Engineering Economic Analysis
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Lecture 39
After Tax Economic Analysis

Welcome to the lecture on income tax analysis.

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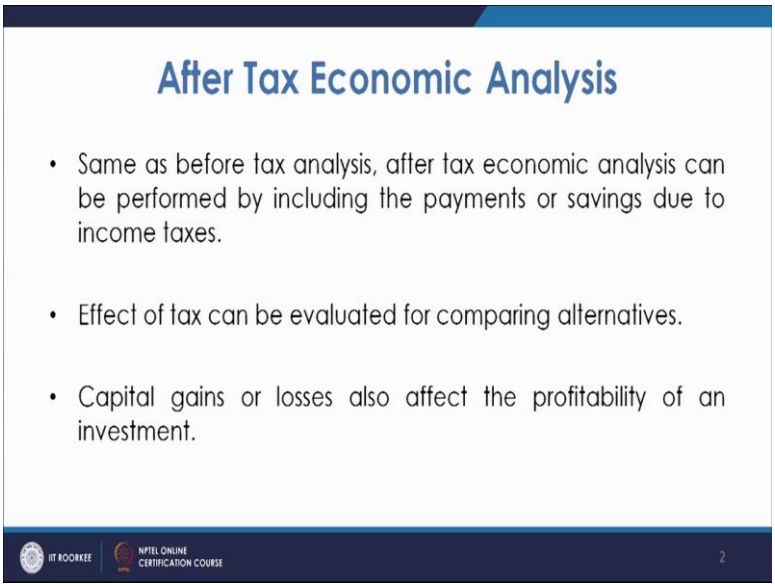

In this lecture we will discuss about after tax cash flows. So what we have so far studies that the after tax economic analysis is important, it has to be done by taking care of the payments or savings which are because of the income taxes. Now many a times we have the alternatives present, so we can even without alternative or with alternative what will be the change in the cash flow when the income tax is applied.

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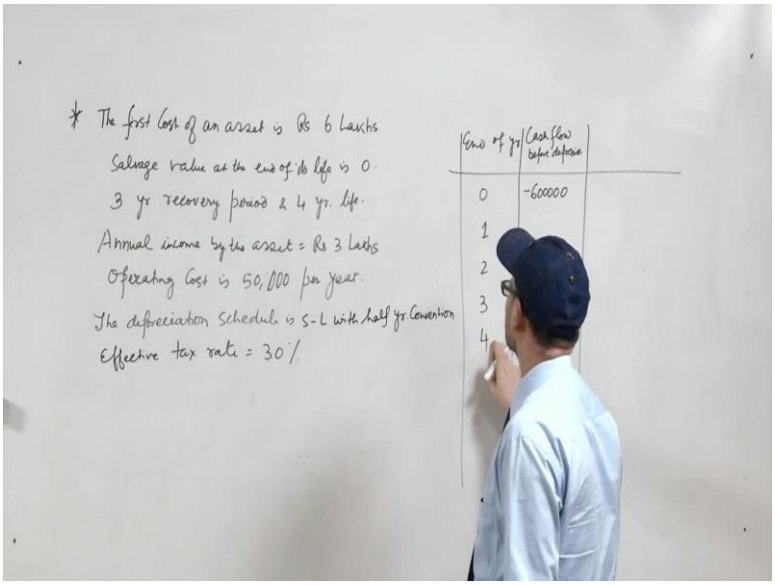

Also, capital gains or losses affect the profitability of an investment. So initially we will see that the once in any business enterprise without any alternative how the after tax analysis brings into changes in the tax ah aw amount and the resulting cash flow. So let us deal with a question where it is given that the first cost of an asset is taken as Rs. 600,000. Now its salvage value at the end of its life is 0. 3 year recovery period is there and 4 year life.

The annual income which the asset is supposed to give, it is Rs. 300,000. Now in that case, the asset also requires the operating cost so the operating cost is 50,000 per year. The depreciation schedule is basically straight line with half year convention. So if you take the straight line with half year convention, the depression has to go in the fourth year. So it is straight line with half year convention.

Now in such cases, the rate of tax, effective tax rate is also given and effective tax rate is given as 30%. Now in these cases we have to see what is the change in the tax flow or the cash flow once you have this depreciation schedule?

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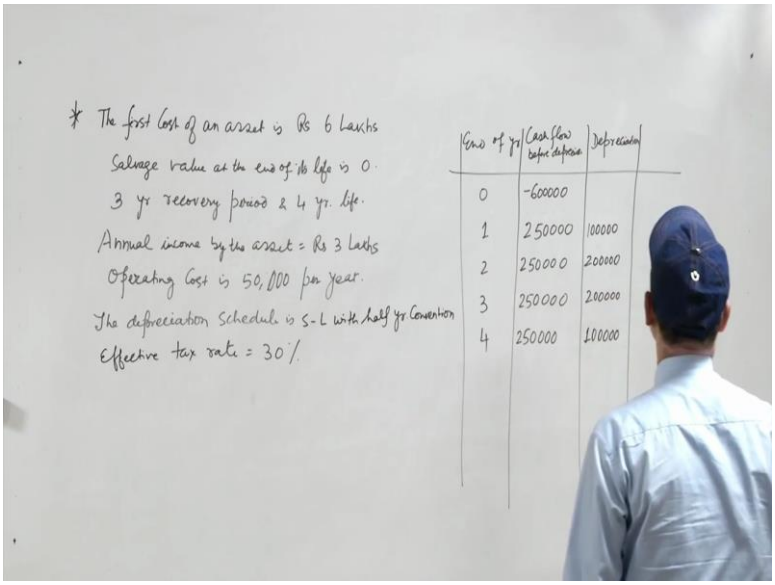

So we can have the table, the table talks about the end of year, cash flow before depreciation, and tax basically. So in the year 0, we have put 6,00,000.

1, 2, 3 and 4, now here in the depreciation schedule is sss straight line with half year convention, so it is going up to the fourth year. Now in this case you have income of the asset, from the asset it is 3,00,000 and operating cost is 50,000, so the income basically is 2,50,000. Now in this case we have to find the depreciation. So depreciation will be basically using straight line and half year convention.

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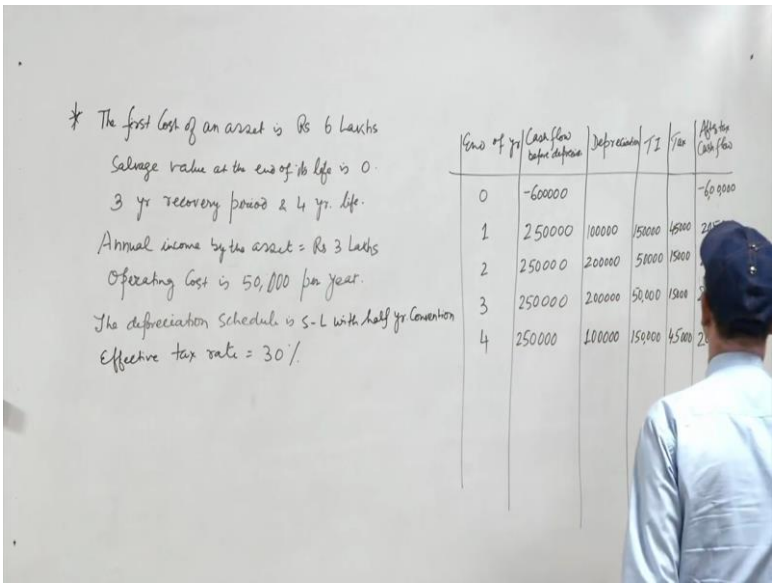

So from this 6,00,000, 1,00,000 will be depreciated in this year and 2,00,000 each during the other years. Other two-year and further 1,00,000 in the last year. Now you will have the taxable income, so taxable income will be, income - depreciation so this will be 1,50,000 and this will be 50,000, this will be also 50,000 and this will be again 150,000.

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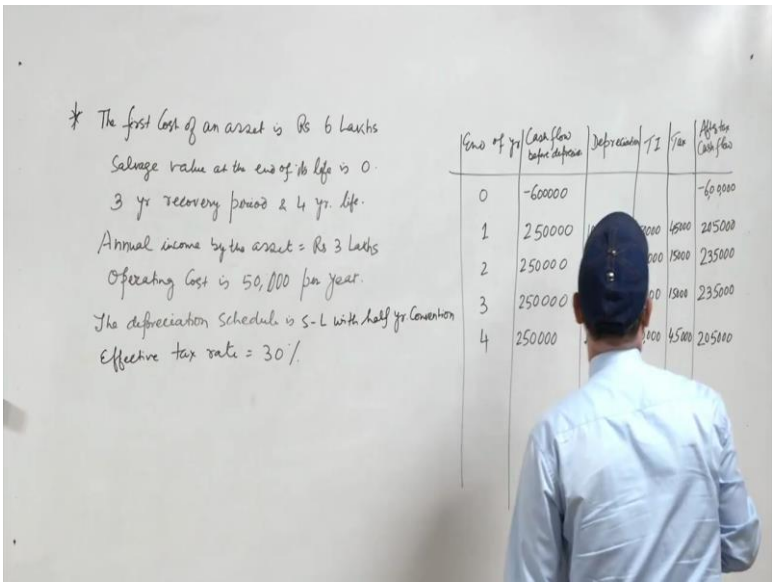

So your tax will be, basically effective tax rate multiplied by the taxable income and effective tax rate is taken as 30%, so it will be 45,000. This is again 15,000, this is again 15,000 and this is 45,000. So after tax cash flow will be, we have -60,000, 6,00,000, is here at the 0 time. Now this is a tax which is basically you have to pay, so it comes out to be 215000. This comes out to be 235,000, again 235000 and this is 205000.

So this is also further, this is 205000. So this is how your tax cash flow is changed which is before depreciation this is the cash flow and after depreciation, this is the cash flow. So the rate of return if we have to compute, the rate of return for the cash flow before the tax payment and after the tax payment, in that case, the rate of return can be found out.

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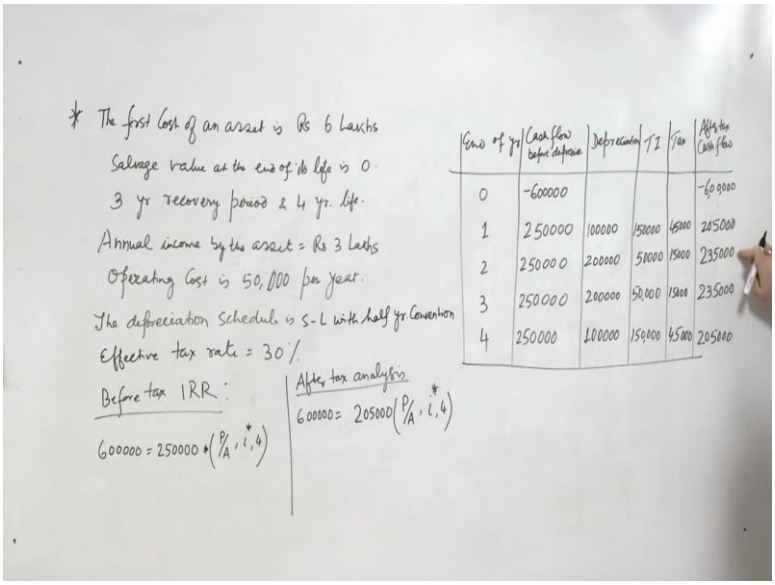

So before tax rate of return will be basically, internal rate of return, if you have to find basically before tax, you have to equate the present worth equal to 0 for this cash flow. So if the tax rate a for any interest rate, the present worth at this point should be 0 or the present worth of these four cash flows should be equal to 6,00,000. So basically for before tax, the IRR can be computed as 6,00,000 equal to 2,50,000 multiplied P by A i star and 4.

So basically this gives you the internal rate of return before tax analysis. And once we go for after tax analysis, in that case you have to again set the present worth value, equivalent present worth value as 0 at this time by taking into account these factors. So this can be taken as like this.

You have 6,00,000, it will be equal to basically, you have 2,05,000, you can take it as the amount which is given these four years, so if you take 2,05,000 multiplied by P by A i star 4 then you have 30,000 for these two years. So you have to get 30000 then this will be P by A, i star 2 its equivalent you will get here. So it will be P by A i star 2.

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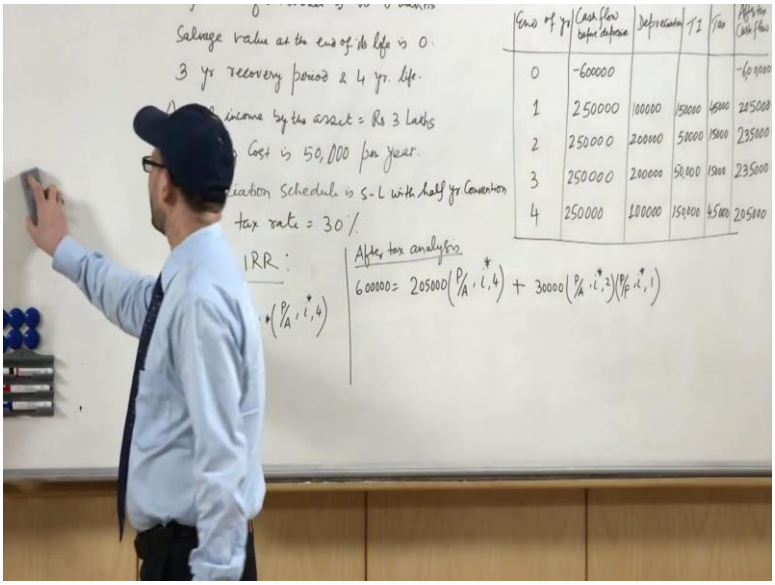

And further its equivalent value for getting at this point, you have to multiply it by P by F i star 1. So basically you can get the rate of return using the before tax analysis and for the after tax analysis by equating the values and all setting the final present worth equal to 0 at this time and I star using this and this can be found out.

And the different values will indicate the difference in the tax analysis difference because of the tax paid and the resultant difference in the cash flow. For that we will have a study when there is alternative present.

If you have two alternatives sometimes, in the plant you may have some alternative to upgradesome existing equipment or to bring it to more cost into the equipment which will basically increase the gross income may be at the expense of increase in the operating expenses. But how that affects the tax flows, the cash flows after taxanalysis that can be further seen by referring to an example.

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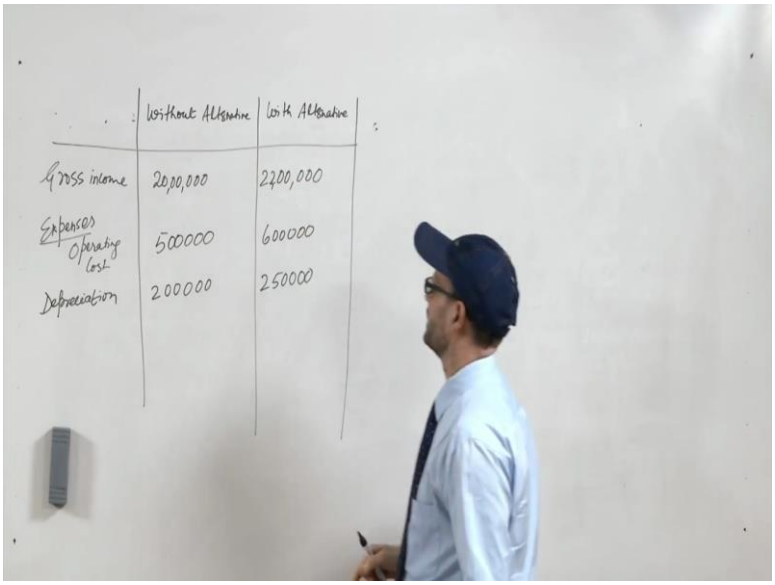

So let us discuss with a situation where the gross income is given with alternative one and two. So in one case you do not consider the alternative or any extra attachment may be which basically gives you more income at the cost of some additional resource cost or **sss** operating costs and other is with alternative.

So**,** it has be seen that, the gross income without alternative, the gross income is reported as 20,00,000 without alternative and 22,00,000 with alternative. So if we do some changes in the existing equipment, we are going to get the enhanced gross income, the increase is by 2,00,000.

Further the expenses like operating cost. Operating cost is seen as 5,00,000 when we are talking about without alternative case is and 6,00,000 when it is with alternative. We talk about depreciation, depreciation is reported as 2,00,000 and it is 2,50,000. So what we see is you have the gross income of 20,00,000 without alternative, 22,00,000 with alternative.

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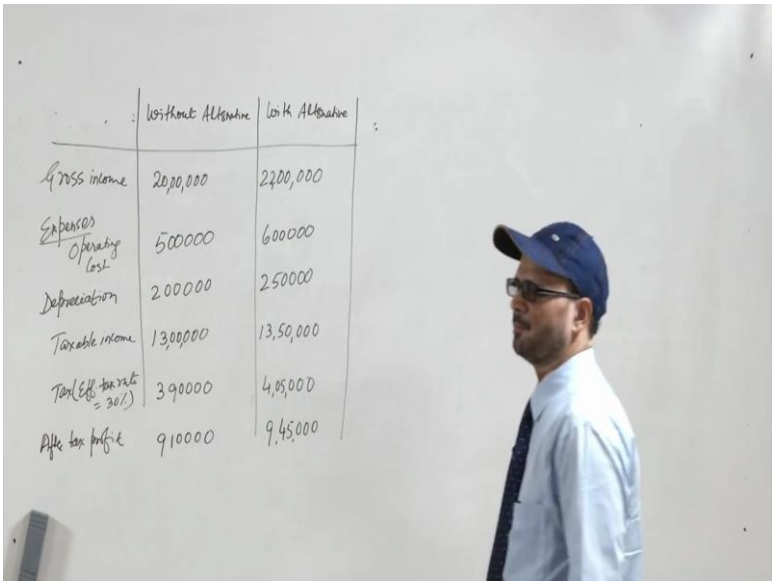

5,00,000 is the operating cost in the case without alternative and 6,00,000 is the operating cost with alternative. Depreciation is 2,00,000 here and 2,50,000. So what we see is the change in the taxable income, now change in the taxable income will be there. So taxable income will be 20,00,000 - 5,00,000 15,00,000 - 2,00,000 so it is 13,00,000.And here it is 22 - 6,00,000 + 2,50,000 so it will be 13,50,000.

Now if the effective rate of interest is taken as 30%, in that case, effective tax rate is 30%, in that case it can be computed as 3,90,000 and this is computed as 4,05,000. So now this was the gross income and this is the tax which is computed.So if we compute the after tax profit, the after tax profit is, taxable income is 13,00,000 and tax is 3,90,000, so after tax profit is coming out to be 9,10,000 and in this case it is 9,45,000.

So basically we can see that if you have the different alternatives and you have the gross income at different levels, operating cost at different levels, so after tax profit can be evaluated and further you can have the decision whether to proceed, how to compare these two alternatives.

Now we will discuss about the effect of capital gains on the tax flow, after tax cash flow. We have already discussed about the capital gains or losses when we dispose any item and at that time when we dispose it, depending upon the book value of the asset, if we are selling it more than its book value, at a price more than its book value, it is a capital gain and you have to pay tax on it.

And if not so, in that case we have to pay we have the opportunity to get the savings also. So let us take an example where effect of salvage value will be considered to see what is its effect on the cash flow.

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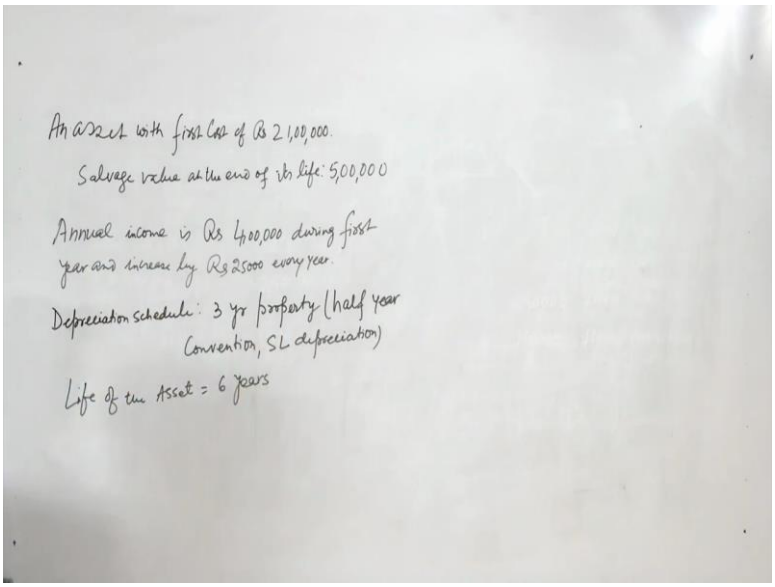

So an asset is there with first cost of 21,00,000. Now this asset has salvage value at the end of its life is given as 5,00,000. So also the annual income which the asset is supposed to produce Rs. 4,00,000 during first year and increase by Rs. 25,000 every year. Then you have depreciation schedule so in that we take it as a three-year property and taken half year convention using straight line depreciation method.

Life of the asset is taken as 6 years. So what happens here that at the end of 6 years you are getting an income of 5,00,000 and this is the capital gain and you have to pay the tax on capital gain. Effective tax rate is 30%. Now in this case we can see the table. We have end of year, so in fact the life is 6 years, so you have 1, 2, 3, 4, 5 and 6 and further in the sixth year you are also getting capital gain.

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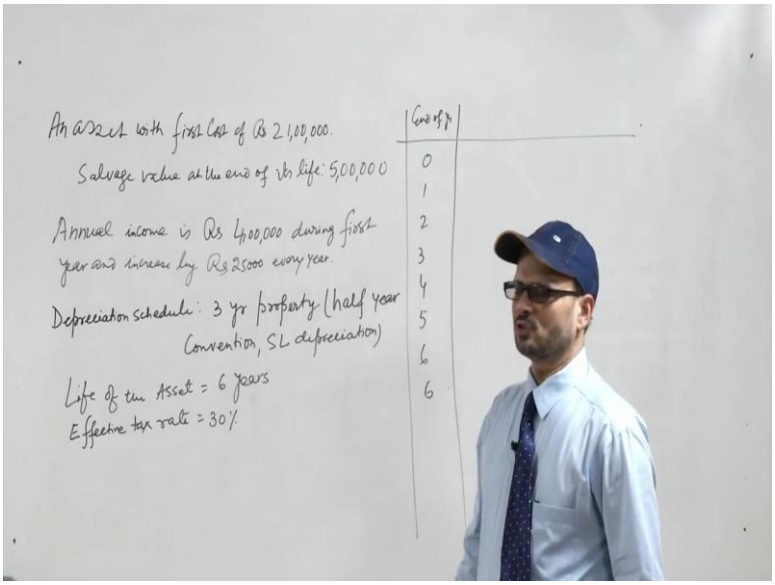

So this is to be put in here. So in this we are having the cash flow before tax. If you take the cash flow before tax, we are taking the asset in 21,00,000, annual income is 4,00,000 and it is increasing 25,000 every year. So 4,00,000, 4,25,000, 4,50,000, 4,75,000, this is 5,00,000, 5,25,000. In the sixth year, at the end, you are getting the salvage value back.

So this is basically the capital gain by the company. Now in that, next we will have the taxable income. So before that we will calculate the depreciation charges. So we are using straight line method with half year convention and 3 year property and this is a property with first cost of 2,100,000. When the first year it will have 3,50,000 and in the next 2 years you have 7,00,000 and in the fourth year it will have further 3,50,000, further it goes to 0.

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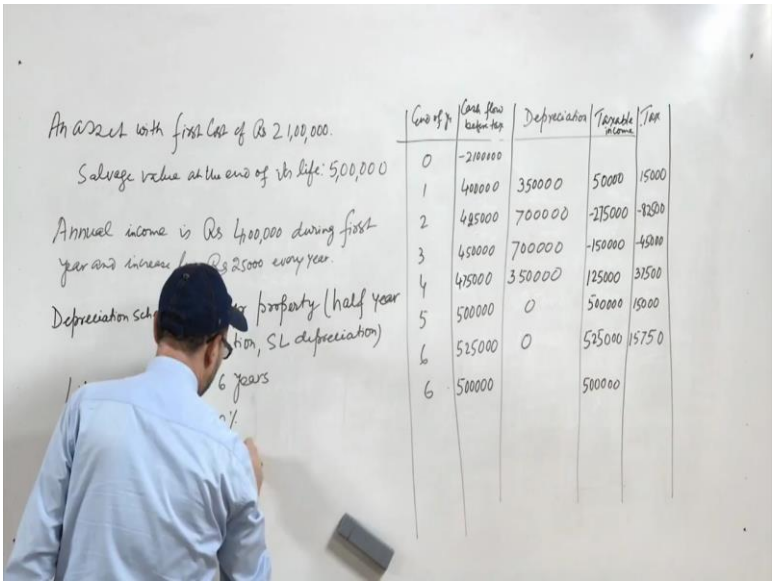

So further you have to calculate the taxable income. In this case the taxable income, the taxable income will be cash flow - the depreciation charge so it will be 50,000. It will be here - 2,75,000, then here it will be 1,50,000. So you have basically tax savings at these two locations, here you have 1,25,000 and further you have 5,00,000, 5,25,000 and 5,00,000 further as the capital gain tax.

Now if the tax rate is 30%, effective tax rate is 30%, in that case the tax which you get is 15,000 here, 82,500 is the savings in the tax, 45,000 is the saving in the tax here and this is 37,500, 15,000, 15,750. And we have to know there are specified rules for the capital gain tax and capital gains tax may have to be found out. Capital gain tax if it is assumed as may be close to 25% suppose in that case, 25% of this amount will be taken here and it will be 1,25,000.

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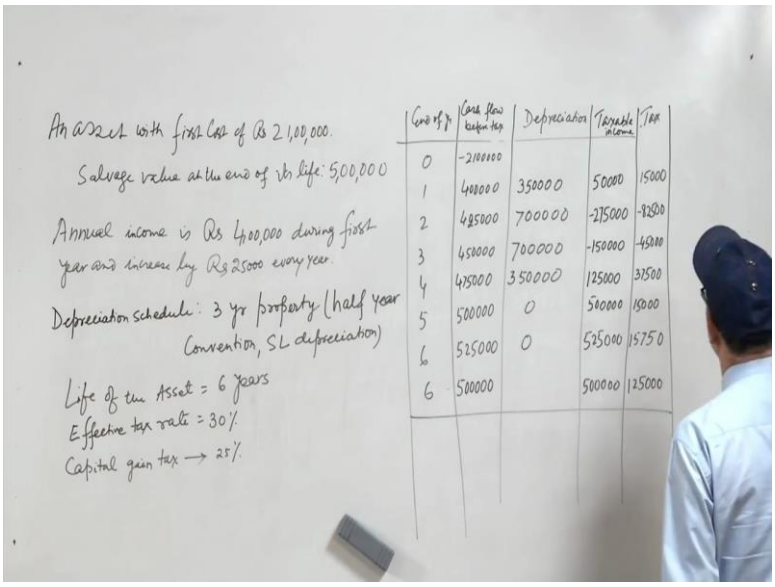

So this way the capital gain which is there at the end of its life which is realised, it has to be taken into account. These are the savings and these are the taxes which you are paying. So ultimately after tax cash flow if you look at, you have so it is - 21,00,000 anyway here, then you have 4,00,000 cash flow before tax and tax you are paying as 15,000, so it will be 3,85,000.

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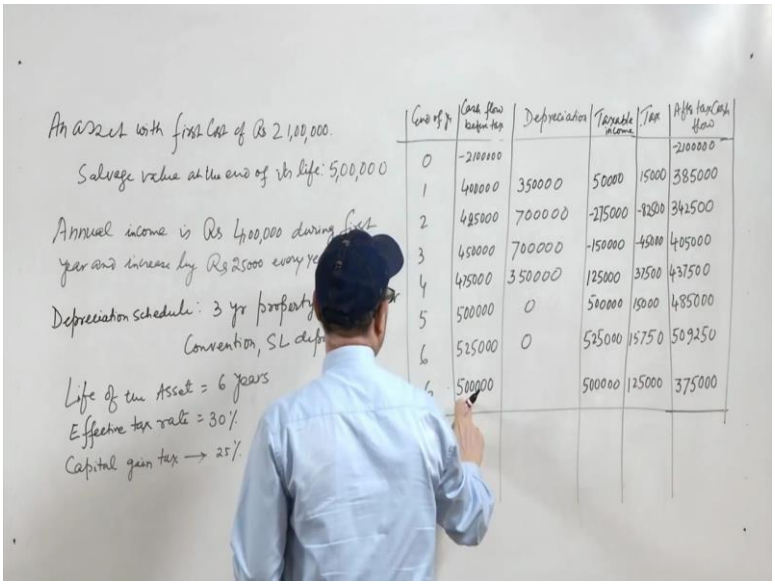

Then 4,25,000 - 82,500, so 425000 - 82500, so this is 342500. Similarly, here it is 450,000 - 45,000, so 4,05,000. 4,75,000 - 37,500 so 4,37,500. This will be 4,85,000 and this will be 5,09,250 and this will be basically 3,75,000. So this is how the after tax cash flows will be calculated when you have the capital gain at the end of the period or be so if it is disposed at a nearer time.

Accordingly the after tax flow is to be calculated and it will be analysed. So actually there has been a mistake here, basically here we have the tax benefit of - 82,500 and - 45,000, so these are the benefits 82,500. So this is a mistake, here it will be added the amount because we are getting the benefit because of the gain and because of the depreciation schedule. So this amount will be added here and it will be 507500. 12

So this will be basically the after tax cash flow for the second year because this the negative quantity, this is the tax saving and that is why your cash flow is increased at this point and the same way here also you have 450000 + 45,000 is basically the tax saving, so you get 4,95,000.

So this is how we see that because of the salvage value calculation, you see that you are ultimately getting certain income and because of that you are paying some tax which is bringing into this amount at the end time and your after tax cash flow can be calculated and respectively you can calculate the rate of return which you earn on these investments. Thank you.