Depreciation, Alternate Investment and Profitability Analysis.
Professor Dr. Bikash Mohanty.
Department of Chemical Engineering.
Indian Institute of Technology, Roorkee.
Lecture-8.
Depreciation-Comparative Study of Different Depreciation Methods.

Welcome to the course Depreciation, Alternate Investment and Profitability Analysis. We are continuing with module one that is depreciation and this is the last lecture of my depreciation. The topic of the lecture is comparative study of different depreciation methods. So obviously we will first go through the different depreciation methods and their formulae and then we will take questions or examples through which we will apply these methods and will compare the depreciation values.

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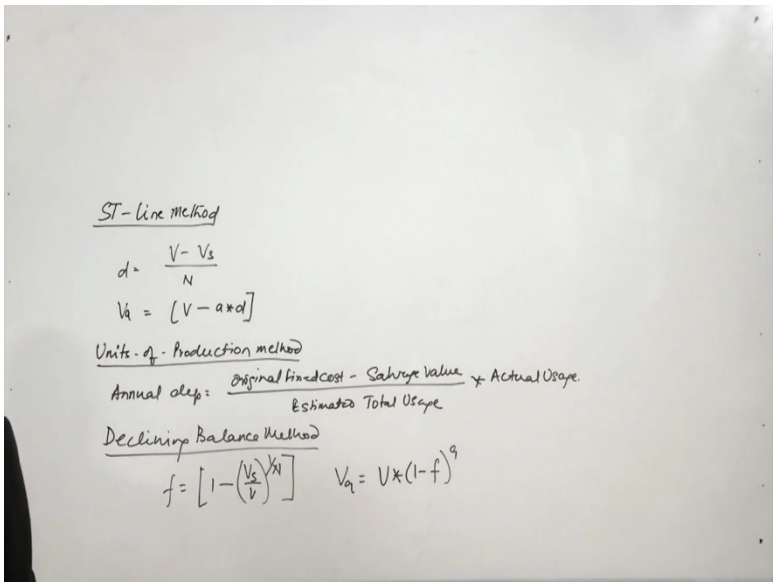

Now to start with the easiest depreciation technique is Straight-Line Method. Here d is equal to V - Vs divided by N and Va is equal to V - a into d. Now for Units-Production Method, this annual depreciation original fixed cost - salvage value divided by estimated total usage into actual usage, now for Declining Balance Method this is fixed factor is equal to 1 - Vs by V to the power 1 by N and Va Book value at the end of eight year is V into 1 - f to the power a.

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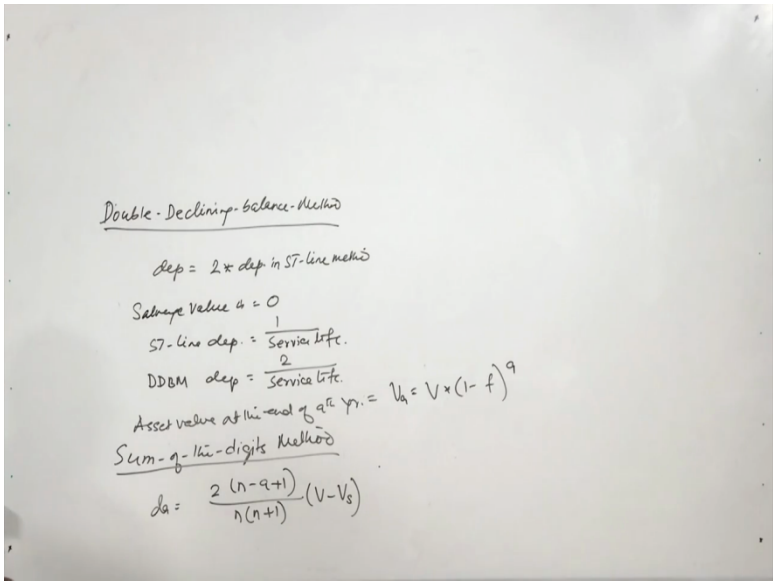

Now this is also available on your screen now let us go for the second set of formulae. Now for Double-Declining Balance Method, now depreciation is 2 into depreciation in Straight-Line Method and if the salvage value is equal to 0 then Straight-Line Depreciation is equal to 1 by service life and DDBM depreciation will be obvious 2 by service life. Now assets value at the end of 'a'th year is equal to Va equal to V into 1 - f to the power a and this f fixed factor will be the Double-Declining Balance Fixed factor not Declining Balance Fixed factor.

Now in the Sum-of-the-Digits Method, da that is depreciation in the year a is equal to 2 n - a + 1 divided by n into n + 1 V - Vs while n is the service life of the equipment.

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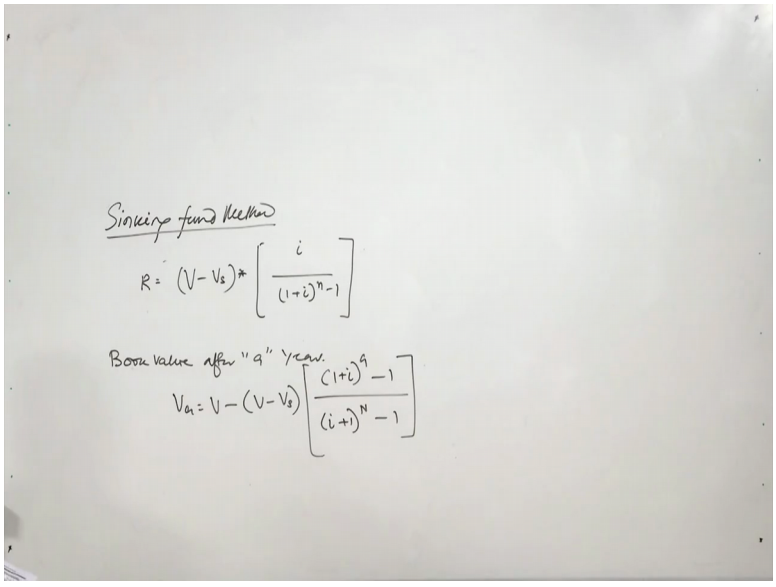

Modified Accelerated Cost recovery System (MACRS)

Applicable recovery year	Applicable recovery percentage to give annual depreciation for class life of			
	3 years	5 years	7 years	10 years
1	33.33	20	14.29	10.0
2	44.45	32	24.49	18.0
3	14.81	19.20	17.49	14.40
4	7.41	11.52	12.49	11.52
5		11.52	8.93	9.22
6		5.76	8.92	7.37
7			8.93	6.55
8			4.46	6.55
9				6.56
10				6.55
11				3.28

Now for Sinking-Fund Method, the R that is uniform payment is equal to V - Vs into i 1 + i to the power n - 1 and the Book value after a years. Va is equal to V - V - Vs 1 + i to the power a - 1 i + 1 to the power n - 1 and for the modified for MACRS there is a table which is shown now on your screen the data given in this table is used to compute the depreciation rates for different years in a MACRS Method. These two graphs shows how the Book value changes n different methods, this very clearly tells that how the book value changes.

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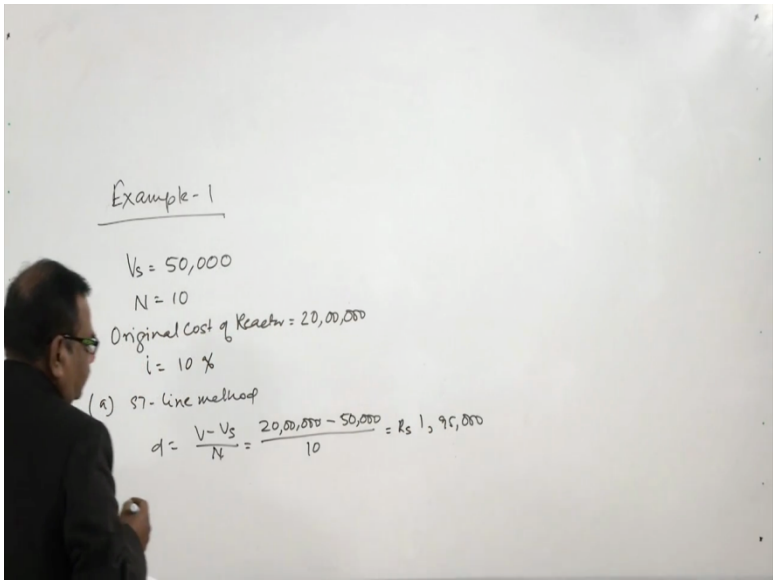
Example-1: A reactor having a salvage value of Rs.50,000 is estimated to have a service life of 10 years. The original cost of the reactor was Rs.20,00,000. Determine the following:

(a) The annual depreciation charge by straight line method
(b) The depreciation charge for the 6th year if double-declining balance method is used
(c) The depreciation charge for the 6th year if declining balance method is used
(d) The depreciation charge for the 5th year if sum-of-the-years-digits method is used
(e) The depreciation charge for the 5th year if sinking fund method is used(Given i=0.1)
(f) The percentage of the original investment paid off in the first half of the service life if double-declining balance method is used
(g) The percentage of the original investment paid off in the first half of the service life if sum-of-the-years-digits method is used
(h) Tabulate depreciation and book value for 1-10 years using combined method, i.e. double-declining balance method for the first five years and straight line method for the rest five years.



Now let us start with the example1 in which we will compare all the methods. Example 1, a reactor having a salvage value of 50,000 Vs 50,000 is estimated to have a service life of 10 years, N is equal to 10 years. The original cost of the reactor is 20,00,000. Cost of reactor is equal to 20,00,000. Determine the following, (a) The annual depreciation charge by Straight-Line Method. (b) The depreciation charge for the sixth year if Double-Declining Balance Method is used.

(c) The depreciation charge for the sixth year if Declining Balance Method is used. (d) The depreciation charge for the fifth year if Sum-of-the-Years-Digits Method is used. (e) The depreciation charge for the fifth year if Sinking-Fund Method is used i is equal to 10 percent. (f) The percentage of the original investment paid off in the first half of the service life if Double-Declining Balance Method is used. (g) The percentage of the original investment paid off in the first half of the service life if Sum-of-the-Years-Digit Method is used and finally (h) tabulate depreciation and book value for 1 to 10 years using Combined Method that is Double-Declining Balance Method for the first five years and Straight-Line Method for the next five years.

Now let us solve this, these are the given values an interest rate i is 10 percent. Part a the Straight-Line Method, now d is equal to V - Vs divided by N is equal to 20,00,000 - 50,000 divided by 10. This comes to be rupees 1,95,000.

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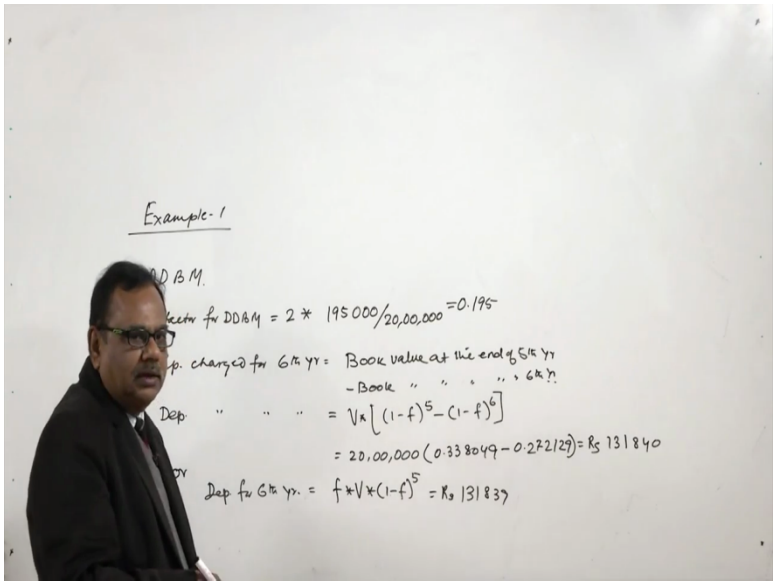

Example 1 now b part, this is DDBM the f factor for DDBM is equal to 2 into 195000 divided by 20,00,000 that comes out to be 0.195. Now depreciation charged for sixth year is equal to Book value at the end of fifth year - Book value at the end of sixth year. So depreciation charged for sixth year is equal to V into 1 - f to the power 5 - 1 - f to the power 6. This is equal to 20,00,000 into 0.338049 - 0.272129 is equal to Rupees 131840.

Or in a different way we can solve this problem also. Now depreciation for sixth year is equal to f into V - 1 - f to the power 5 and this is also equal to rupees 131839 and this is 131840, this is 131839 and this small mistake has been done due to rounding rounding off error.

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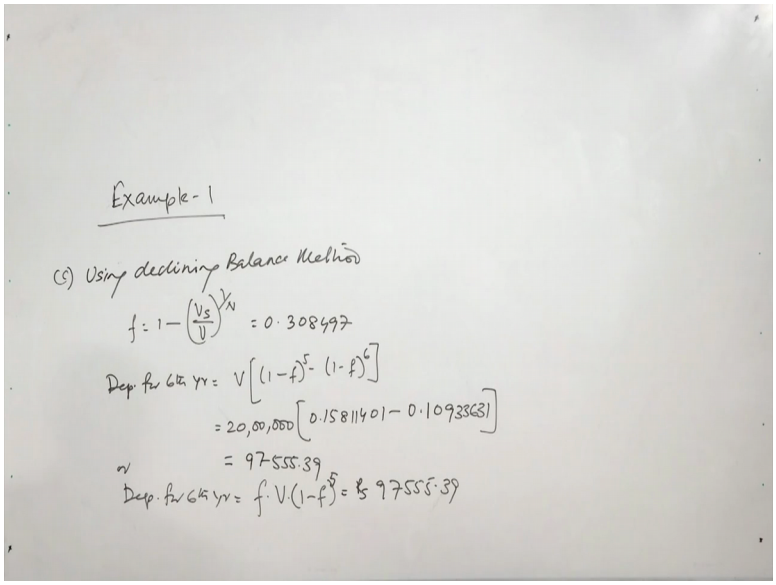

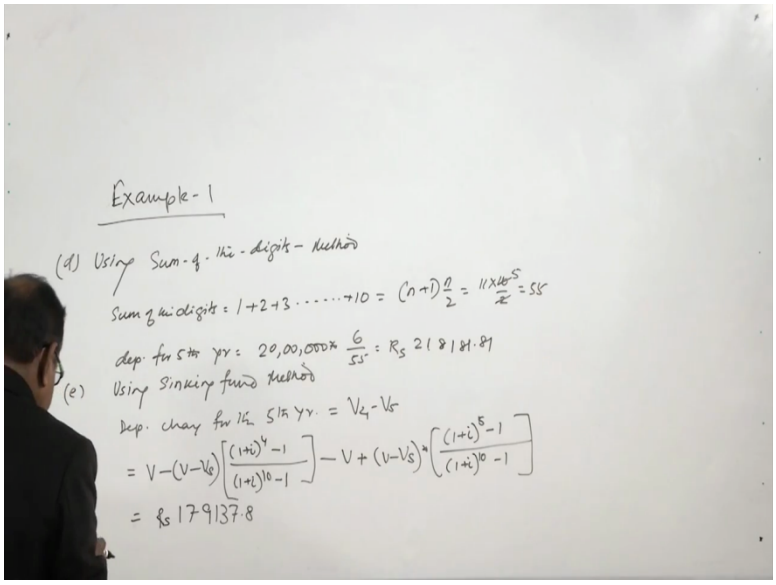

Now using Declining Balance Method c part f is equal to 1 - Vs by V to the power 1 by N, with this we calculate the value of f as 0.308497. Now depreciation for sixth year is equal to Book value of the fifth year - Book value of the sixth year. So you can write down this 1 - f, 5 - 1 - f to the power 6 and when you put the values here 20,00,000, this comes out to be 0.15811401 - 0.10933631 and this comes out to be 97555.39 or we can calculate depreciation for sixth year is equal to f into V into 1 - f to the power 5 that comes out to be rupees 97555.39.

Now (d) using Sum-of-the-Digits Method, now Sum-of-the-Digits equal to 1 + 2 + 3 + 10 is equal to n + 1 n by 2 is equal to gyrah into dus by 2 pahch isko 55. Now depreciation for fifth year is equal to twenty lakh into 6 by 55 is equal to rupees 218181.81. Now (e) using Sinking-Fund Method now depreciation charged for the fifth year is equal to V4 - V5 and is equal to V - V - Vs 1 + i to the power 4 - 1, 1 + i to the power 10 - 1 - V + V - Vs into 1 + i to the power 5 - 1, 1 + i to the power 10 - 1. i is 10 percent so this comes out to be rupees 179137.8.

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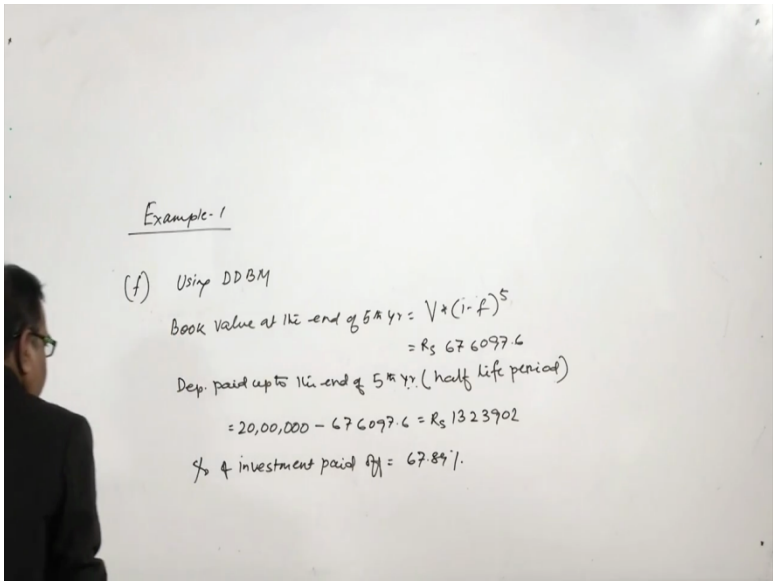
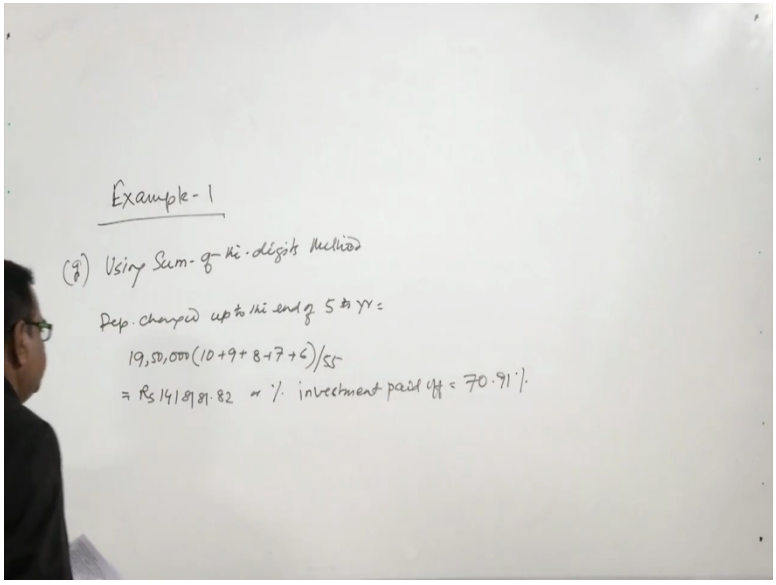
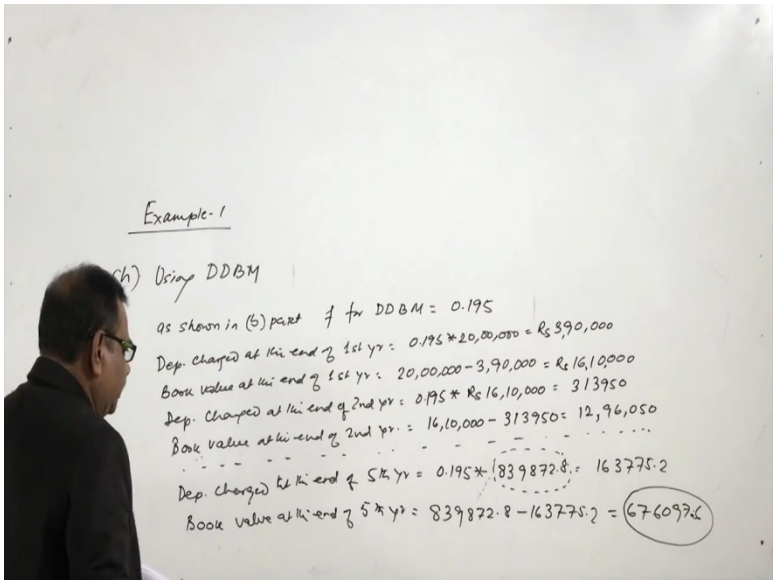




Year	Dep. Charged, Rs.	Book Value, Rs.	Method Used
0		2000000	
1	390000	1610000	DDBM
2	313950	1296050	DDBM
3	252729.8	1043320	DDBM
4	203447.4	839872.8	DDBM
5	163775.2	676097.6	DDBM
6	125219.5	550878.1	SLM
7	125219.5	425658.6	SLM
8	125219.5	300439.1	SLM
9	125219.5	175219.6	SLM
10	125219.5	50000.11	SLM



Now part (f) using again DDBM, Book value at the end of fifth year is equal to V into 1 - f to 5 this comes out to be rupees 676097.6. Now depreciation paid up to the end of fifth year that is half life period is equal to 20,00,000 so initial cost - this value 60,6097.6 that comes out to be rupees 1323902 and percent wise percent paid, if I want to calculate, is percentage of investment paid, this paid off it is equal to about 67.89 percent.

Now (g) part using Sum-of-the-Digits Method, now depreciation charged up to the end of fifth year is equal to 1950 + 10 + 9 + 8 + 7 + 6 divided by 55 and this comes out to be rupees 1418181.82 or percentage wise investment paid off is equal to 70.91 percent and this factor is 20,00,000 - 50,000 rupees. Now if we go for (h) part using again DDBM Method but here I have to calculate the depreciation for the first five years using DDBM and the next five years using Straight-Line Method. So as shown in (b) part of this problem, f for DDBM is equal to 0.195. So depreciation charged at the end of first year is equal to 0.195 into 20,00,000 and this comes out to be rupees 3,90,000. So Book value at the end of first year is equal to 20,00,000 - this value 3,90,000 comes out to be rupees 161 four zeros that is 16,10,000. Now depreciation charged at the end of second year is equal to 0.195 multiply by this rupees 16,10,000 which comes out to be 313950.

Now Book value at the end of second year is equal to 16,10,000 - this 313950 which comes to be 12,96,050. Now this way I compute up to five years, so depreciation charged at the end of fifth year is equal to 0.195 into Book value and that Book value comes out to be 9872.8, so it comes out to be 163775.2 and this value I can pick up from the table. This is the table before you and from this table I can pick up this value.

So Book value at the end of fifth year is equal to 839872.8 - 163775.2 this comes out to be 676097.6, now from this value 6760976.6.6 this has to depreciated to 50,000 rupees which is the Book value.

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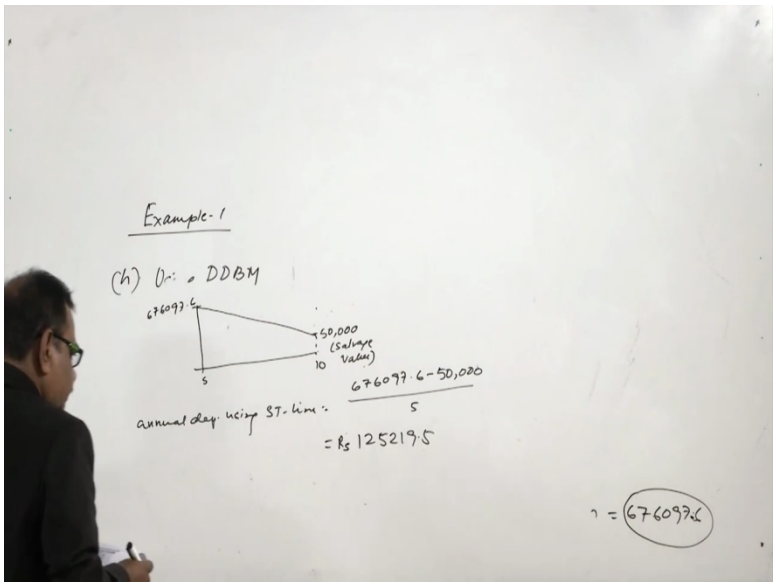

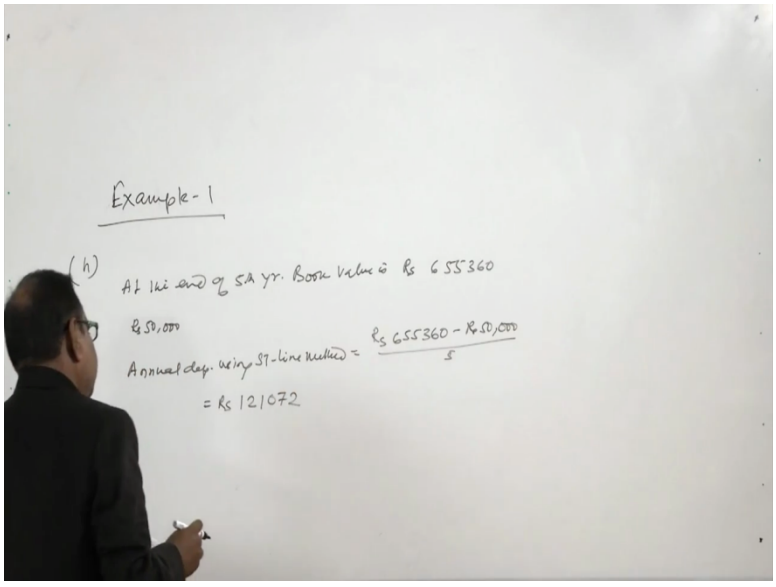

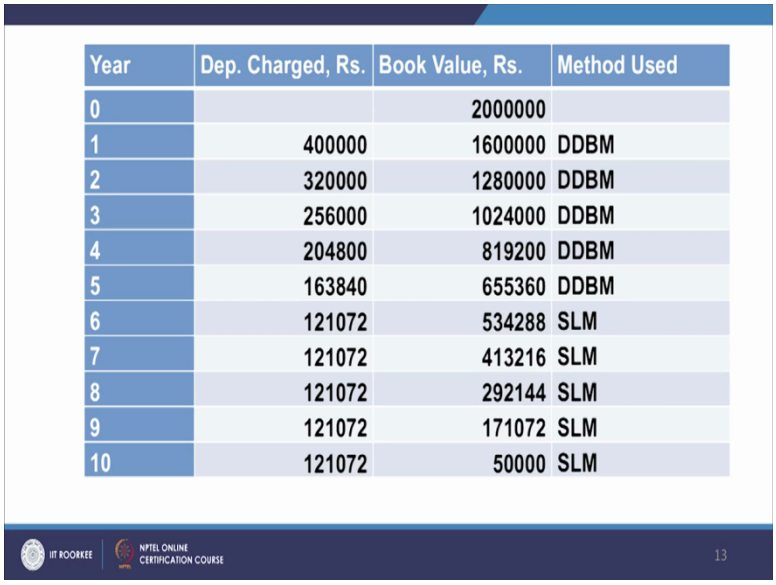

Now after applying DDBM for five years this is 5, this is 10 this value is 676097.6 and this value is 50,000 this is salvage value. So by using straight line I have to reach from this value to this value and thus annual depreciation using Straight-Line Method is equal to 676097.6 - 50,000 divided by 5 that comes out to be rupees 125219.5.

So this is the amount of Straight-Line depreciation it remains constant for the next five years and accordingly the Book values are being calculated. So you can see the table and check the Book values and the depreciation. If you see here at the end of fifth year the Book value is rupees 655360 now this Book value need to be depreciated to rupees 50,000 which is the salvage value in 5 years using Straight-Line Method.

So annual depreciation using Straight –Line Method is equal to rupees 655360 - rupees 50,000 divided by 5 years, which comes out to be rupees 121072. As this is a Straight-Line Method the depreciation per year remains constant. So for the next five years the depreciation per year will be 1,21,072.

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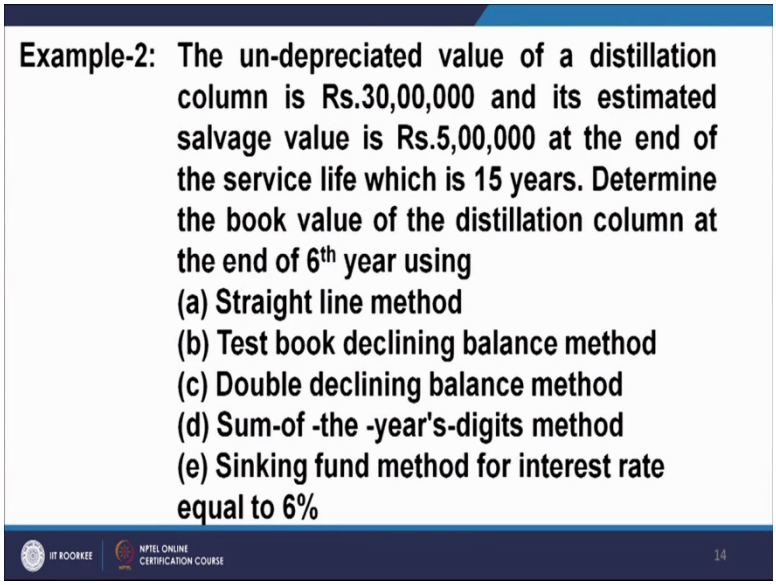

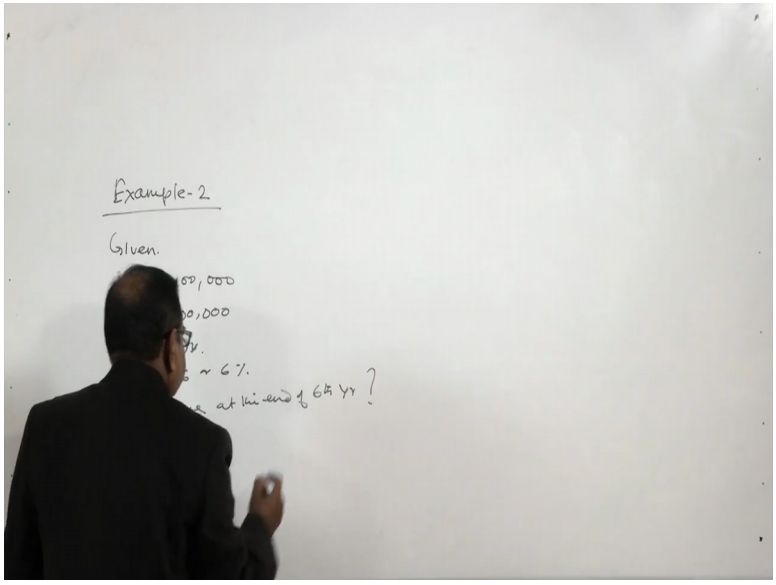

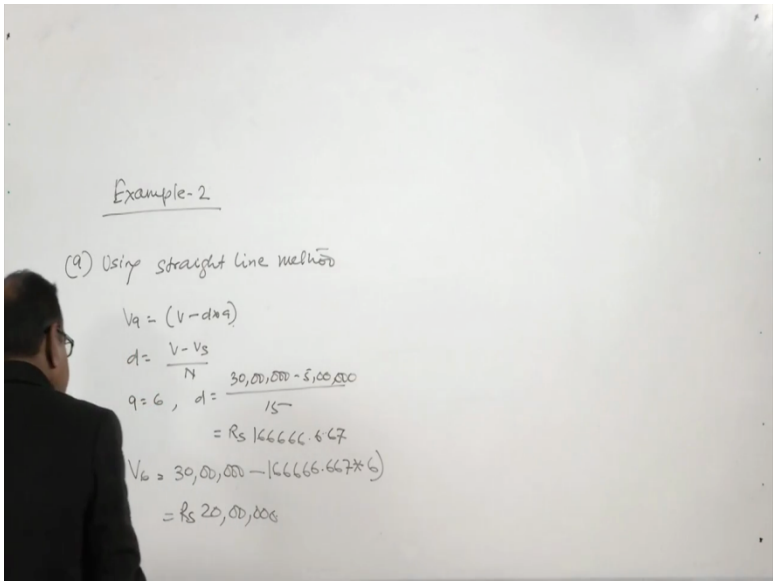

Now this is the second question example number 2. The example number 2 the un-depreciated value of a distillation column is 30,00,000 and its estimated salvage value is 5,00,000 at the end of the service life which is 15 years. Determine the Book value of the distillation column at the end of sixth year using Straight-Line Method, Test Book Declining Balance Method, Double-Declining Balance Method, Sum-of-the-Year-Digit Method, Sinking-Fund Method for interest rate equal to 5 percent.

Now the solution, what is given is V is equal to 30,00,000, Vs is equal to 5,00,000, service life N is equal to 15 years 15 years or 5 years yes 15 years, i is equal to 0.06 or 6 percent, now Book value at the end of sixth year . Now if we use the Straight-Line Met6hod (a) using Straight-Line Method, Va is equal to v - d into a and d is equal to v - Vs divided by N. So for our case a is equal to 6, d is equal to 30,00,000 - 5,00,000 divided by 15 that comes to be 166666.667 so V6 is 30,00,000 - 1 into 6 this comes out to be rupees 20,00,000.

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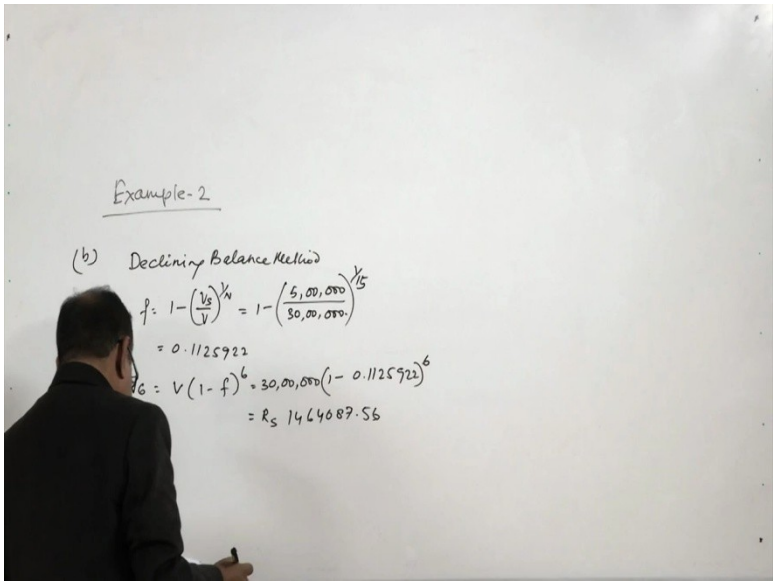

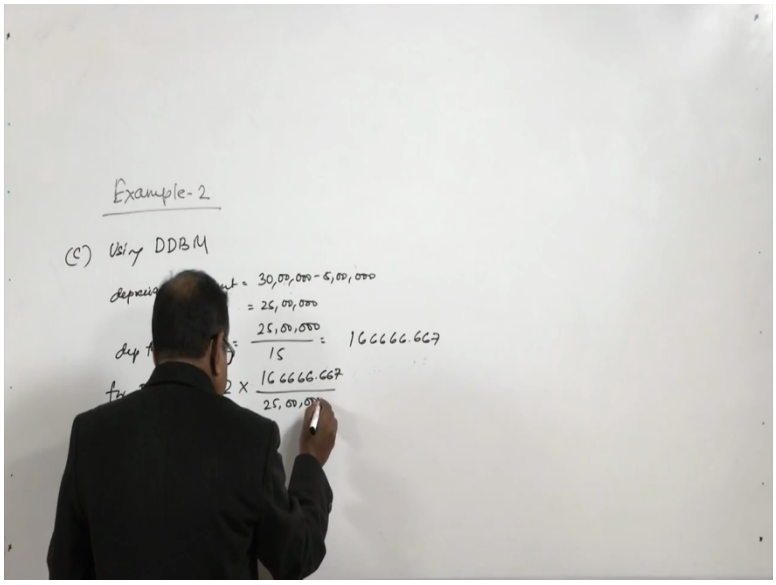

Now (b) Declining-Balance Method f is equal to 1 - Vs by V to the power 1 by N, now this is equal to 1 - 5,00,000 divided by 30,00,000 to the power 1 by 15. This comes out to be 0.1125922, so V6 is V into 1 to the power 6 is equal to 30,00,000, 1 - 0.1125922 to the power 6 this comes out to be rupees 1464087.56. Now (c) part using Double Declining Balance Method now depreciable amount equal to 30,00,000 - 5,00,000 equal to 25,00,000.

Now depreciation for ST Method this 25,00,000 has to depreciated in 15 years and hence this is 166666.667. Now for DDBM the depreciation will be twice into the fraction 166666.667 divided by 25,000. To summarize this lecture what we have done in this lecture that we have taken a problem and have calculated the depreciation rates and Book values for Straight-Line Method, Declining-Balance Method, Double Declining Balance Method, Sum-of-the-Years-Digits Method and Sinking-Fund Method. Thank you.