	
	22,000	41,000	41,000	
Discounting factor @ 12%	*0.893	*0.797	*0.712	
NPV of Leasing option	19,646	32,677	29,192	81,515
Higher NPV under buying option				11,188

In view of above buying option is recommended

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Note:

1. Maintenance and particularly insurance are to be paid by the owner. So, cash outflow of Rs.10,000 = Rs.20,000* (1 - 0.5) is not considered under leasing option.
2. Cash flows on account of Service Charges Receivable and Cost of Operation of the computer are common to both of the alternatives. These could therefore, have been eliminated. The NPV's of the options will change but the net NPV of Rs.11,188 will be the same. Full credit should be given for such answers also.

Evaluation from the lessor's point of view

The lessor is also supposed to buy the computer under the same terms of financing. His position is analysed below:

	Y	E	A	R
Particulars	1	2	3	NPV
Lease Rental	96,000	98,000	98,000	
Taxes & Insurance – being the owner, will be borne by the lessor	(-)20,000	(-)20,000	(-)20,000	
Loan Interest	(-)36,800	(-)36,800	(-)36,800	
Depreciation	(-)40,000	(-)40,000	(-)40,000	
Incremental PBT	(-)800	1,200	1,200	
Corporate tax	400	(-)600	(-)600	
(Assuming that the less will get adjusted with other profits for leasing out other assets)	(-)400	600	600	
Depreciation added back	40,000	40,000	40,000	
	39,600	40,600	40,600	
Terminal Disposal			1,10,000	
Repayment of Loan			(-)2,30,000	
Cash Flow	39,600	40,600	79,400	
Discount factor @ 16 (1- 0.5)% = 8%	*0.926	*0.857	*0.794	
NPV of leasing	36,670	36,670	(-)63,044	8,420

The NPV being positive, the proposal would be acceptable to the lessor also.

Alternative Answer

	Y	E	A	R
Particulars	1	2	3	NPV
Lease Rental	96,000	98,000	98,000	
Taxes & Insurance – being the owner, will be borne by the lessor	(-)20,000	(-)20,000	(-)20,000	
Loan Interest	(-)36,800	(-)36,800	(-)36,800	
Depreciation	(-)40,000	(-)40,000	(-)40,000	
Incremental PBT	(-)800	1,200	1,200	
Corporate Tax @50%		(-) 200	(-) 600	
PAT	(-) 800	1,000	600	
Depreciation added back	40,000	40,000	40,000	
			40,600	
			(-) 1,20,000	
	39,200	41,000	(-) 79,400	
	*0.926	*0.857	*0.794	
	36,299	35,137	(-) 63,044	8,392

In view of the positive NPV, the proposal should be accepted by lessor.

Alternative 2

Evaluation from the point of view of Lessee

The lessee has two alternatives: (i) To acquire the computer out of borrowed funds, and (ii) To acquire the computer on lease basis. The financial implications of these two options can be evaluated as follows:

Option I: To acquire computer out of borrowed funds. In this case, the company has to pay interest @ 16% annually and repayment of loan at the end of 3rd year. However, the

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salvage value of Rs.1,10,000 will be available to it. The information can be presented as follows:

Year	Interest	Depreciation	Expenses	Tax Shield (5)=50% of (2+3+4)	Cash outflows	PVF (8%)	PV (Rs.)
(1)	(2)	(3)	(4)	(5)	6=(2+4-5)		
1.	Rs.36,800	Rs.40,000	Rs.20,000	Rs.48,400	Rs.8,400	.926	7,778
2.	36,800	40,000	20,000	48,400	8,400	.857	7,199
3.	36,800	40,000	20,000	48,400	8,400	.794	6,670
4.	Repayment – Savage (2,30,000 – 1,10,000)				Rs.1,20,000	.794	95,280
Present Value of Outflows							1,16,927

Option II: To acquire the Computer on lease basis: In this case, the Company will be required to pay an annual lease rent of Rs.85,000 + 5% of annual billing at the end of year. The financial implications can be evaluated as follows:

Year	Rental	5% of Billing	Tax Shield	Cash Outflow	PV (8%)	{PV}
(1)	(2)	(3)= (50% of 1+2)	(4)= (1+2+3)			
1	Rs.85,000	Rs.11,000	Rs.48,000	Rs.48,000	.926	Rs.44,448
2	85,000	13,000	49,000	49,000	.857	41,993
3	85,000	13,000	49,000	49,000	.794	38,906
Present Value of Outflows						1,25,347

As the PV of outflows is less in case of buying option, the Company should borrow funds to buyout the computer.

Note: It may be noted that the additional expenses of Rs.80,000 to operate the computer have not been considered in the above calculation. These expenses are required in both the options and are considered to be irrelevant to decide between lease or buy.

Evaluation from the point of view of lessor:

	Year 1	Year 2	Year 3
Lease Rental	85,000	85,000	85,000
5% of Billing	11,000	13,000	13,000

Leasing Decisions

Total Income	96,000	98,000	98,000
Less: Maintenance Expenses	20,000	20,000	20,000
Depreciation	40,000	40,000	40,000
Income before tax	36,000	38,000	38,000
Tax @ 50%	18,000	19,000	19,000
Net Income after Tax	18,000	19,000	19,000
Depreciation added back	40,000	40,000	40,000
Cash Inflow (Annual)	58,000	59,000	59,000
Scrap Value	-	-	1,10,000
	58,000	59,000	1,69,000
PVF (12%)	.893	.797	.712
Present Value	51,794	47,023	1,20,328
Total Present Value			2,19,145
Less: Initial Cost			2,30,000
Net Present Value			<u>-10,855</u>

As the NPV for the lessor is negative, he may not accept the proposal.

Question 12

XYZ Ltd. requires an equipment costing Rs.10,00,000; the same will be utilized over a period of 5 years. It has two financing options in this regard :

- (i) Arrangement of a loan of Rs.10,00,000 at an interest rate of 13 percent per annum; the loan being repayable in 5 equal year end installments; the equipment can be sold at the end of fifth year for Rs.1,00,000.
- (ii) Leasing the equipment for a period of five years at an early rental of Rs.3,30,000 payable at the year end.

The rate of depreciation is 15 percent on Written Down Value (WDV) basis, income tax rate is 35 percent and discount rate is 12 percent.

Advise which of the financing options should XYZ Ltd. exercise and why?

Answer

Option A

Year	Interest 13%	Depreciation 15% WDV	Interest + Dep.	Tax Shield 03 × 35%	Repayment	Net 01 + 05 – 04 =	PV 12%
	01	02	03	04	05	06	
01	130,000	150,000	280,000	98,000	200,000	232,000	(207,176)
02	104,000	127,500	231,500	81,025	200,000	222,975	(177,711)
03	78,000	108,375	186,375	65,231	200,000	212,769	(151,492)
04	52,000	92,120	144,120	50,442	200,000	201,558	(128,191)
05	26,000	78,300	104,300	36,505	200,000	189,495	(107,443)
06	Scrap Value					100,000	56,700
							(715,313)

Option B

Lease Rent	330,000
Tax Shield	<u>(115,500)</u>
Outflow	<u>214,500</u>
	× 3.599
	Rs. 771,985

Since PV of outflows is lower in the Borrowing option, XYZ Ltd. should avail of the loan and purchase the equipment.

EXERCISES

Question 1

Mr. Lee wants to acquire a mechanized feed spreader that cost €80,000. He intends to operate the equipment for 5 years, at which time it will need to be replaced. However, it is expected to have a salvage value of €10,000 at the end of the fifth year. The asset will be depreciated on a straight-line basis (€16,000 per year) over the 5 years, and Lee is in a 30 percent tax bracket. Two means for financing the feed spreader are available. A lease arrangement calls for lease payments of €19,000 annually, payable in advance. A debt alternative carries an interest of €19,000 annually, payable in advance. A debt alternative

carries an interest cost of 10 percent. Debt payments will be at the start of each of the 5 years using mortgage type of debt amortization.

- (a) Using the present-value method, determine the best alternative.
- (b) Using the internal-rate-of-return method, which is the best alternative? Does your answer differ from that to part a?

(Answer: (a) As the present value of cash outflows under the debt alternative is lower i.e. €55,322 versus €59,986, hence debt option would be preferred. (b) IRR is 10.11%, hence debt option would be preferred.)

Question 2

ABC Ltd., presently leasing computers on a yearly basis rental amounting Rs.10,00,000 per year. These computers can also be purchased by the company for Rs.50,00,000. This purchase can be financed by 16% loan repayable in 4 equal annual instalments.

The economic life of the computer is that of 4 years. It is estimated that the computers would be sold for Rs.20,00,000 at the end of 4 years. The company uses the straight line method of depreciation. Corporate tax rate is 50%.

- (a) Whether computer should be acquired or leased?
- (b) Analyse the financial viability from the point of view of lessor, assuming 14% cost of capital.
- (c) Determine the minimum rent which will yield an IRR of 16% to the lessor.

(Answer: (a) The lease option is financially better. (b) The proposal is not financially viable. (c) Rs.13,92,423)