Depreciation, Alternate Investment and Profitability Analysis.
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Lecture-6.
Depreciation Modified Accelerated Cost Recovery System.

Welcome to the course depreciation, alternate investment and profitability analysis, module one depreciation. In this lecture, today I will tell about a depreciation method which is called modified accelerated cost recovery system, the modified accelerated cost recovery system which is called MACRS, it stands for the modified accelerated cost recovery system. It is the current system allowed in the United States to calculate the tax deductions on account of depreciation for depreciable assets other than intangible assets. Internal revenue services that is IRS form 4562 is used to claim depreciation deduction. It allows a larger deduction the early years and lower deduction in late years when compared to the straight line method of deduction.

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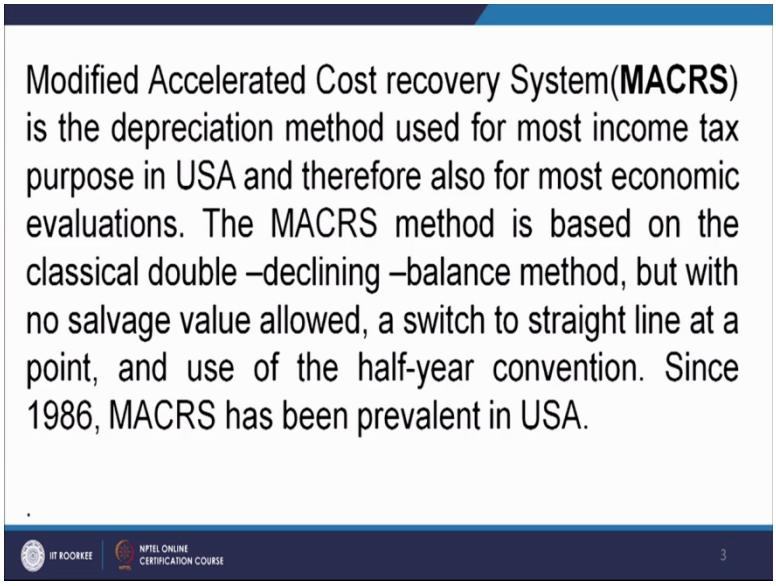

Modified accelerated cost recovery system is the depreciation method used for most income tax purposes in USA and therefore, also for most economic evaluations. The MACRS method is based on the classical double declining-balance method but with no salvage value allowed that means for this system we take salvage value is equal to zero and the switch to straight line at a point and use of the half-year convention, Since 1986, MACRS has been prevalent in USA.

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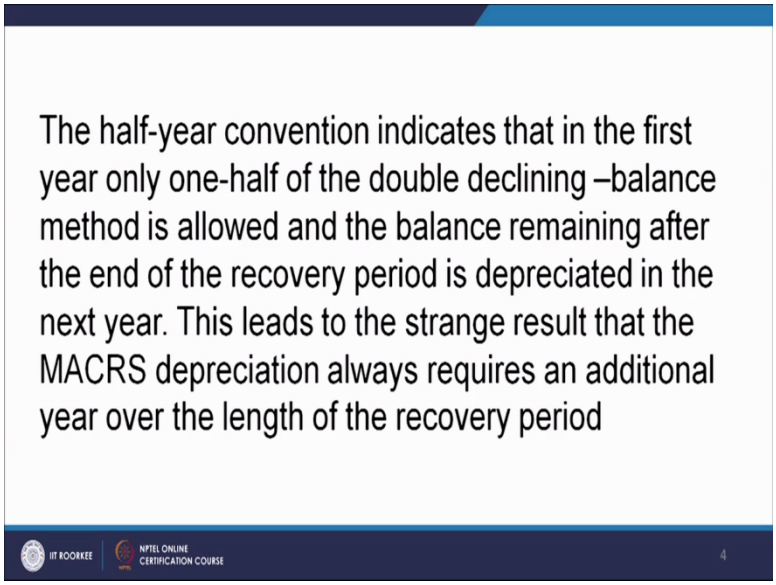

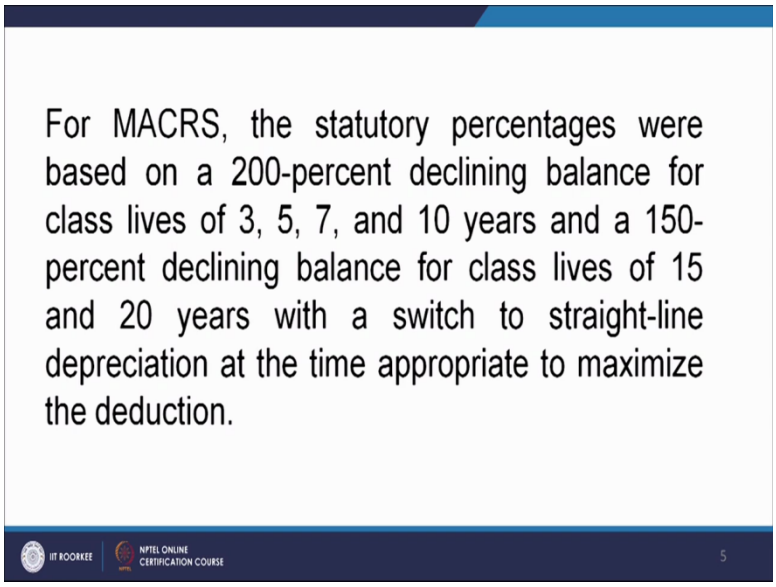

Now, what is the meaning of this half-year convention? The half-year convention indicates that in the first year only one half of the double declining-balance method is allowed and the balance remaining after the end of the recovery period is depreciated in the next year. This leads to the strange result that the MACRS depreciation always requires an additional year over the length of the recovery period. For MACRS, the statutory percentage were based on a 200 percent declining-balance for class lives of 3, 5, 7 and 10 years and a hundred fifty percent declining-balance for class of lives of 15 and 20 years with a switch to straight-line depreciation at the time appropriate to maximize the deduction.

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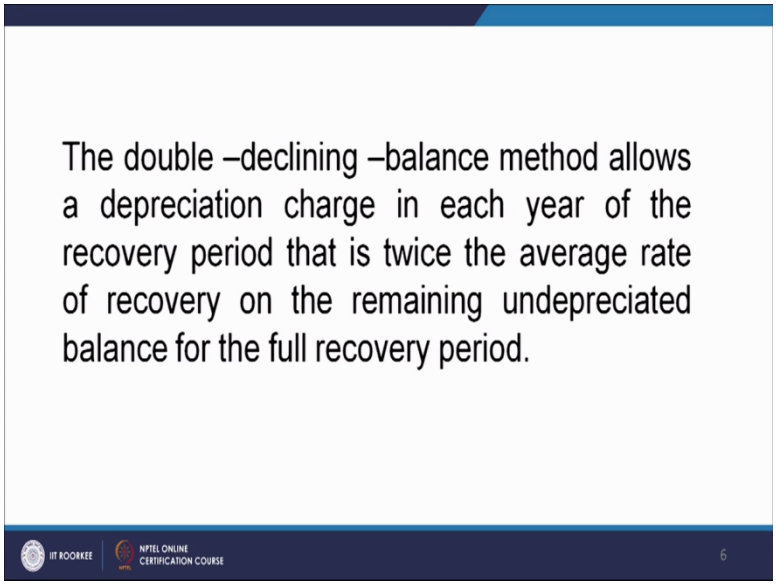

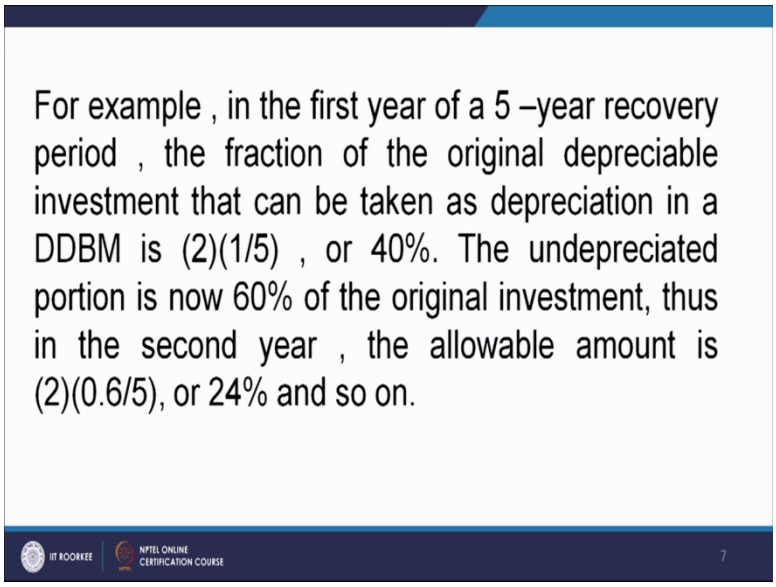

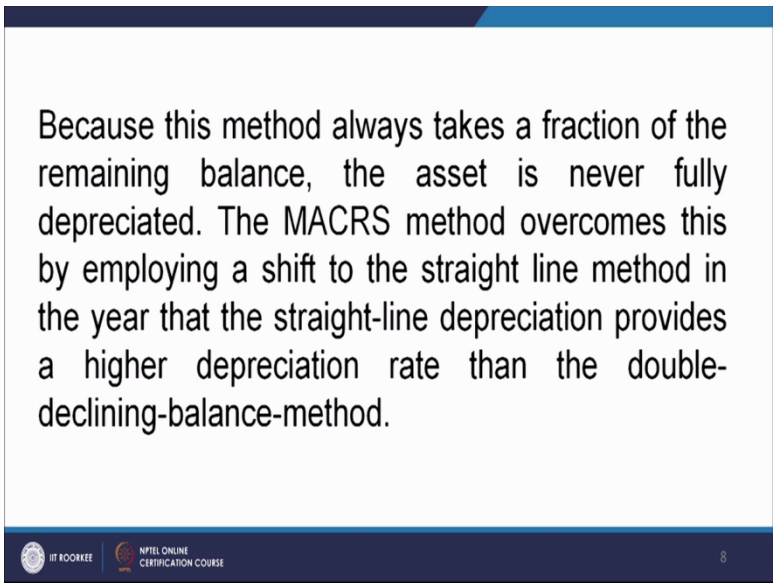

The double-declining-balance method allows a depreciation charge in each year of the recovery period that is twice the average rate of recovery on the remaining underappreciated balance for the full recovery period, for example, in the first year of a 5 year recovery period, the fraction of the original depreciable investment that can be taken as depreciation in DDBM is 2 into 1 by 5 because the salvage value is zero.

In a straight line method, the depreciation will be 1 by useful life of the system. So, it is 1 by 5 and in a double declining-balance method twice of the straight line depreciation is taken and that is why, it becomes 2 into 1 by 5 or 40 percent. The un-depreciated percent is now 60 percent of the original investment. Thus, in the second year, the allowable amount is 2 into 0.6 by 5 and so on. Because this method always takes a fraction of the remaining balance, the asset is never fully depreciated.

The MACRS method overcomes this by employing a shift to the straight line method in the year that the straight line depreciation provides a higher depreciation rate than the double declining-balance method. Accelerated cost recovery system ACRS which was used before, the use of modified accelerated cost recovery system that is MACRS was used by companies which reported depreciation amount and provide them with higher tax deduction.

What has happened, ACRS used to give depreciation cost which were higher in amount and thus, the tax deductions were less in the early years. These tax deductions allow them to keep more of the revenue generated by these assets. This made it possible for companies to quickly repay any associated debts while increasing their bottom life.

Perhaps the most dangerous trend to grow out of the favorable tax treatment of capitalized assets was a large number of hostile takeovers. ACRS inadvertently unleashed a potent weapon for corporate raiders who specialize in leveraging the assets of the target company to finance their attacks. Responding to the criticism, the US congress revised the ACRS as part of the 1986 tax reform act.

The new depreciation method for tangible property put in use after 1986 is called the modified accelerated cost recovery system that is MACRS. The main difference between ACRS and MACRS is that the later method uses longer recovery periods and thus, reduces the annual depreciation deductions granted for residential and the non-residence real states.

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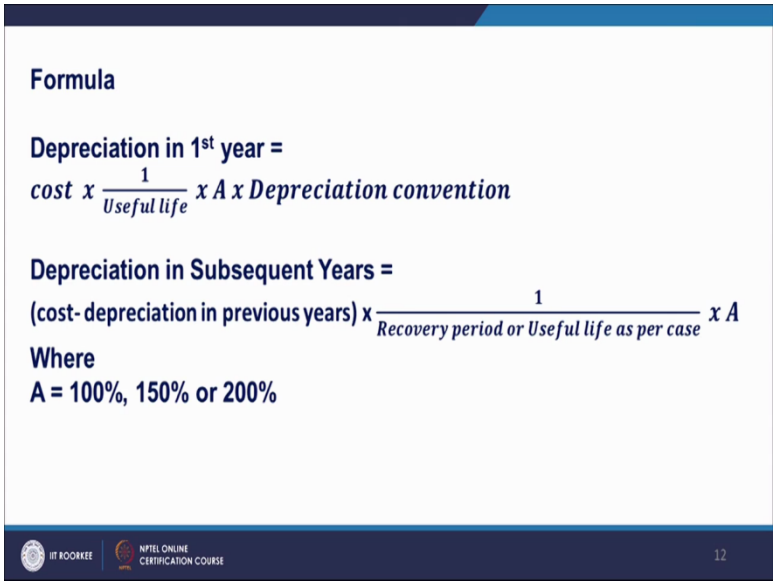

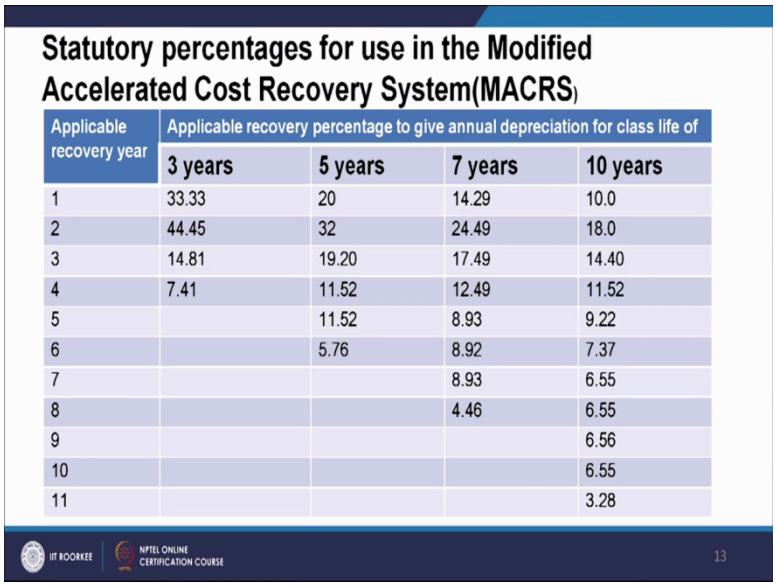

Applicable recovery year	Applicable recovery percentage to give annual depreciation for class life of			
	3 years	5 years	7 years	10 years
1	33.33	20	14.29	10.0
2	44.45	32	24.49	18.0
3	14.81	19.20	17.49	14.40
4	7.41	11.52	12.49	11.52
5		11.52	8.93	9.22
6		5.76	8.92	7.37
7			8.93	6.55
8			4.46	6.55
9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

Now, the formula is this depreciation in the first year is equal to cost 1 by service life into A into depreciation convention. The half yearly convention is basically a depreciation convention. Now, the depreciation in subsequent years is cost - depreciation in the previous years into 1 by service life into A where A can be 100 percent, 150 percent or 200 percent. In a double declining method which is 200 percent method, the A is 200 percent that means 2, the value of A will be 2 and in 150 percent, DDBM it will be 1.5. Now, this shows you the statutory percentage for the use in the modified accelerated cost recovery system MACRS and the class lifes are 3 year, 5 year, 7 year and 10 year.

Now, this table gives the percentage of deduction of the original value each year and here, we are using the half-yearly convention that means in the first year whatever depreciation will be

calculated using DDBM, half of it will be charged. Now, we will take up a table from this table the five year convention and then will try to find out from where this percentages have come up and we will try to justify through calculations these percentages.

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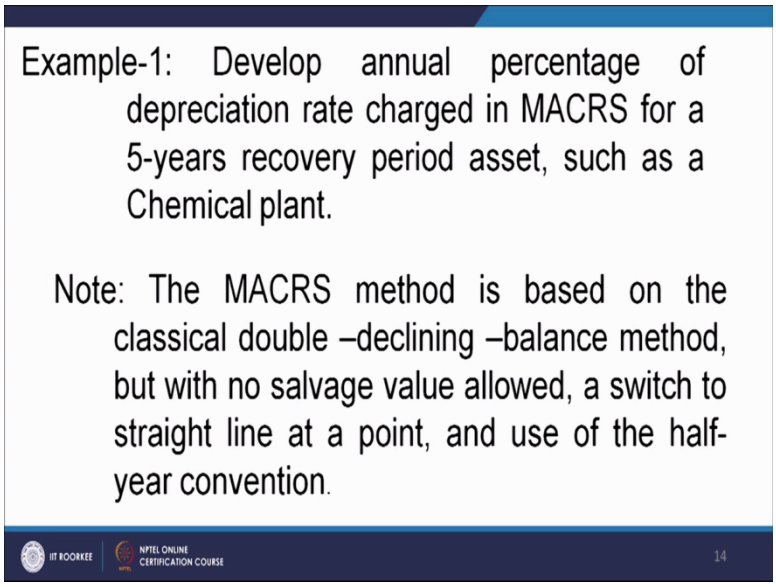

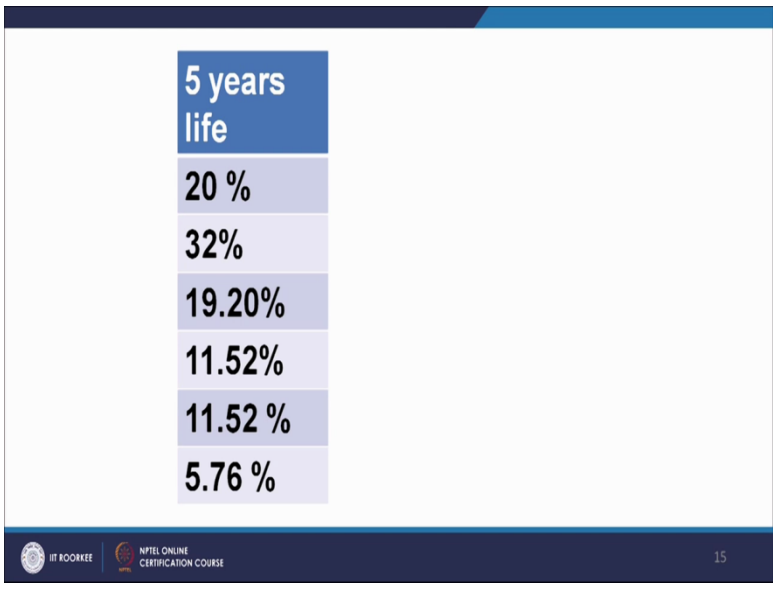

Now, let us take an example, through this example, we will prove. Develop annual percentage of depreciation rate charged in MACRS for a 5-years recovery period assets, such as a chemical plant. Now, we should note that the MACRS method is based on the classical double-declining-balance method, but with no salvage value allowed, that means salvage value taken is zero, a switch to straight line at a point and use of the half-year convention.

Now, this is the 5 year life period. Now, here we see that in the first year we are charging 20 percent of the original value, the second year 32 percent of the original value and in the third

year 19.20 percent of the original value and fourth year 11.52 percent of the original value and fifth year 11.52 percent of the original value and in the sixth year 5.76 percent of the original value. Now, here we see that though, it is 5 years life span product, it is taking 6 year to depreciate it. And when we use the half-yearly convention then in the first year we are charging lesser amount of the depreciation, what is being calculated by the double declining-balance method.

Now, we will prove the automatically that from what this 20 percent, 32 percent,19.20 percent, 11.52 percent and again 11.52 percent and 5.76 percent has arrived. And we will also show you that how to switch from double declining-balance method to a straight line method at a point when either the depreciation calculated by the double declining method is equal to the straight line method or the straight line method computes better depreciation charges or more depreciation charges than the double declining-balance method.

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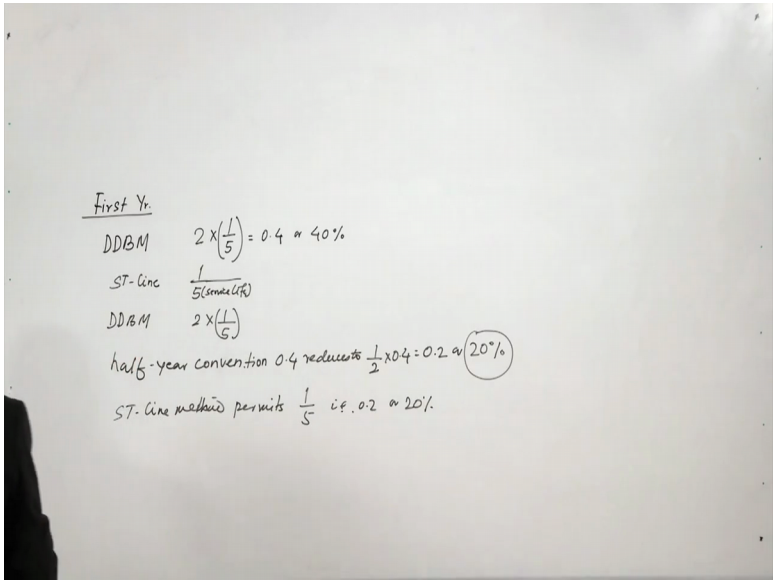

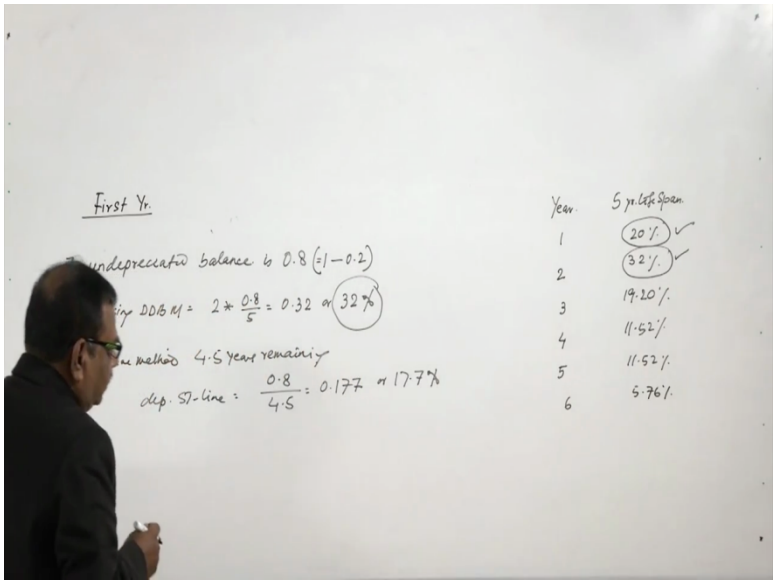

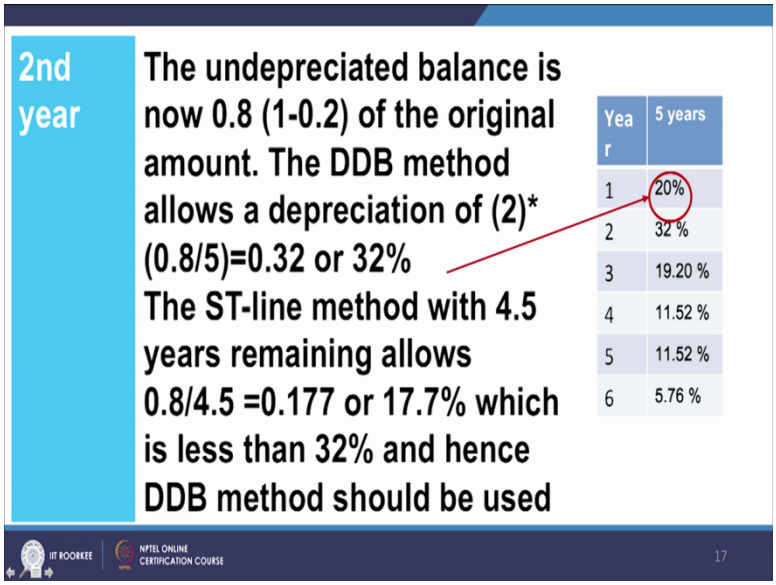

Now, let us take this, the double declining-balance method, we will compute a depreciation which is equal to 2 into 1 by 5 is equal to 0.4 or 40 percent. As salvage value is zero, the straight line method will compute a depreciation which is 1 by 5, 5 is service life and for double declining-balance method this becomes two times and thus 2 by 1 by 5. The percentage calculated is 40 percent in the first year but as we are using the half-year convention, it reduces to half.

Due to the half year convention, this reduces to 40 percent. Now from this 20 percent if we check the 5 year life period table then the first entry in the first year is 20 percent and this is the 20 percent which we have calculated. Thus we are justifying that 20 percent in the first year. Now, if we use the straight line method, the straight line method permits 1 by 5 that is

0.2 or 20 percent also. This is same as the method we are permitting due to the half year convention which is also 0.2 and the straight line method also computes 0.2.

Now, for the second year 5 years life span, this is year, this is 5 year life span. In the first year it is 20 percent, in the second year, this is 32 percent, in the third year, this is 19.20 percent and in the fourth year, this is 11.52 percent and the fifth year again it is 11.52 percent and in the sixth year this is 5.76 percent. We have computed already this, so, this has been checked.

Now, in the second year, the un-depreciated balance is 0.8; how 0.8, 1 - 0.2. This is 20 percent I have already paid up. So, this is 1 - 0.2 is 0.8. Now, the depreciation using DDBM is equal to 2 into 0.8 by 5 and this comes out to be 0.32 or 32 percent. So, we see that in the second year, the depreciation is 32 percent we have calculated and if we see here, in the second year, it is charging 32 percent. So, this is checked.

Now, if we see the straight line method. So, this is 4.5 years remaining because that was half year's convention we deduced half-year format. So, it is 4.5 years and the remaining balance is, depreciation using straight line method is remaining balance is 0.8 and remaining years is 4.5, this comes out to be 0.177 or 17.7 percent. So, what we find that the depreciation which is being calculated using the straight line method is less than the DDBM method and that is why we will pick up DDBM in this case and this is why we can use 32 percent deduction in the second year.

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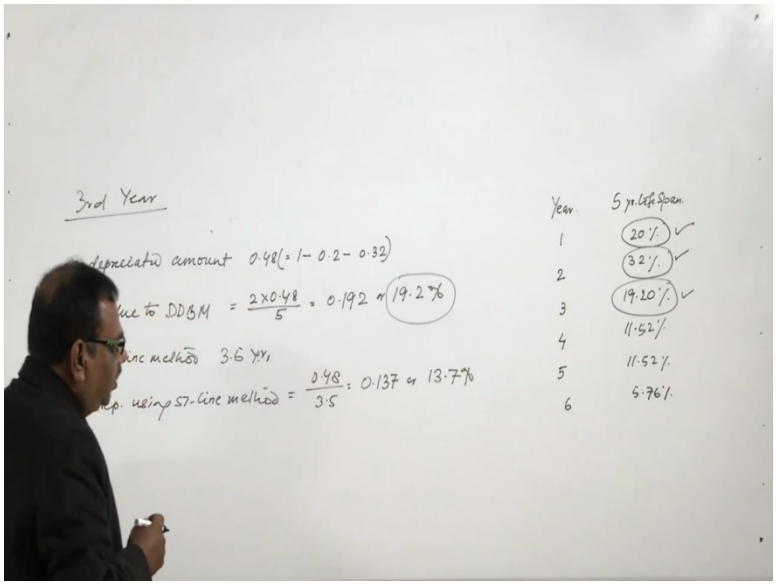

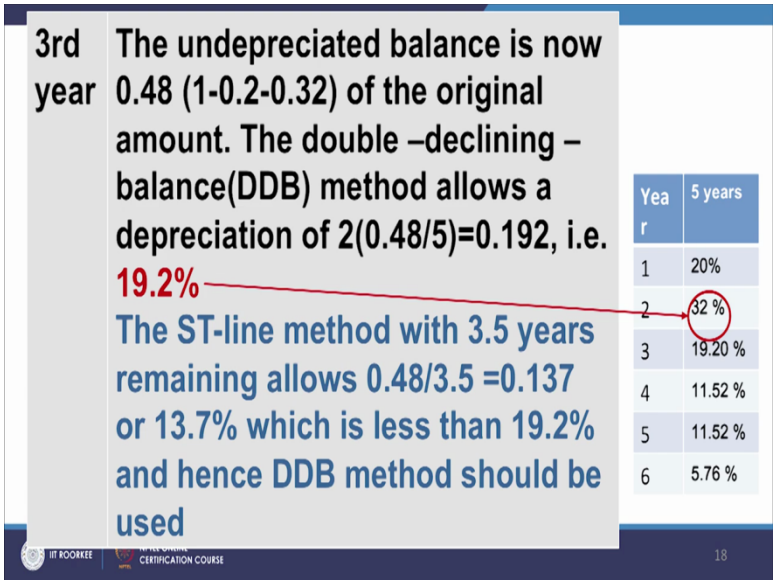

Now, let us go to the third year. Now, un-depreciated amount is 0.48 and how this has come, 1 - 0.2 - 0.32. 1 - 0.2 due to this 20 percent deduction and due 30 percent deduction, it is 0.32. So, this is 0.48 and if we calculate the depreciation due to DDBM, it will be 2 into 0.48 divided by 5 which will come out to be 0.192 that is 19.2 percent. So, we have seen that in the third year we are deducing 19.2 percent as depreciation. Now, if I calculate the depreciation using straight line method.

So, straight line method, it is 3.5 years remaining and depreciation using straight line method is equal to 0.48 divided by 3.5 which comes out to be 0.137 or 13.7 percent. So, as 13.7 percent is less than 19.2 percent, I will select 19.2 percent. In this way, it will change to straight line method only when the depreciation computed by straight line method will be more than the depreciation computed by the DDBM method.

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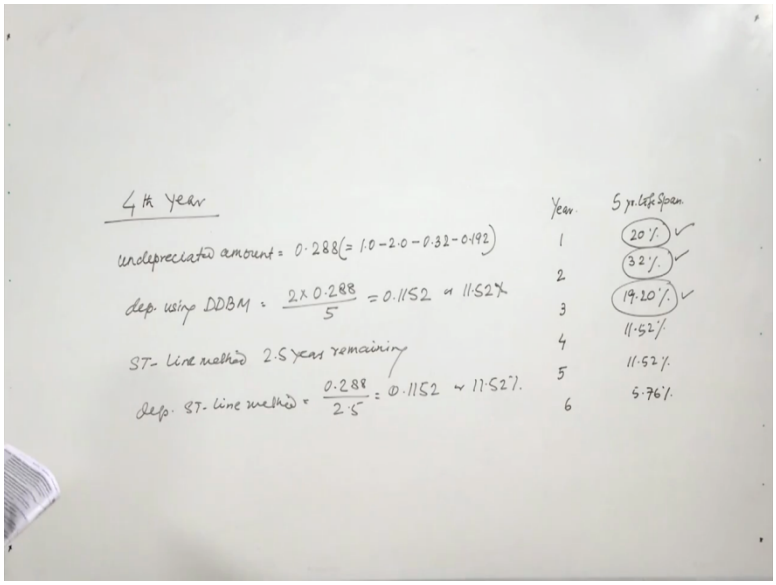

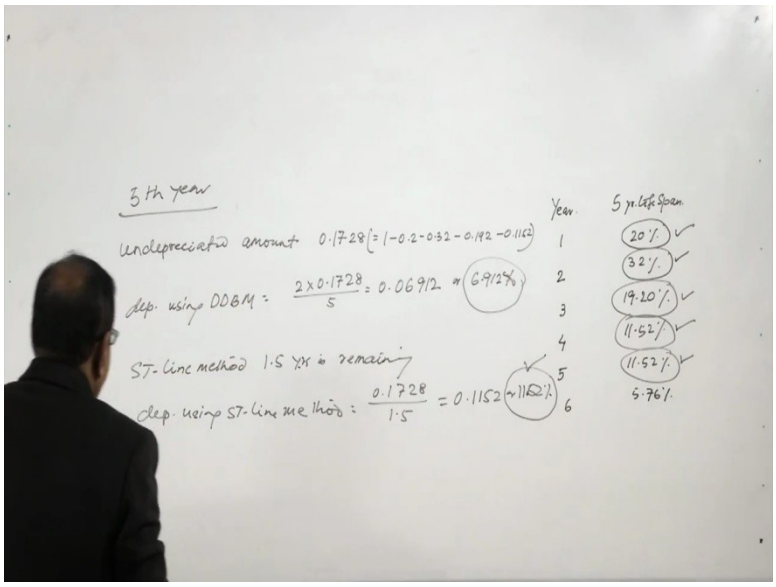

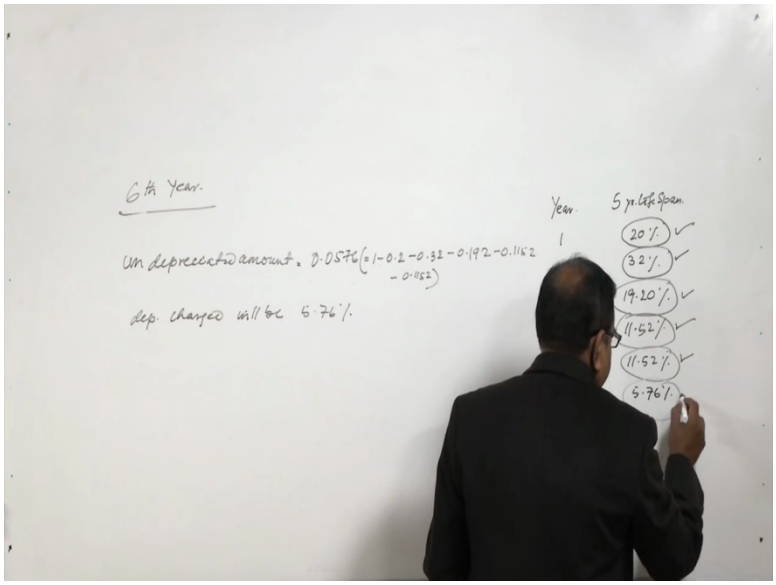

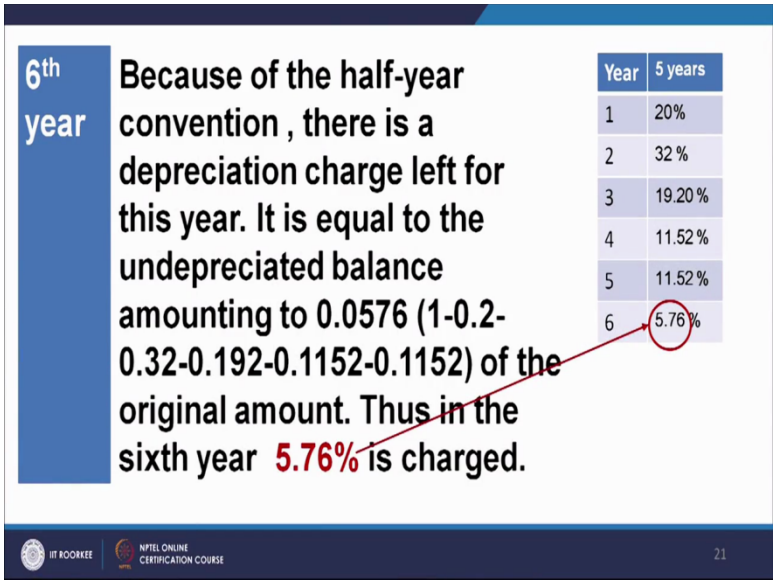

Now, let us go to the fourth year, if you go to the fourth year, the un-depreciated amount is equal to 0.288. And how this has arrived? This is 1.0 - 2.0 - 0.32 - 0.192. This will give you 0.288 and if we use a depreciation using DDBM method, this will be 2 into 0.288 divided by 5 that comes out to be 0.1152 or 11.52 percent. Now, if we use depreciation calculate depreciation using the straight line method. Now, 2.5 years is remaining. So, depreciation using straight line method is equal to 0.288 divided by 2.5, this comes out to be 0.1152 or 11.52 percent. So, here both are equal. This is 11.52 percent, 11.52 percent both are equal. So, either of it can be taken.

So, let us take the DDBM. So, this is correct. Now, in the fifth year we will calculate the un-depreciated amount, un-depreciated amount is 0.1728 or it has come 1 - 0.2 - 0.32 - 0.192 - 0.1152. Now, the depreciation charged using DDBM is equal to 2 into 0.1728 divided by 5, this comes out to be 0.06912 or 6.912 percent. Now, this depreciation if we calculate using straight line method, so for straight line method 1.5 years is remaining and depreciation using straight line method is 0.1728 divided by 1.5, this comes out to be 11.5, this is 0.1152 or 11.52 percent.

Now, what we see that depreciation computed by the straight line method is more than the depreciation computed by the double declining-balance method and hence, we will pick up this value. So, this is explained. In the sixth year, obviously, the remaining balance has to be charged has depreciation. Because of the half-yearly convention, there is a depreciation charge left for this year. It is equal to the un-depreciated amount un-depreciated amount is 0.0576, which comes out like this 0.2 - 0.32 - 0.192 - 0.1152 - 0.1152. So, we have to charge

the depreciation charge will be 5.76 percent because whatever left out amount has to be charged in the sixth year and this is 5.76 percent, this explained.

So, we see that in MACRS system how these percentages were arrived at for a 5 year life span. The same type of calculation can be done for three years, five years, seven years, ten years and for fifteen and twenty years, we have to use, the 150 percent double declining-balance method instead of 200 percent double declining-balance method. For the five years life span we have used 200 percent double declining-balance method.

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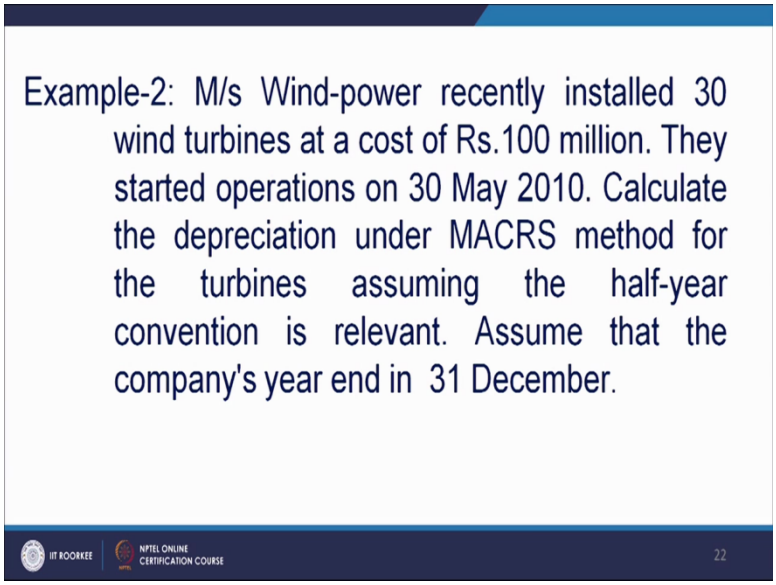

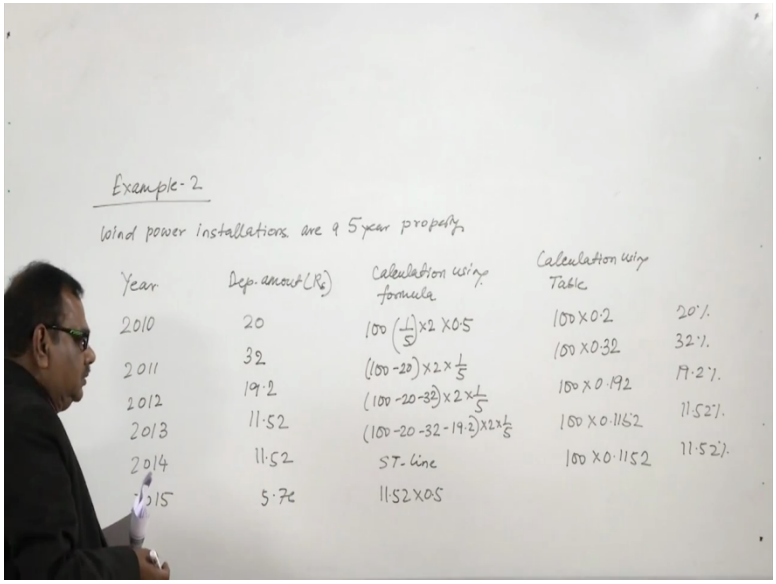

Now, take the example number two, M/s wind-power recently installed 30 wind turbines at a cost of Rupees 100 million. They started operation on 30th may 2010. Calculate the

depreciation under MACRS method for the turbines assuming the half-year convention is relevant. Assume that the company's year end in 31 December.

Now, this is the solution of it, we will compute it on the blackboard. Now, if we check from the standard tables, we find that wind power installations are a 5 year property. So, the government specifies that all wind power installations are 5 year property that means, it has to be depreciated within that space of time. But when I use the MACRS method, it will be depreciated in 6 years because we will be using half-year convention. Now, we say the year, depreciation amount in Rupees calculation using formula and then calculation using table.

In the table there are percentages are given for 5 year property, we will use those figures. Now, in 2010 the depreciation is 20 million Rupees and how this is being calculated 100 million is their, cost 1 by 5 becomes straight line depreciation, into 2 becomes the double declining depreciation and into 0.5 because it is half-year convention. So, this gives you 20 million and from the table, it is 100 million into 0.2. So, that gives you 20 million.

Now, in the 2011, this is 32. Now, this is 100 - 20 depreciable amount is this now, into 2 into 1.5 and this is 100 into 0.32. This is 20 percent, this is 32 percent. Now, in 2012, this is 19.2 millions nowthis is 100 - 20 - 32 into 2 into 1 by 5 and now, this is 100 into 0.192, 19.2 percent. Now, in 2013, this is 11.52 how we arrive at 11.52, this is 100 - 20 - 32 - 19.2 into 2 into 1 by 5 or 100 into 0.1152, 11.52 percent.

Now 2014, this is again 11.52. So, here we will calculate using the straight line method as discussed earlier and this is and based on the remaining balance, which is 5.76 million which will be computed, which is the basically 50 percent of, due to the half-year convention or the remaining amount will be charged in 2015.

Now, let us summarize. The monetary value of an asset decreases over time, due to the we use wear and tear or obsolescence. This we know now and for this purpose depreciation is charged, because the depreciation fund is being created to replace the equipment. Now, in the present lecture, I have taken the modified accelerated cost recovery method, which is a very simple method and is useful in computing the depreciation and this is used in USA, for computing the depreciation amount. Thank you.