Depreciation, Alternate Investment and Profitability Analysis.
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Lecture-4.
Double-Declining Balance Method.

Welcome to the course depreciation, alternate investment and profitability analysis. We are continuing with module one that is depreciation. In this lecture, we will cover another depreciation method which is called double declining-balance method and this is fourth lecture in the series. Welcome to the course, depreciation, alternate investment and profitability analysis, we are continuing with module one that is depreciation. In this lecture I will cover another depreciation method which is called double declining-balance method. This is fourth number of lecture in the series.

The double declining balance method is an accelerated form of depreciation methods, under which the majority of the depreciation associated with a fixed asset is recovered during the first few years of its useful life. The approach is reasonably under either of the following circumstances that means we should accept or we should use this double declining method approach under following circumstances.

When the utility of an asset is being consumed at a more rapid rate during the early part of its useful life, or when the intent is to recover more expense now, thereby, shifting profit recognition further into the future, which may be used for deferring income taxes. This I had also explained in the declining-balance method that if I, the depreciation is high in the early part of the useful life then one has to pay less taxes and hence, more money will be there in the firm to utilize. However, this method is more difficult to calculate than the traditional straight line method of depreciation.

Also, most assets are utilized at a consistent rate over the useful lives, which does not reflect the rapid rate of depreciation resulting from this method. So, with the usefulness is consistent rate, that means at a consistent rate we are using the equipment, then probably double declining method of depreciation should not be used. But if the depreciation is fast in the early periods like I had given an example of computer. The computer usage is more in its early period, than in the later period and hence, for computer type of equipment the double declining method is a better method to be used than straight-line method.

Double declining-balance method. A common depreciation-computation method that involves applying the depreciation rate against the non-depreciated balance and is generally used for long-lived assets. The double declining-balance depreciation method is an accelerated depreciation method that computes twice as much of the depreciation based on asset's book value each year compare to straight-line depreciation method.

This method is sometimes called double declining-balance or 200 percent method. There are other methods also like this double declining-balance 150 percent methods also but generally, double declining-balance method refers to about 200 percent method. In fact it is a declining-balance method using a fixed percentage factor, giving a depreciation rate equivalent to twice the minimum rate with the straight-line method.

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Formula for Double declining balance Method

Declining balance depreciation is calculated using the formula:

Depreciation = Depreciation rate x Book value of the asset

However, for Double Declining Balance method (DDBM) it is:

Depreciation = Accelerator x Straight line rate

Depreciation for a period=2*straight line depreciation percent*[(book value at beginning of period].

The value of accelerator = 2 for DDBM
The value of the accelerator is 1.5 for 150% declining balance method

The formula for double declining-balance method if we check then it is very clearly shown in the slide. Declining-balance depreciation is calculated using the formula. Depreciation is equal to depreciation rate into book value of the asset. However, in the double declining-balance method, it is depreciation is equal to a accelerator factor into straight-line rate.

Depreciation for a period in a double declining-balance method is equal to 2 into straight-line depreciation percentage into book value at the beginning of the period. The value of the accelerator factor is 2 for double declining-balance method. The value of the accelerator factor is 1.5 or hundred fifty percent. In a hundred fifty percent declining-balance method, if the accelerator factor is 2, this is 200 percent declining-balance method, if it is 150 percent, it is the hundred fifty percent decline-balance method.
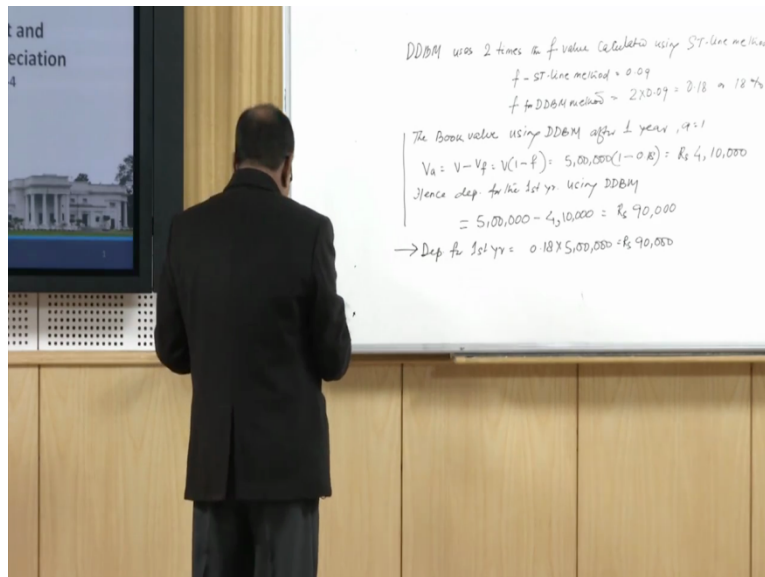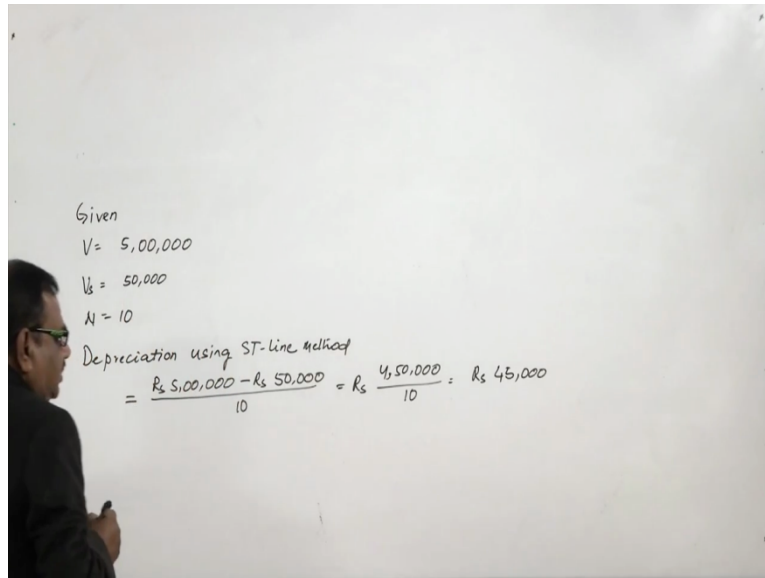
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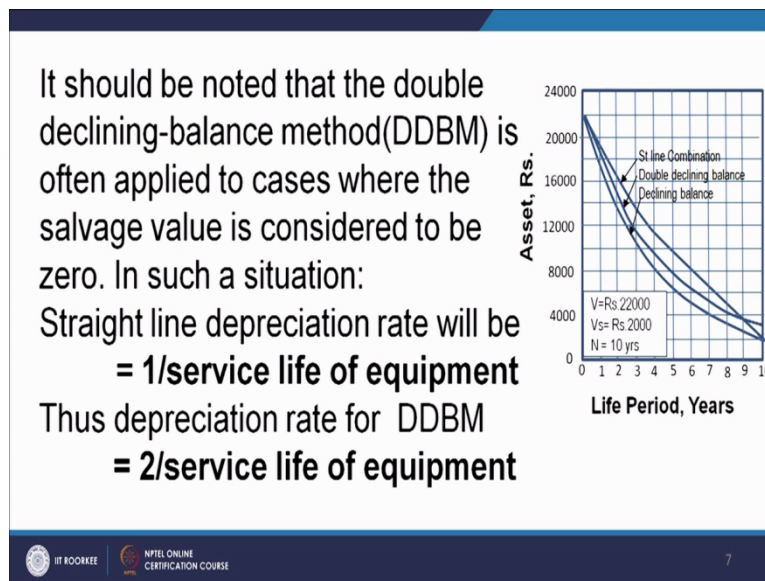
It should be noted that the double declining-balance method is often applied to cases where the salvage value is considered to be zero. If salvage value is zero then the formula shortens because if the salvage value is zero then in a straight-line depreciation method, the depreciation is equal to 1 by the service life of equipment. And hence, if it is taken as 1 by service life of the equipment then for double declining-balance method, this becomes 2 divided by service life of the equipment.

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Given

$V = 5,00,000$

$V_s = 50,000$

$N = 10$

Depreciation using ST-line method

$= \dfrac{Rs\ 5,00,000 - Rs\ 50,000}{10} = Rs\ \dfrac{4,50,000}{10} = Rs\ 45,000$

DDBM uses 2 times the f value calculated using ST-line method

f – ST-line method $= 0.09$

f for DDBM method $= 2 \times 0.09 = 0.18$ or 18%

The Book value using DDBM after 1 year, if = 1

$V_a = V - V_f = V(1-f) = 5,00,000(1-0.18) = Rs\ 4,10,000$

Hence dep. for the 1st yr. using DDBM

$= 5,00,000 - 4,10,000 = Rs\ 90,000$

→ Dep for 1st yr $= 0.18 \times 5,00,000 = Rs\ 90,000$

So, it simplifies and only knowing the service life of the equipment we can compute the percentage for the double declining-balance method. Let us take an example to compute, double declining-balance method. Now, the example is if a business purchased a vehicle for RS 5 lakh and expect it to last for 10 years and after which its salvage value is expected to be Rupees 50,000, the company would deduct the remaining 4 lakh 50000 as 45000 per year for 10 years under straight-line depreciation method. Find the depreciation for first two years using double declining-balance method.

Let us solve it on the board. Now, this is the example to demonstrate, the double declining-balance method. So, what is given, V equal to 5 lakh, Vs is equal to 50000, N is equal to 10. Now, if I try to calculate what will be the depreciation using straight-line method, so, depreciation using straight-line method. This is equal to Rupees 5 lakh - Rupees 50,000

divided by 10 which comes out to be Rupees 4,50000 divided by 10 is equal to RS 45,000. This is my depreciation rate using straight-line method.

Now, hence fixed percentage factor f using straight-line method is equal to 45,000 divided by 5,00,000, this comes out to be 0.09 or 9 percent. Now, DDBM double declining-balance method uses 2 times the f value calculated using straight-line method. So, f for straight-line method is equal to 0.09 and hence, f for DDBM method will be 2 into 0.09 that is 0.18 or 18 percent.

Now, the book value using DDBM after 1 year that is a equal to 1, Va is equal to V - Vf is equal to V 1 - f is equal to 5 lakh into 1 - 0.18 is equal to Rupees 4,10,000. Hence depreciation for the first year using DDBM equal to 5 lakh - four lakh ten thousand is equal to Rupees 90,000. Now, this can be directly computed. Depreciation for first year is equal to 0.18 into 5, 00,000 is equal to Rupees 90,000. So, again we can calculate is in this manner or we can directly calculate the depreciation for the first year as this.

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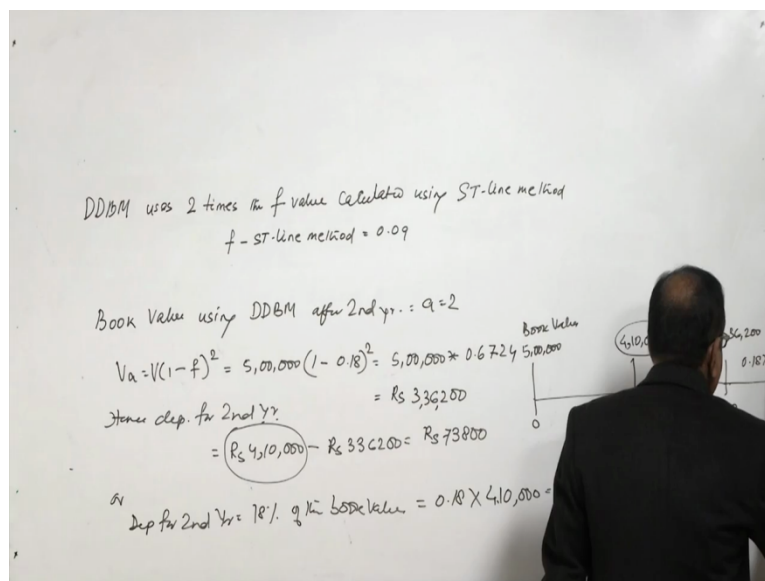
Now, similarly depreciation for the second year. Now, book value using DDBM after second year, a equal to 2, Va equal to 1 - f whole square equal to 5 lakh 1 - 0.18 whole square, this comes out to be 0.6724 Rupees 336200. Hence, depreciation for second year is equal to Rupees 4,10,000 - Rupees 36200 equal to Rupees 73,800. Now, this 4,10,000 is the book value after the first year, that we have calculated in the first step or directly you can go, the depreciation for second year is equal to 18 percent of the book value that comes out to be

0.18 into the 4,10,000, comes out to be 0.18 into 41,000, this is 0.18 into 4,10,000 that comes out to be, Rupees 73,800.
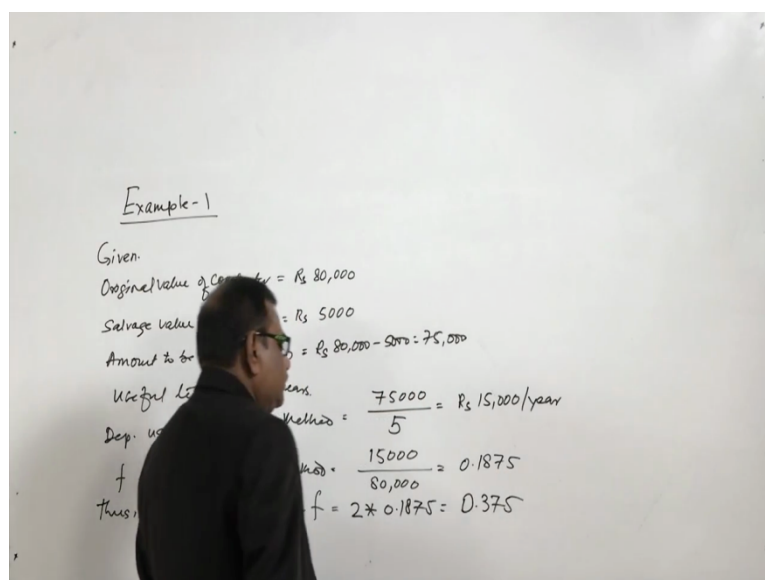
If in the time line we see, this is zero, the cost is 5,00,000 which is book value after one year, this reduces to 4,10,000 Rupees and after, 2.0 this is 3,36,200. So, depreciation from the second year, this will be computed based on the fixed percentage 0.18 into this value. Similarly, for the third year this will be a 0.18 into 3,36,200 depreciation. So, this is the way, how this will move.

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Now, let us take another example, the earlier example was basically given to demonstrate how to compute the depreciation using double declining balance method. Now, this in this example one tells, vinod purchased a i7 computer paying Rupees 80,000. The computer's

estimated salvage value is Rupees 5000 after 5 years of useful life. Use double decline method to compute annual depreciation for all five years.

Now, what is given to us, original value of computer is equal to Rupees 80,000, salvage value of computer is equal to Rupees 5000, amount to be depreciated is equal to Rupees 80,000 - 5000 equal to Rupees 75,000. Useful life N is equal to 5 years. Now, this is the parameters under which, we have to compute the depreciation. Now the first step is to find out, depreciation using straight-line method.

So, depreciation using straight-line method is equal to Rupees. 75,000 divided by 5, which comes out to be Rupees. 15,000 per year. Now, you have to for find out the value of f, f value that is fixed percentage value for straight line method is equal to 15,000 divided by the original cost that is 80,000, which comes out to be 0.1875. Now, thus for double declining method. Thus, for DDBM the value of f will be equal to 2 into 0.1875, comes out to be 0.375 that is 37.5 percent.

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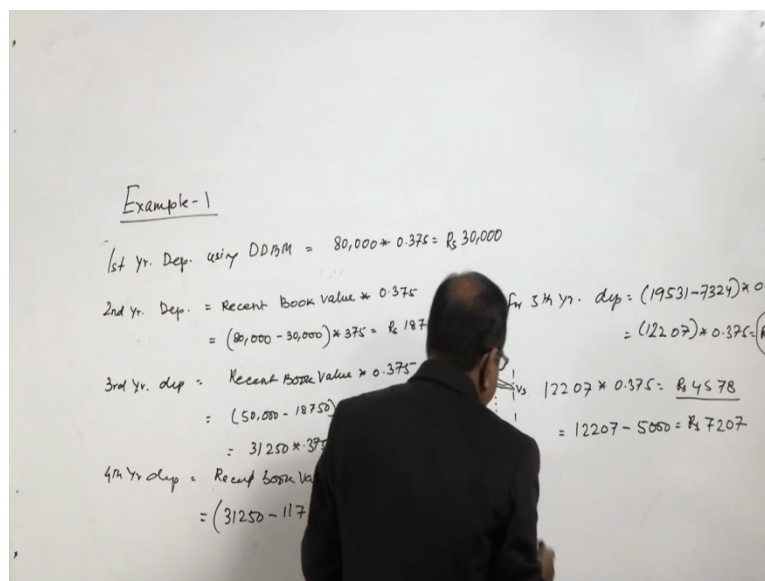
Using straight line depreciation method

Annual depreciation = 75000/5= Rs.15000 per year

Annual depreciation(in terms of fraction of original cost) = 15000/80000=0.1875

Thus for double decline method annual depreciation will be =2*0.1875=0.375

Thus for 1st year depreciation amount will be= 80000*0.375 = Rs. 30,000

For 2nd year depreciation amount will be= Recent Book value*0.375 = (80000-30000)*.375= Rs.18750

For 3rd year depreciation amount will be= Recent Book value*.375 = (50000-18750)*.375= Rs.11718.8

For 4th year depreciation amount will be= Recent Book value*0.375 = (31250-11719)*.375= Rs.7324

For 5th year depreciation amount will be= Recent Book value*0.375 = (19531-7324)*.375= Rs.7207*

* At the end of 5th year the book value should reach Rs.5000. However, as per the calculation it is Rs. 4578(.375*12207). However, this value when deducted from 4th year end book value will not bring the book value to Rs.5000. Thus the 5th year depreciation will be 4578+2629= Rs.7207 which when deducted from Rs.12207(book vale of 5th year) will bring the book value to Rs.5000.

Year	Depreciation Rate	Depreciation, Rs.	Cumulative Depreciation, Rs.	Book Value
0				80000
1	0.375	30000	30000	50000
2	0.375	18750	48750	31250
3	0.375	11719	60469	19531
4	0.375	7324	67793	12207
5	0.375	7207*	75000	5000

*Rs.12207- Rs.5000 = Rs.7207 This is for matching the salvage value of the asset which is Rs.5000

Now, the first year depreciation, the first year depreciation using DDBM method is equal to 80,000 into 0.375, this comes out to be Rupees 30,000. Now, now second year depreciation will be recent book value into 0.375, this is a factor. Now, recent book value is 80,000 - 30,000 because this is the depreciation of the first year into 375 that comes out to be Rupees 18,750, let us check it. Now for third year, depreciation will be recent book value into 0.375 and in this case the recent book value will be, this will be book value, at the end of the first year and start of the second year. Now, the book value will be 50,000 - 18750 into 375 which comes out to be 50,000 - 18750, comes out to be 31,250 into 375 into point 375 comes out to be Rupees 11,718.8.

Now, fourth year depreciation will be, recent book value into 0.375. So, this is equal to 31250 - 11719, let us write it 719 into 0.375, this comes out to be Rupees 7324. And for the fifth

year for fifth year, the depreciation is equal to 19531 - 7324 into 0.375, this comes out to be 11207 into 0.375, which comes out to the Rupees 7207. Now, at the end we are charging 7207 but if I multiply this, this comes out to this less, this is 122. So, if I multiply 12207 into 0.375 this comes out to the Rupees 4578, however I am charging this 7207.

From where this 720607 has come, this has come 12207 - the book salvage value 5000 comes out to be Rupees 7207 that means, this is Vs, this V, I was moving something like this above Vs. So, from here we have taken straight-line. This is fourth year to fifth year, this is fifth year. So, for the fifth year I am deducting 7207 instead of 4578 to bring it to the DBVs value. This table shows you, the values computed. The depreciation computed for different years which I had already shown you in the blackboard.

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Now, let us go to the example number two. Now, the example number is two is a crude distillation laboratory unit was purchased by paying Rupees 2 lakh with a service life of 7 years. The expected salvage value after the useful life is estimated to be 20,000. Determine the depreciation charges and year and book values using declining-balance method.
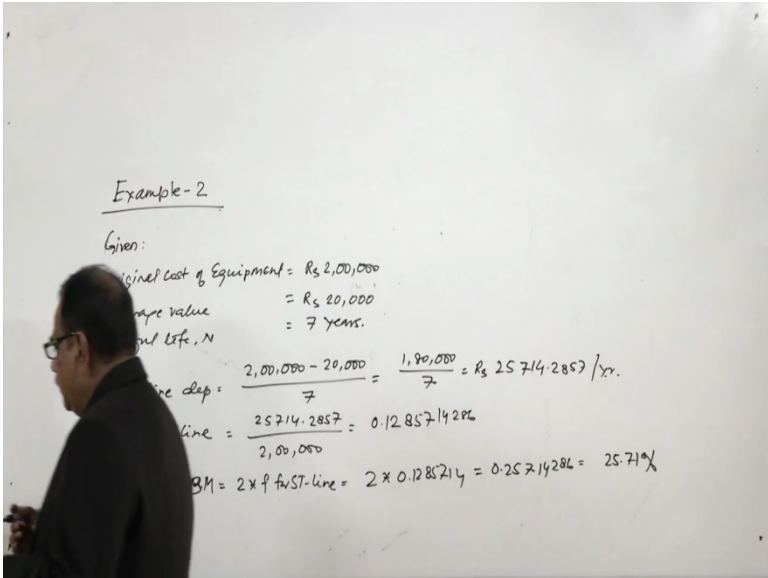
Uhh This question is not much different than the example one. So, let us solve it. So, given are, original cost, cost of the equipment was Rupees 2 lakh, salvage value is Rupees 20,000, useful life N is equal to 7 years. Now, obviously the first step for solving this will be to calculate, the depreciation rate using straight-line method and then we have to convert it into a fraction f and then for double declining-balance method will take two times this value and start computing the depreciation charges.

So, using straight-line, depreciation will be 2, 00,000 - 20,000 divided by 7. So, this is nothing but 1,80,000 divided by 7, this comes out to be Rupees 25714.2857 per year. So, the fraction value of f using the straight-line method is equal to 25714.2857 divided by this two lakh using a finding out the fraction of the original cost, comes out to be 0.1285714286. Now, thus f for DDBM, BM is equal to 2 into f for straight-line method is equal to 2 into 0.1285714 comes out to the 0.25714286 is equal to around 25.71 percentage.

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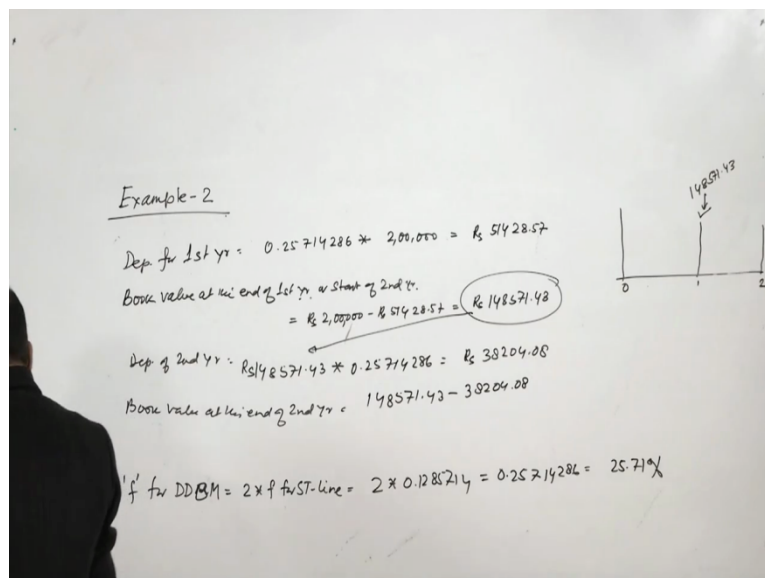
So, we have computed now the f for double declining-balance method which comes out to be about 25.71 percent. Now , depreciation for first year will be this value 0.25714286 into Rupees 2,00,000, that is the original cost of the equipment which comes to be Rupees 51428.57.

Now, the book value at the end of first year or start of second year because this is the book value here, this is zero, this is one, this is two. So, this is the book value here, at this point. So, I can say that the end of the first year or the start of the second year is equal to RS 2,00,000 - this value which 51428.57 is equal to Rupees 148571.43. So, this is the value 148571.43 this is at this point.

Now, the depreciation for the second year will be, will be this book value multiplied by the factor. This book value will come here, that is Rupees 148571.43 into this factor 0.25714286, this comes out to the Rupees 38204.08. Now, the book value at the end of second year will be 148571.43 - 38204.08. Now, this way the computations should be done. Now, let us see, the results in a tabulated form.

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Year	Depreciation Rate	Depreciation, Rs.	Cumulative Depreciation, Rs.	Book Value
0				2,00,000
1	0.2571428	51428.56	51428.56	148571.4
2	0.2571428	38204.8	89633.4	110366.6
3	0.2571428	28379.9	118013.3	81986.7
4	0.2571428	21082.3	139095.6	60904.4
5	0.2571428	15661.1	154756.7	45243.3
6	0.2571428	11633.9	166390.7	33609.3
7	0.2571428	13609.3*	180000.0	20000

* At the end of 7th year the book value should reach Rs.20000. To maintain Rs.20,000 as book value the depreciation charged at the end of 7th year is Rs. 13609.3 and not 0.2571428 *33609.3 (=8642.39).

Now, this is the result in the tabulated form and here we should observe that the depreciation is decreasing. In the first year, it is 51428 then it is 38000 and then it will further decrease. That means in the early years, the depreciation will be far more than the later years. In this also we will see that, the depreciation in the last year has to be computed based on the salvage value because here we also find that from the starting to V, it will not reach Vs, it will reach something here.

So, somewhere here we have to put a straight-line method that it is sixth year, this seventh year to reach to the Vs and that is why the value of Vs will be different that I had already written at the end of this table that how the Vs value will have to be calculated in the last year.

Now, let us summarize the lecture. The monetary value of an asset decreases over time due to the use wear and tear or obsolescence, this is, this decreases the measure of depreciation, this we have already known about this. And in this lecture, I have demonstrated how to use double declining-balance method for depreciation computation and the main thing for, of this double declining-balance method is that it depreciates large value, it gives large value of depreciation at the early years than the later years. And hence, due to this high depreciation the profit in the early years will be less and hence, you have to pay less taxes in the early years. Thank you.