Entrepreneurship Essentials
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Module - 11
Lecture - 54
Capital Budgeting Decisions

Welcome we have seen how profitability estimated and cash flow statements are prepared. Suppose you have multiple projects and with reliable method you have estimated the projected cash flow projected profitability. I mean cash flow and then you make a ordered list of increasing or decreasing cash flow.

This is not going to give you the comfort of selecting means, whichever project shows maximum cash flow its not necessarily the best project from a financial point of view. Because if one project is giving you the maximum cash flow in the 5th year whereas, another project is giving you maximum cash flow in the 2 nd year. You do not actually know which project is better because time value of money is very very important.

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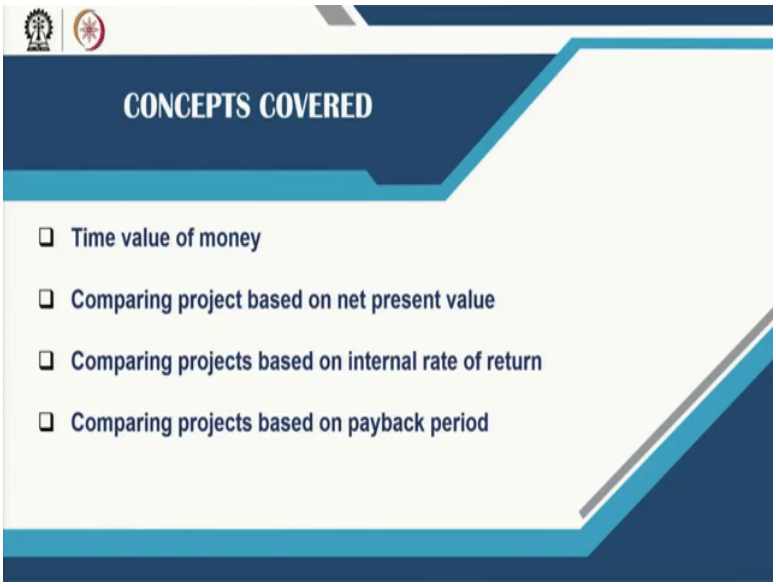

So, we need to really understand what is the time value of money and capital budgeting offers us that opportunity. The methods that are used in capital budgeting they are particularly they particularly applies the time value of money. Meaning 1 rupee today is more valuable than 1 rupee tomorrow day after. So, how much is the less how much less is the value tomorrow there is a topic.

Now, we would like to compare different projects based on cash flow, we can use net present value method, then we can also use internal rate of return or payback period method; payback period of course, does not consider time value of money.

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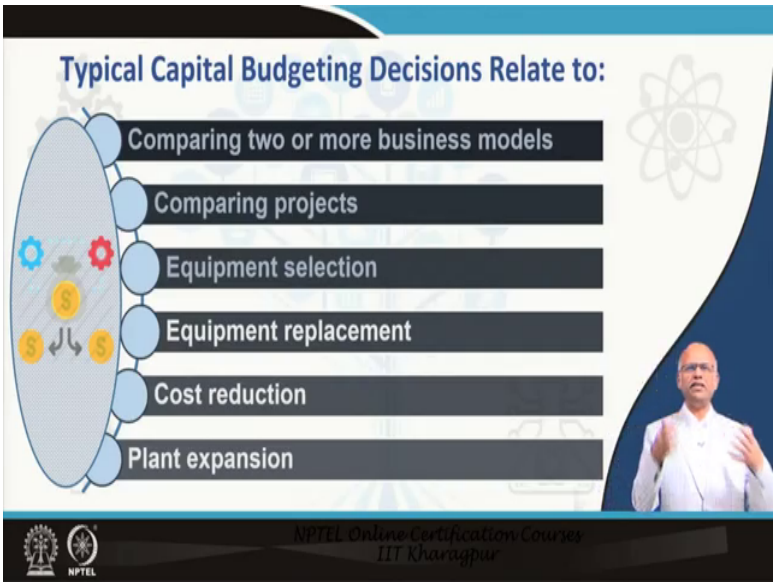

Now, why capital budgeting decisions are important or why how is it related where is it relate related to. Comparing two or more business models can be done using capital budgeting then, comparing projects business model as well as project.

If you are selecting equipment may be one is labour intensive, another is say automatic or semiautomatic. So, use save labour cost at one place you save capital cost from the other. Suppose you have access to a lot of capital maybe bank is interested to give you a loan, you have to pay interest, then you have to you have the depreciation cost which are going to be fixed cost.

Whereas, when you are you have a labour intensive project you have less capital cost. So, depreciation will be less interest will be less, but then your variable cost is going to go up because you have to pay a lot of wages to labour.

So, when you try to compare the two; you need capital budgeting methodologies. Equipment replacement suppose you want to replace an old machine with a new machine, there is capital implication; wherever there are capital investment decisions you need to apply capital budgeting methods.

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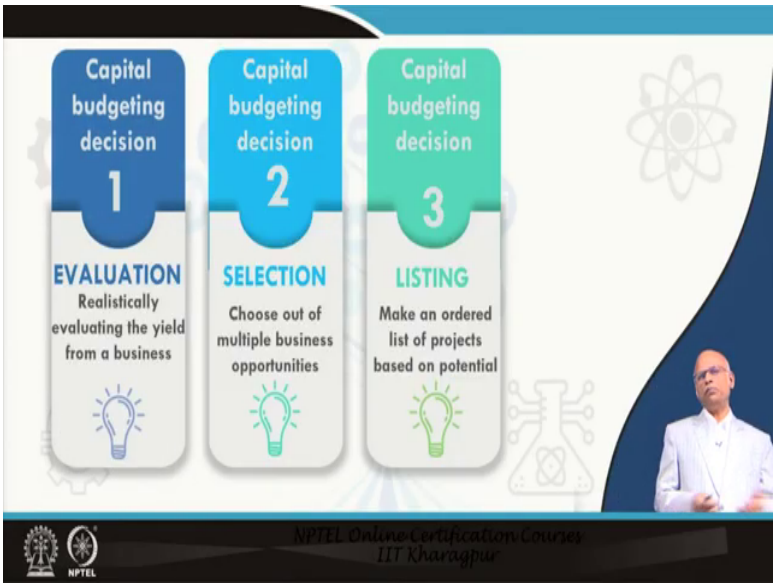

So, one is evaluation, you want to realistically evaluate the yield of a business. Then you want to choose out of multiple business opportunities you want to make an ordered list depending on cash flow etcetera.

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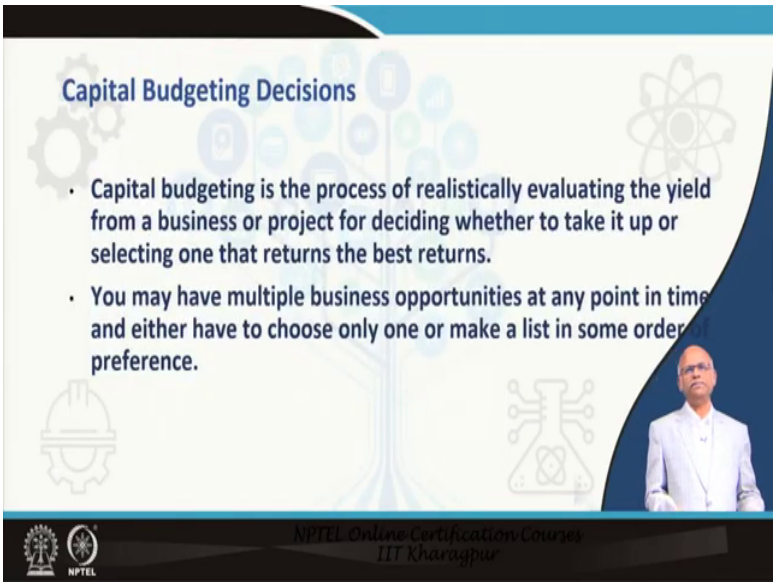

Now, the same thing told differently.

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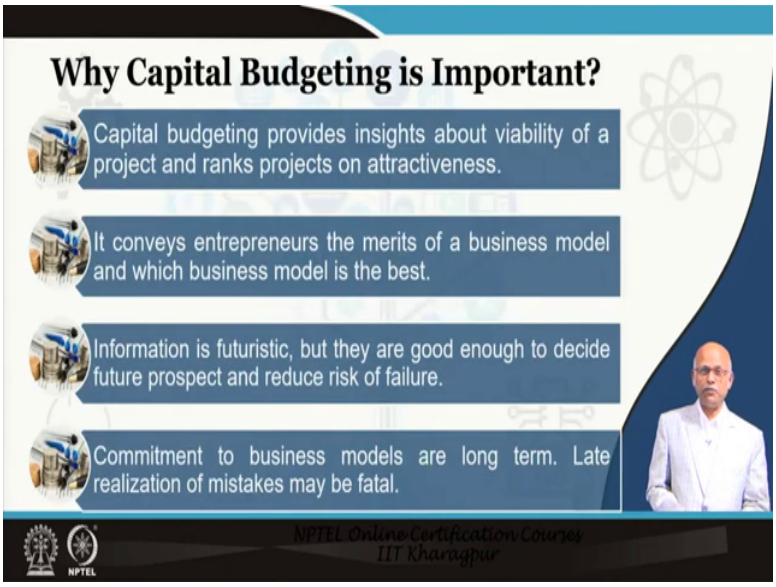

If you have multiple project opportunities you have to really make a order list. Same thing again why capital budgeting is important? It provides insight about viability of projects and it ranks projects on the basis of net present value. So, that gives a clearer picture then projected cash flow.

It conveys entrepreneurs the merits of a business model and which business is better or best information is futuristic, but they are good enough to decide future prospect. One thing is always to be kept in mind, that is these are all based on future data. So, there is hardly any model or method that can realistically estimate future cash flow. These are all based on assumption and anything or everything may go ever.

But then in absence of anything more reliable we have this break even point analysis then capital budgeting methods which are the tools that are only available and we have to really

apply them. And so, far as long as people are using these methods, these are actually helping in decision making; because if you make a mistake and the mistake is known much later that becomes fatal because you are you have already your sunk cost is gone.

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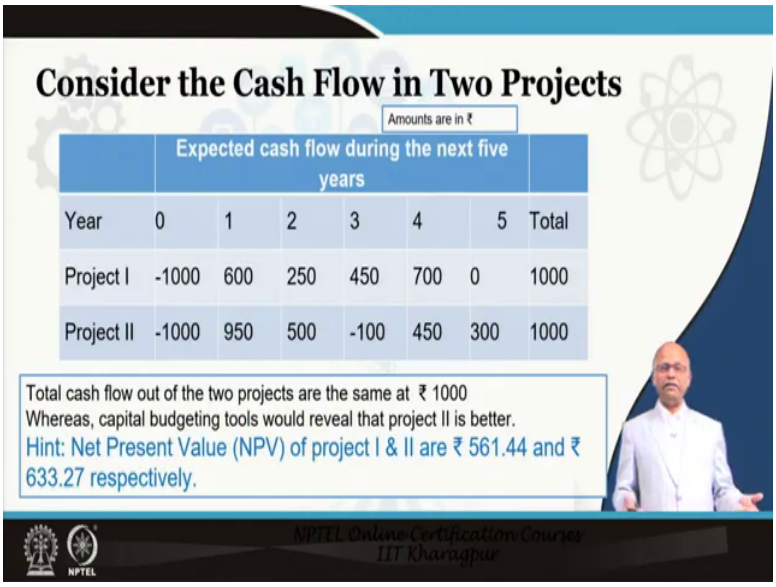

And there is no way to recover that. In case you choose the wrong projects here is an example to drive from the point. Suppose there are project 1 and 2 and your initial investment is 1000 and 1000 in both projects let it be 1000 say 1000. So, it is 10 lakhs and 10 lakhs something like that, put any unit as you like.

1st year you have a cash flow positive cash flow; meaning money is coming in, 600 rupees for project on 950 for project 2 likewise. Look at 3rd year in project 1 you are getting 450 cash inflow whereas, 100 rupees is going out; meaning there is negative cash flow. So, add them up you have total cash flow of 1000 for project 1 another 1000 for project 2 net cash flow.

Now, look at their final data aggregate data. So, both projects have 1000 rupees cash flow. So, how to make a decision? So, here you have to estimate the net present value to understand which project is more attractive. And if you do that you will find that project 1 net present value is 561 project 2 it is 633. So, you make a comparative analysis, we will talk about it moving forward.

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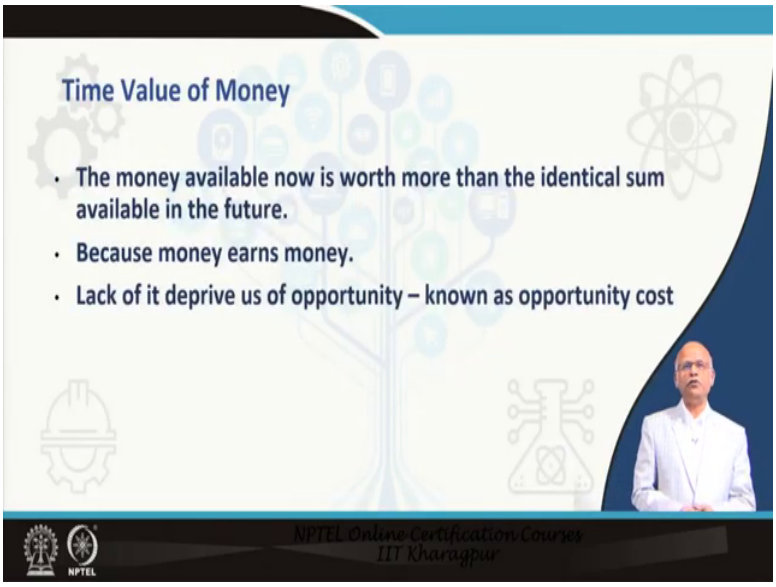

So, time value of money the money available now is worth more than identical sum available in the future; because money earns money. You put 100 rupees in the bank tomorrow you withdraw that money if the bank has a scheme to pay interest on a daily basis you get something whatever that is. If you give that 100 rupees to somebody today and tomorrow that person returns you 100 rupees, you are poorer by that interest.

And normally we call it opportunity cost. I have the opportunity to invest the money somewhere, somewhere meaning somewhere risk free. Now understand what is risk free. You invest in a project every project has some bit of risk associated with that, you never know what is going to happen tomorrow. So, every that is some uncertainty, even without that uncertainty there as there is project specific uncertainty. Because you make some projection that does not go the way you have made make the projection, you might have made mistake in making the projection itself.

Now, you have the opportunity to put that money somewhere, which does not have any risk where is that? Maybe you put that money with Reserve Bank of India, but then Reserve Bank does not take public money in that sense. So, you have to put the money in some bassam nationalized bank; perhaps that is say hypothetically speaking that is 100 percent safe up to a certain extent that is insured. So, you can say that it is 100 percent safe; but then its not always 100 percent safe many countries are becoming bankrupt forget about that.

But then, suppose you have the opportunity to invest the same money risk free at risk free rate it with something. So, what now for suppose that is 10 percent, now you invest in another project and you lose that you do not get any return. So, your opportunity cost is 10 percent; because you could invest that money risk free in a bank get 10 percent interest whereas, you have lost that opportunity, so, that is what is opportunity cost.

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Capital budgeting make compressive comparative analysis, particularly when future outcome or future cash flow is somewhat known. So, if you are making say you want to purchase a new equipment to reduce your existing cost. May be operational cost or power cost some of the new machines will be more fuel efficient or energy efficient.

So, you might think that ok, let me reduce the recurring expenses by installing new machine discard in the old machine. So, if you discard the old machine, you are going to gets some money back; because you are going to sell it for something. Whereas, when you buy something, you are going to spend some capital. What is the net capital investment new expenses minus the cash flow that is coming in and then how much is the regular saving. So, you make a discounted cash flow to understand, whether it really gives a positive net cash flow make a decision.

If you want to expand your business you have to make the same analysis you know the cash flow and then you know what is the investment necessary. You may even make analysis of several equipment there are multiple equipment. So, it multiple types of capital investment types of saving of operational expenses and also replacement.

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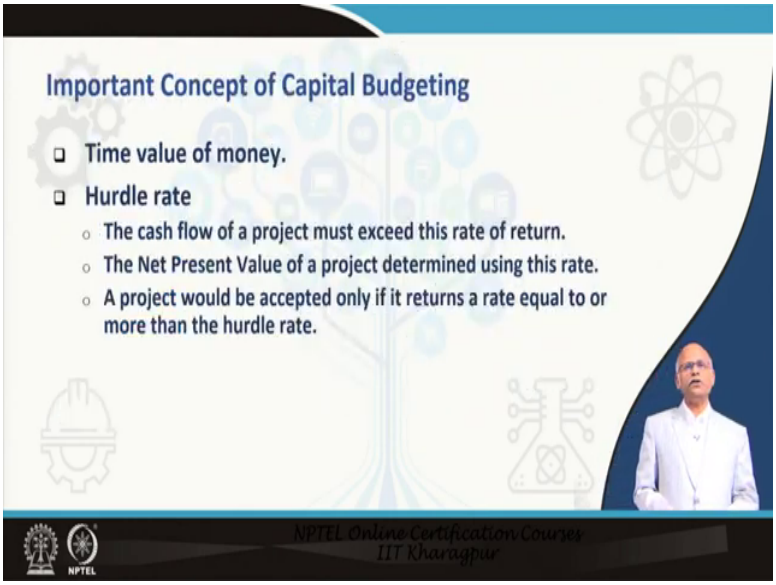

Now, two things are very important for capital budgeting one is time value of money. At a rupee today is more valuable than a rupee next year hurdle rate hurdle; means as you understand when you are making a race, there is a hurdle race meaning there is a hurdle you have to cross that to really move ahead. Here also hurdle rate means a company who is thinking of making investment in something, they always have something in mind that is the rate of return from the project. Because they are putting in capital so, what is the rate of return on that capital that they would like to understand?

And if they have a benchmark, that I must receive say 15 percent rate of return from this project only then I can move ahead that is called hurdle rate. They have to cross the project has to cross that hurdle; meaning the cash flow of the project has to cross that hurdle. Meaning the net present value at that particular rate will become 0 or positive for the project to be qualified or for the project to be selected for investment.

And net present value is determined using the hurdle rate and if the net present value is 0, then hurdle rate is the rate at which the project is returning cash, if it is more it is returning much it is returning more than hurdle rate; if it is less than 0, it is returning less than hurdle rate. So, you are not going to accept the project.

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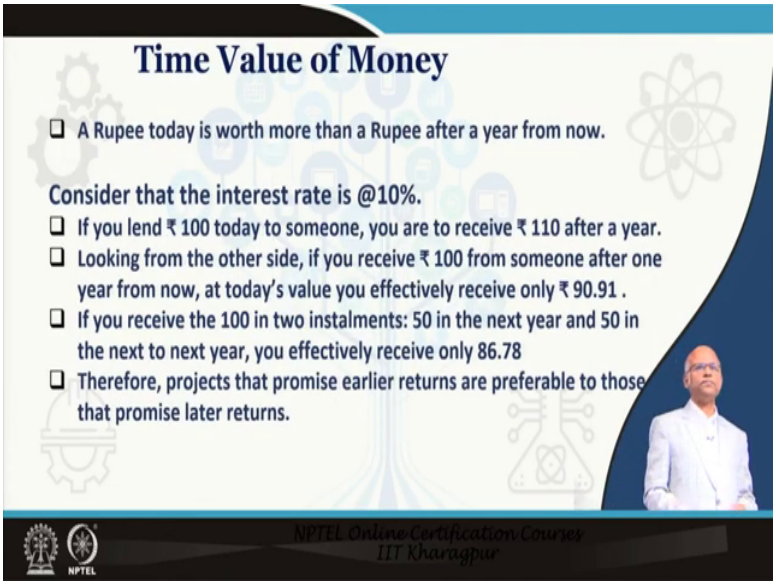

So, just in another example is not I will not waste time on that you invest say you lend 100 rupees today to somebody next it becomes 110 if the interest rate is 10. So, if that person

returns you 100 rupees next year, it is equivalent to receiving 90.91 rupee; because at today's rate 100 rupee next year is equivalent to 90.91 rupees today. So, you are a loser likewise there are other examples you can pause and see.

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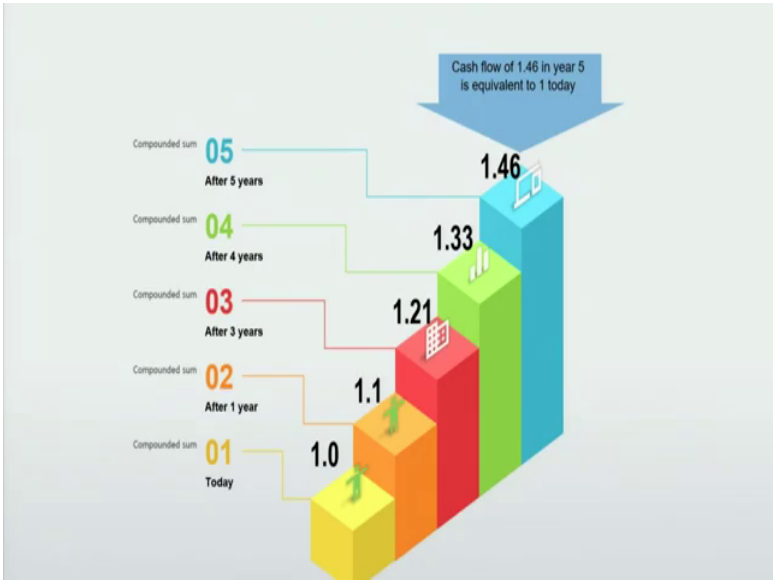

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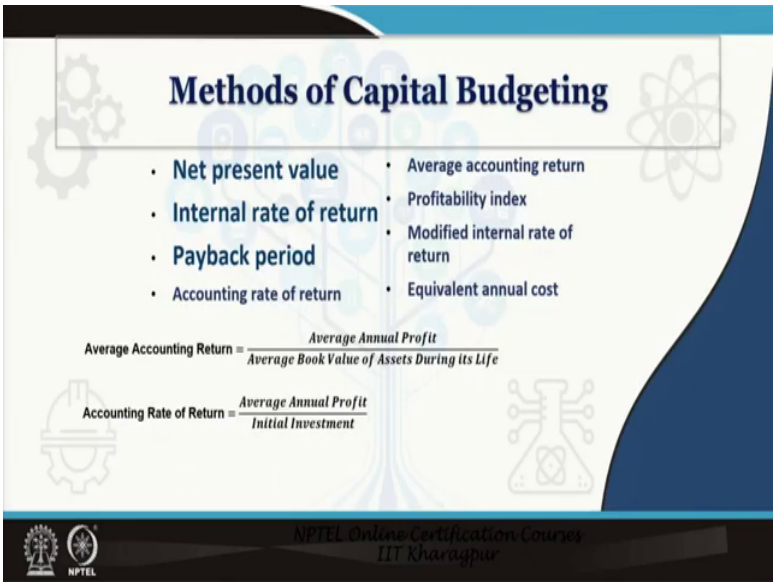

So, you see one suppose it is 1 crore rupees and the other one is 1.46 crore rupees. So, 1 crore rupees today is equivalent to 1.46 crore rupees after 5 years and this is as at the rate of 10 percent I have estimated using 10 percent rate of interest. 10 percent at the rate of 10 percent 1 crore rupees today is 1.1 crore tomorrow, 1.21 crore next if not tomorrow next year next to next year and after 5 years.

So, after 5 years, you must get 1.46 crore to justify giving 1 crore rupees to somebody today that is how money appreciates. Money appreciates in value in not in value, but in absolute value, not in realistic relative value. Relatively it is actually reducing value because 1 crore today is equivalent to 1.46 crore 5 year sense that is it.

Now, as we have mentioned that capital budgeting uses several methods, most importantly there was net present value method, internal rate of return method, payback period method;

these three will be discussing very elaborately with examples. Accounting rate of return we may not discuss much, but I have provided the formula. Average accounting first thing is accounting rate of return at the bottom which is average annual profit.

Suppose the project goes for 5 years so, whatever is the total profit in the 5 years some year it may be loss or deduct the loss add the profit then divide that by initial investment. Say there is no other investment in between that is the condition. So, whatever you get that is that and multiplied by 100 will be account rate of accounting rate of return. Then there is a average accounting rate of return. So, here also you estimate average annual profit, average book value of asset during lifetime; meaning if there are changes during the life so, whatever is the book value of the asset divided by that.

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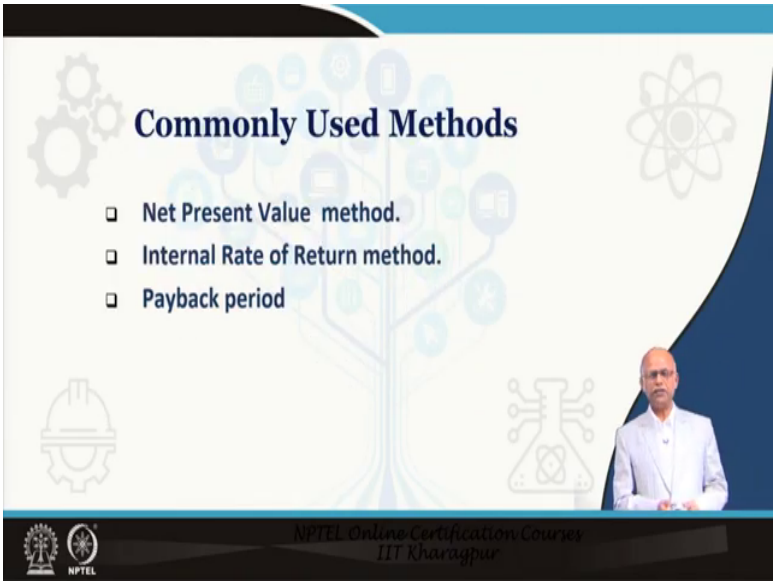

Let us move forward. So, we will be discussing this three method.

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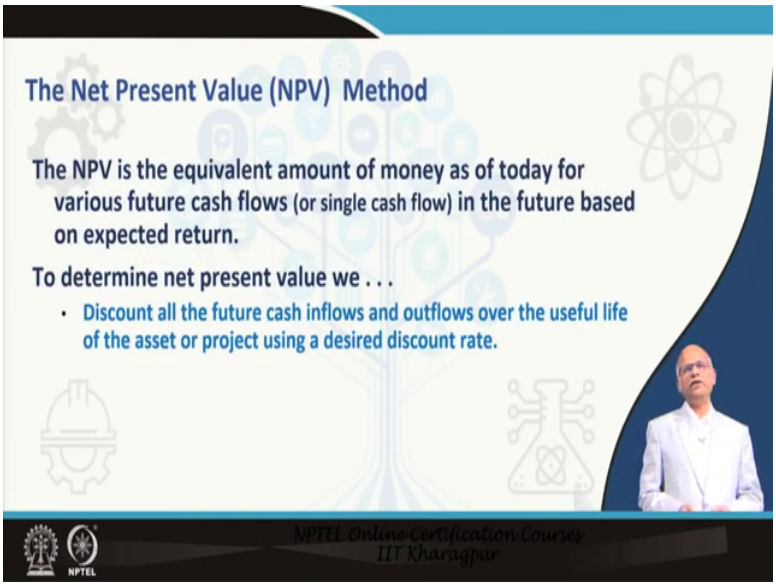

First thing is net present value method, the net present value is the equivalent amount of money as of today for various future cash flow or maybe single cash flow in some years. So, discount that single cash flow in the future based on expected return. Meaning whatever return at which we expect the money to come in. Like if you deposit money 100 rupees in the bank or 1 lakh rupees in the bank, bank will say rate of rate of interest is say 6 percent; that means, your rate of return is 6 percent that is rate of return.

To determine rate net present value, we discount all future cash inflows and outflows over the useful life of the asset or project using whatever discount rate or whatever in rate of return that we expect. Whether it will give or not that will see, but we expect it to return at say 15 percent so, we will discount at 15 percent.

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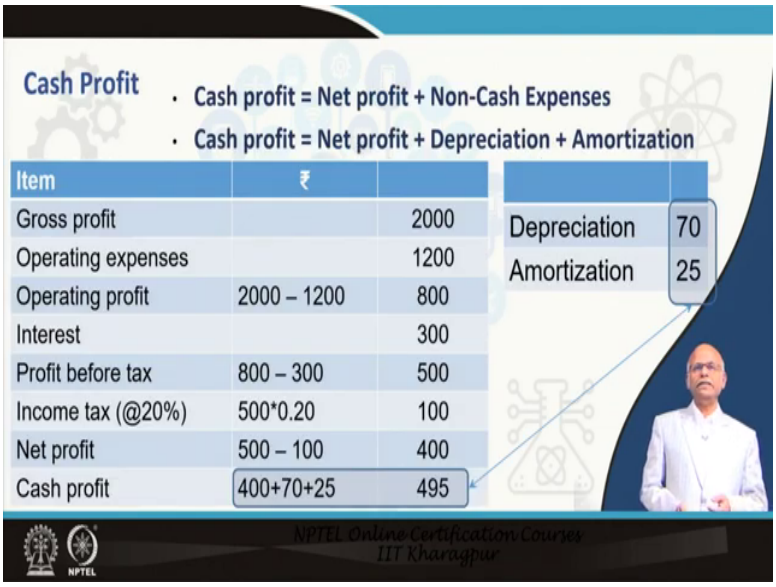

Now, we need to understand for all these we need to understand, the cash flow we are yet to discuss what is cash flow. We have we know net profit, when we talked about financial statements we estimated gross profit then, operating profit then profit before tax after tax we estimated net profit. So, we know about net profit.

What is cash profit? Cash profit is nothing but net profit plus noncash expenses that we have deducted from operating profit we have to miss or from gross profit you have to add them back; because these are not expenses not real expenses. These are book entry as I said earlier like depreciation like amortization these are just book entries. So, cash profit is equal to net profit plus depreciation plus amortization.

Suppose you have this financial statement gross profit is 200 2000 operating expenses 1200 operating profit is gross profit, minus operating expenses 800 interest is 300. So, profit before

tax is 500 then finally, you have net profit of 400. Now, what is cash profit? Cash profit is net profit plus depreciation plus amortization it becomes 400 and 95 that is what is cash flow positive cash flow if you say negative value negative cash flow.

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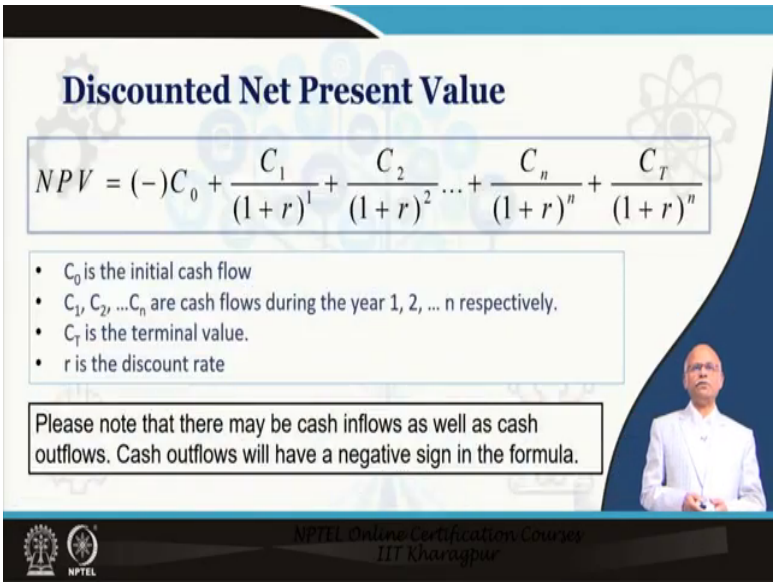

Now, what is discounting? So, far we have been telling discounting, discounting. So, if suppose you have invested 100 rupees now and you get it back sometime after some time. So, the discounted net present value is the same thing because there is no elapse of time.

Now, suppose you get 100 rupees and after 1 year. So, you have to discount that for 1 year if the period is 1 year, if the period is 1 month you can always discount. So, you need to know what is the rate of return within a month per month return. So, if the rate of suppose interest rate is or say if discount rate is 12 percent annually.

Then if you are doing it on a monthly basis then every month you have only 1 percent rate of return 1 percent plus 1percent plus 1 percent ultimately becomes 12 percent. Then the period will be month wise month basis, but normally we go for annual basis and we will not complicate the situation by going into bifurcating the period. So, know this for the time being you know that it is annual.

So, suppose you receive 100 rupees next year. So, what is the present value today? You discount that 100 rupees by your expected rate of return for 1 year what is that? Say 100 rupees divided by within bracket 1 plus the rate of return with a decimal not full. Suppose 10 percent rate of return means 0.10. So, 100 divided by 1 plus 0.10 meaning 1.1 whole to the power number of periods say. Now it is 1 year so, whole to the power 1, whatever is the value that is the net present value of that 100 rupees.

Suppose it is you get another 100 rupees after another 1 year so, it becomes 2 years. So, you give 100 rupees divided by 1 plus 0.1 whole to the power 2 because it is second year that is how the formula is given. And then eventually, suppose it is for n number of years not 5, 6, 7 years whatever is the general some general format of the formula is C n meaning cash flow during n th year, divided by 1 plus r whole to the power n.

Then there may be some terminal value; suppose you have some plant machinery where you are putting in capital and then at the end you might you may like to sell those machine you are not going to throw away; whatever value you get you call it salvage value or you call it terminal value. So, we write C T and that also comes after n number of years so, it is n. So, this is how the net present value is estimated and this formula is used for estimating discounted net present value.

Please note that, all these plus signs and minus signs are the core part of the formula intrinsic part of the formula. But if there is a negative cash flow you have to put that negative sign before C 1, C 2, C 3 or wherever the negative cash flow is happening to accommodate that negative cash flow positive cash flow difference.

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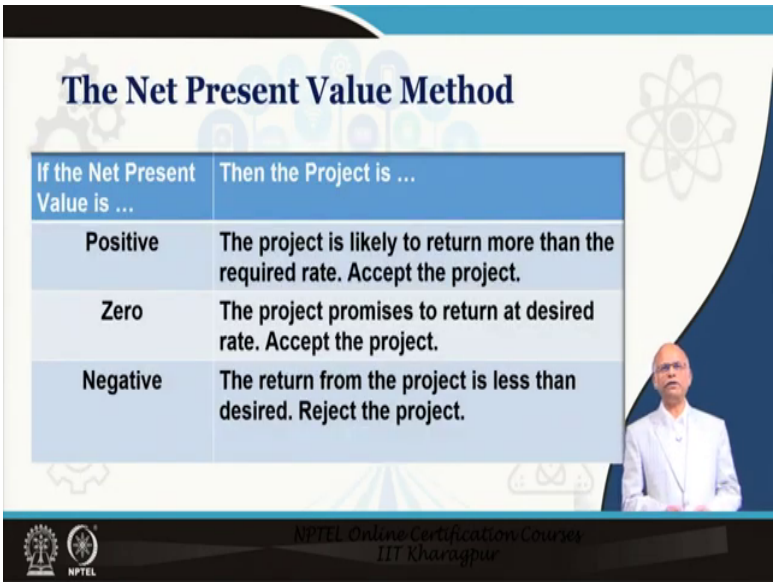

Now, if the net present value is positive you accept the business proposition. That means, that the business proposition will return more than your expected rate of return, if it is 0 it is exactly equal to your expected rate of return. If the net present value is negative it is returning less than your expected rate of return so, you do not accept that.

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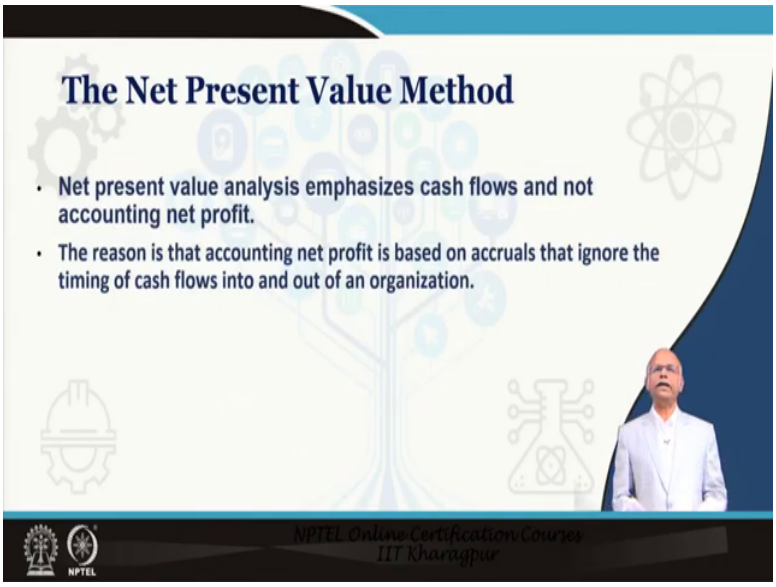

Now, it emphasizes on cash flow, not accounting profit that is what I mentioned at the beginning it is not profit net profit it is cash flow.

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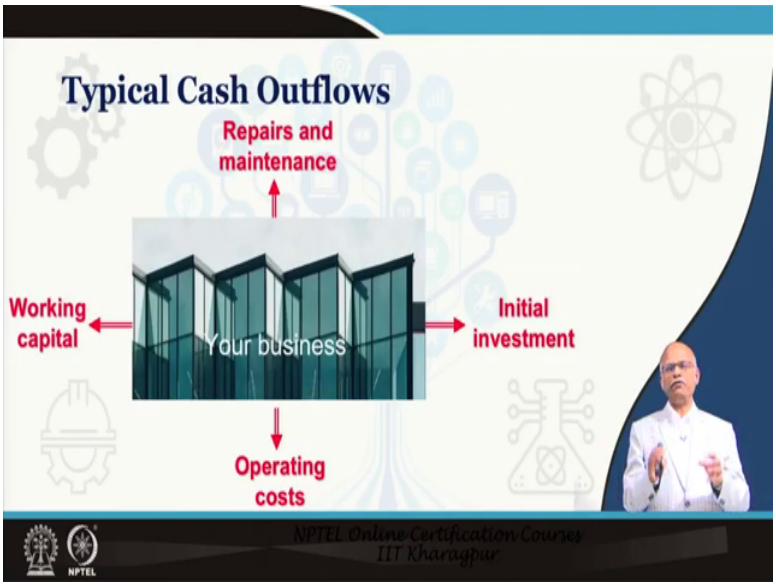

So, you have to add all noncash expenses. Some examples, suppose cash outflow what are cash outflow the most important cash outflow is the initial capital investment on the right initial investment. That is a kind of a sunk cost you invest that money in capital and you do not get you get whatever you get that is the revenue, every now and then you get the sorry this is cash outflow.

So, capital investment is cash outflow at the beginning you may also invest some money in working capital that is very important. Most of people make this mistake some working capital also is necessary to run a business that is also cash outflow. Then all operating expenses that are also part of cash outflow. Suppose you pay transportation cost, you buy raw material, you buy you pay to labour, you pay for telephone for website development for data whatever you pay these are cash outflow. You pay repair and maintenance etcetera these are cash outflow.

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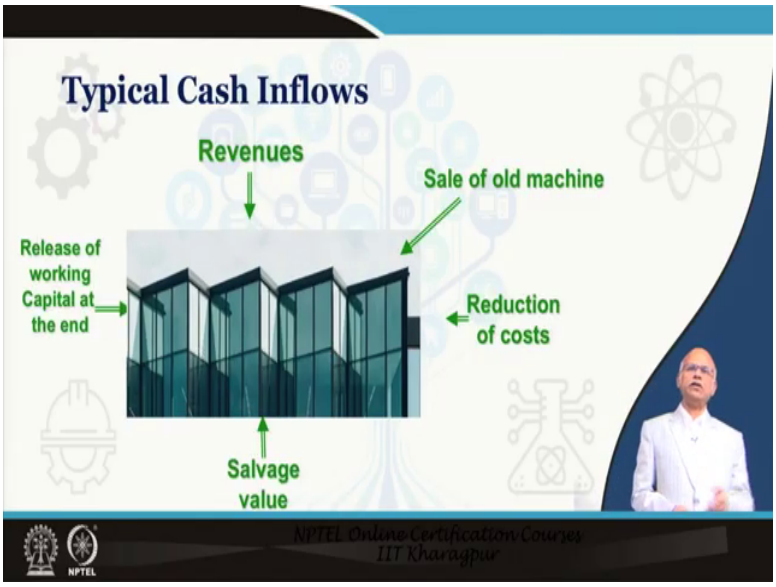

What are cash inflow? Most important cash inflow is revenue or sales. So, from sales you get money that is cash inflow, then you may sell some old machine at times not always, but sometimes you sell. So, whatever money you get that is a cash inflow. Then at some point of time you reduced cost becomes cash inflow. At the end of the business or at the end of the horizon, your accounting horizon when you think that this machine will go up to these many years. So, at the end, you may like to sell all your assets. So, whatever salvage value you have got a value you get you call them salvage value that is a cash inflow.

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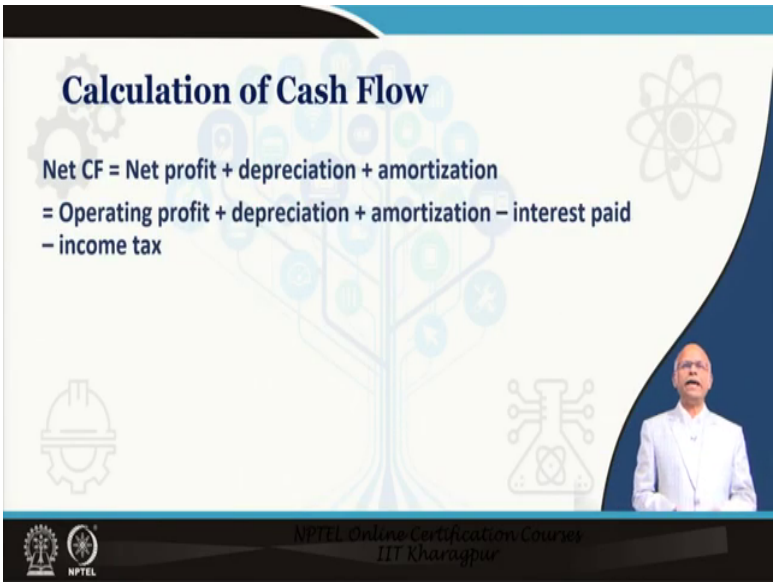

Similarly working capital also will come back that is also cash inflow. Calculation of cash flow; net cash flow is equal to net profit plus depreciation plus amortization. Look in other words if you start from operating profit operating profit includes depreciation. So, operating profit minus interest paid minus income tax should be the formula not plus I am operating profit actually reduces depreciation.

Because operating expenses include depreciation operating expenses include amortization, but we are looking for a profit with depreciation. That means, operating profit plus depreciation plus amortization, but then minus interest paid minus income tax is the cash flow. Because interest also is to be deducted from operating profit, income tax also is to be deducted from operating profit to get cash flow net cash flow.

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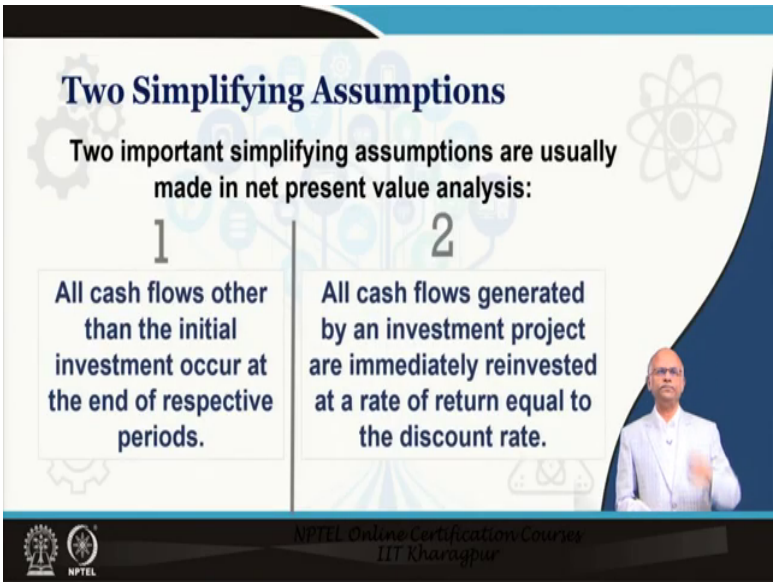

Now, this is very important one. We make two very important assumptions in estimating net present value. Number 1 assumption is all cash flows other than the initial investment occur at the end of the respective periods. Meaning that, if some cash flow happens on say in April, we consider that it is happening in the next year March; because we want to discount that money for the entire year during which it is happening.

So, suppose some cash flow happens on the 5th year at the beginning of the 5th year, we are going to discounted for whole 5 years. So, we assume that it is happening at the end of 5th year rather than beginning of 5th year. Similarly all cash flows generated by an investment project are immediately reinvested at the rate of return equal to the discounting discount rate. These two assumptions are very important and the formulas which I showed you is based on that assumption.

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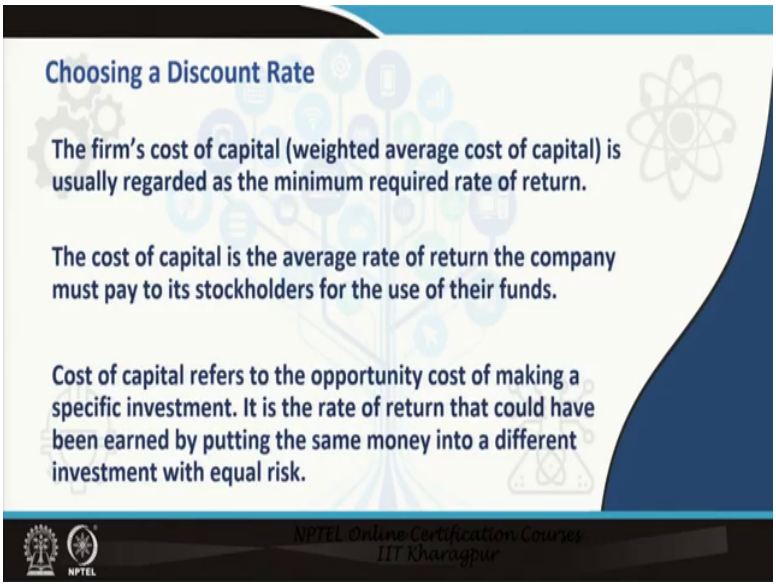

Now, we have been talking about discount rate, then opportunity cost what is this discount rate. You may see the somebody may say that risk free rate is the discount rate; because I that is my opportunity cost, but then when you are investing in a project you are taking some risk. So, you expect much more return than risk free rate.

So, the bank is giving you say for argument set 6 percent. So, you can always earn 6 percent by putting your money in the bank why should you invest in a project which may not which may ultimately (Refer Time: 25:07) or something you do not know. So, your expected rate of return from this project will be much more than what you are investing in the bank. So, risk and time when the money is getting returned, these two factors are very very important when you choose a discount rate.

So, one thing is your cost of capital. Suppose you are borrowing money from bank at say 20 percent for argument sake, now you are investing that money in a project, if that project does not return more than 20 percent you are going to incur loss. So, you need to you need to expect or the project needs to return you more than 20 percent to justify investing. So, there are so many parameters for deciding on choosing the discount rate.

Cost of capital is the average rate of return of the company must pay to stockholders and their debtors so many people are involved they are getting money from different sources. Cost of capital refers to the opportunity cost of making a specific investment it is a rate of return that could have been earned by putting the same money into different investment plus risk premium.

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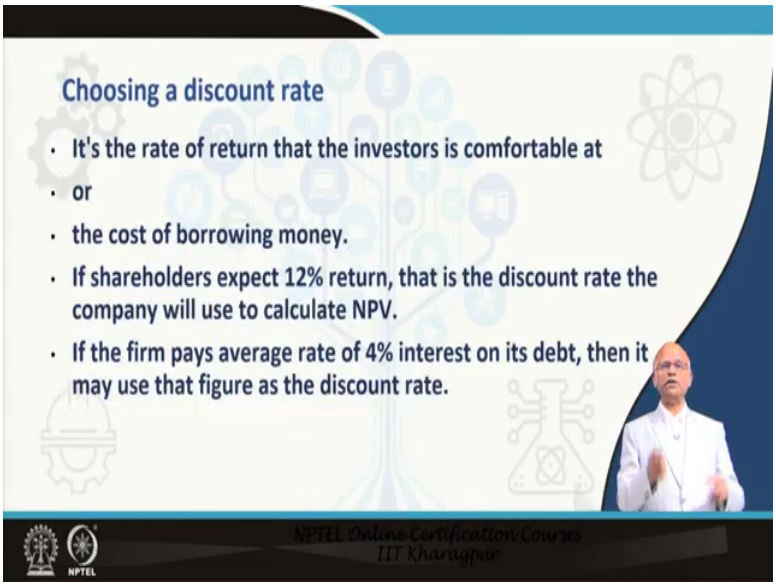

So, remember the risk premium is very very important choosing a discount rate. So, whatever is whatever we have discussed now what is weighted average cost of capital; meaning suppose you have equity money, money in the form of equity and you expect that your equity should return 20 percent. Now, you have some borrowed money where your interest rate is say 10 percent. So, you want to return 10 percent to them you want to get 20 percent on your money. Suppose there is another guy who has given you some unsecured loan at 30 percent some urgent money that you need.

So, if it is 30 percent then you need to return that guy at 30 percent. So, what there are three rates now. So, what should be the actual rate, that is where the weighted average cost of capital comes into play.

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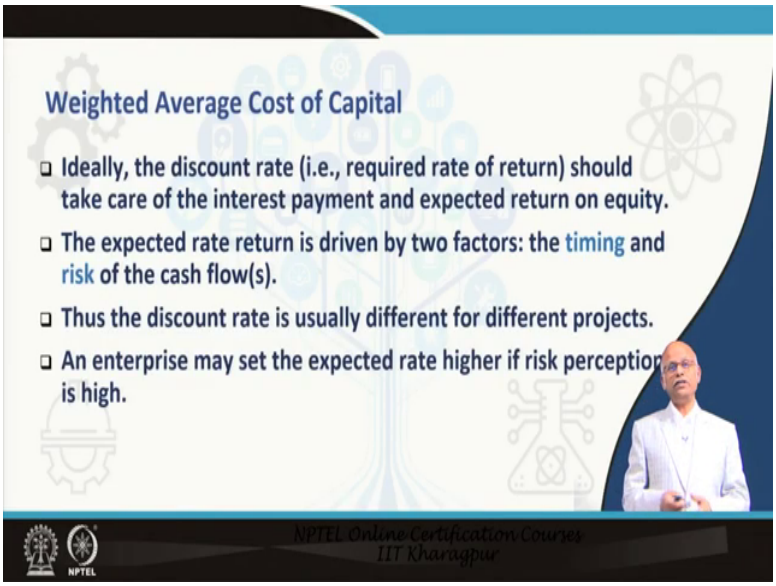

What is that that is the suppose you have 10,000 rupees from the bank at 10 percent. You have 20,000 rupees of equity. So, 10,000 comes at 10 percent 20,000 comes at say your expected return is 20 percent another guy gave you 5000 at 30 percent. So, what is the weight? 5000 is the weight 20,000 is the weight 10,000 is the weight these are 3 weights.

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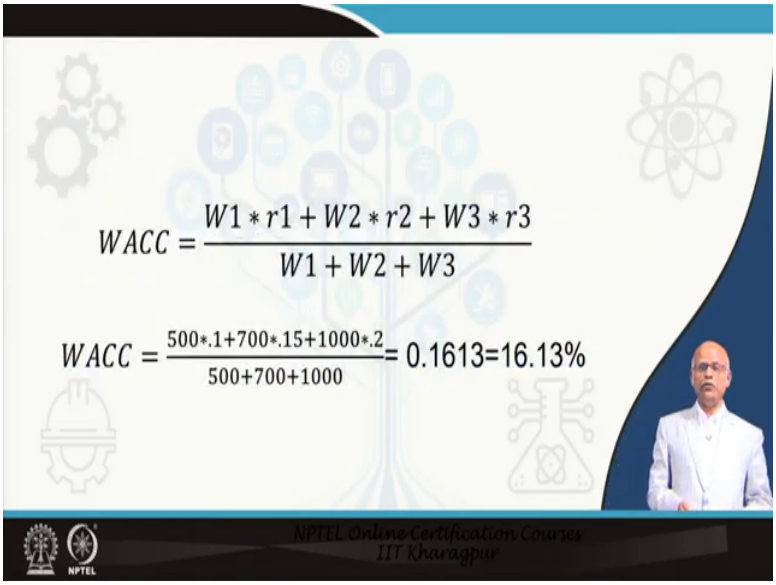

So, like suppose W 1 is the quantum of the money r 1 is the rate of return or rate of your cost or something. So, suppose 500 rupees you have borrowed from bank at 10 percent so, 500 into 0.1. Plus suppose your equity is 700 and you expect return of 15 percent so, 700 into 0.15. Plus you borrowed 1000 unsecured loan at 20 percent so, 1000 into 20, 20 percent divided by the whole sum of money W 1, W 2, W 3 whatever you get 16.13 percent is the weighted average cost of capital.

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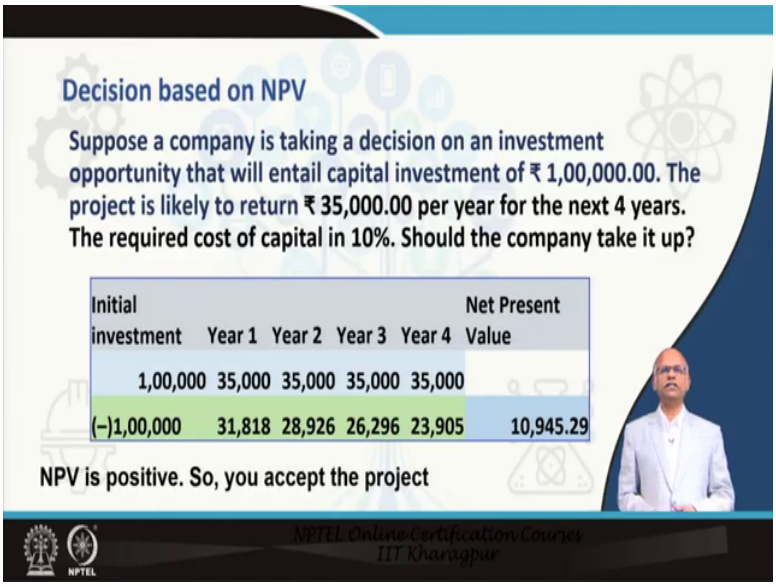

You have to discount all future cash flow at 16.13 percent and not at 10 percent 20 percent or 15 percent. Now, this is an example, suppose you have an opportunity to invest 1 lakh rupees and that will give you 35000 every year for 4 years your expected rate of return is 10 percent. So, you put that in excel sheet 1 lakh rupees is the initial investment. So, cash flow is negative 1 lakh 1st year you are getting 35000 discount that at 10 percent that becomes 31818.

2nd year you are expecting 35000 discount that for 2 years, likewise in the 4th year you get 35000 whose net present value is 23905 add them up including the initial capital investment of 1 lakh you get 10000 rupees. That means, you are getting more than 10 percent interest 10 percent return because you have discounted at 10 percent and net present value is positive; that means, rate of return by this project is more than 10 percent.

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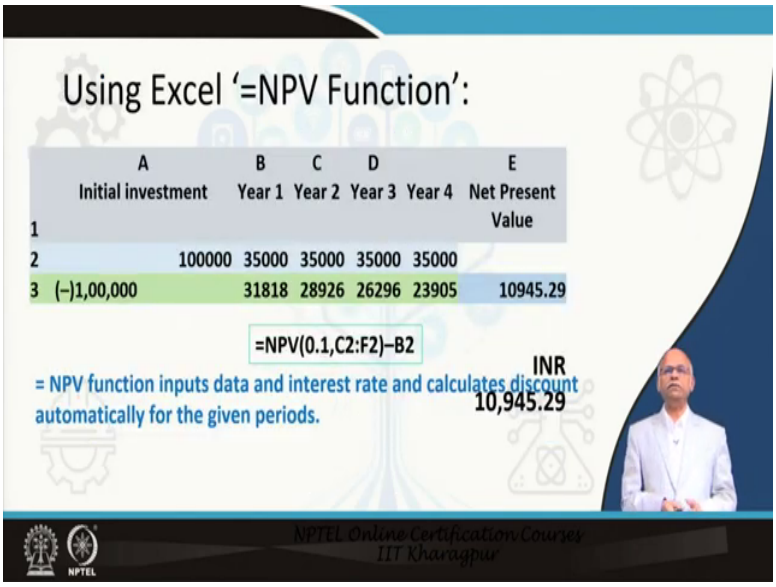

You can use excel formula for doing this and the formula is equal to NPV within bracket the first argument is the rate of return here it was 10 percent. So, I am given 0.1 comma then give the range of fields where you have the cash flow except the initial cash flow that is why it is C 2 colon F 2 from C 2 you can see from C 2 up to F 2; here it is A B B C D E F there is some mistake on the letters.

So, C 2 to F 2 minus B 2; B 2 means the initial capital, A should be actually one step on the on the left side. So, that is why the mistake just when I copied the formula from excel. So, it was B 2 and the net and the result comes automatically at 10,945 rupees simply.

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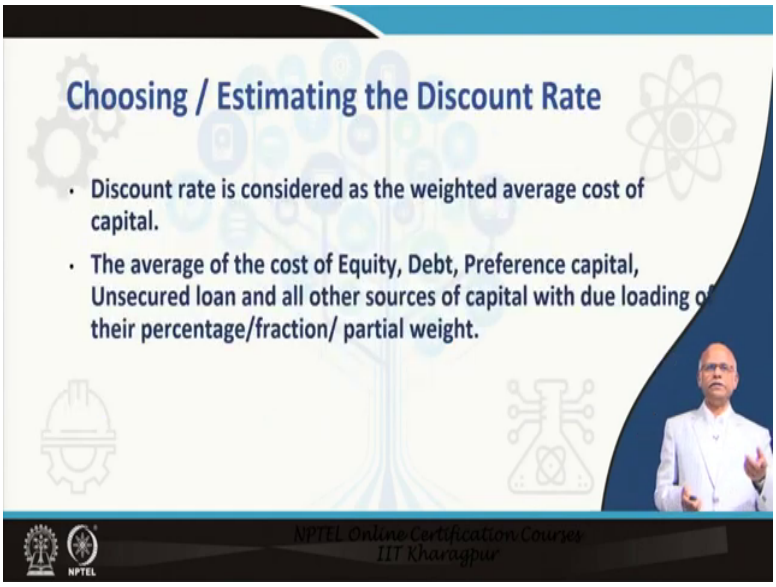

So, you can use excel formula, but when you are in a examination hall you may not have excel, but in real life you have excel and you can use the formula now its so, simple.

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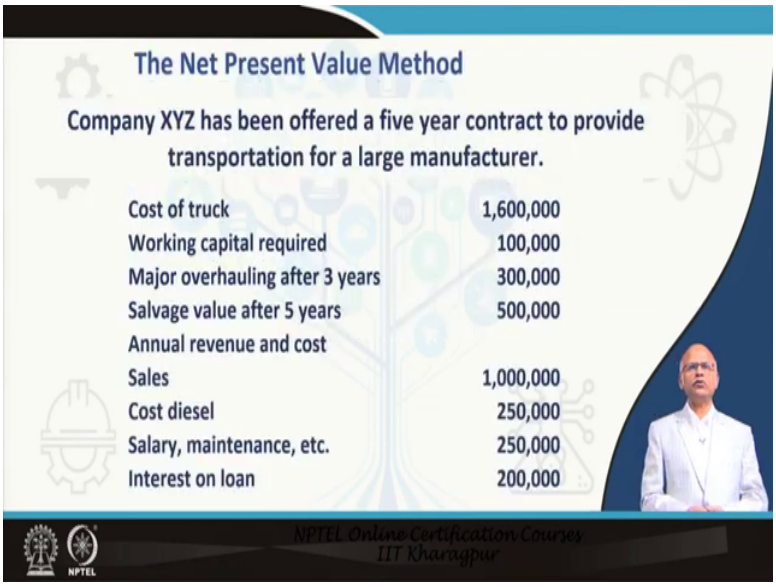

Choosing estimating discount rate so, we will not discuss so much about that you have already done. Here is an example suppose you have a business some company XYZ XYZ has been offered a 5 year contract to provide a truck for a large manufacturer. You want to provide a truck a truck cost suppose 1,600,000 rupees and you need working capital of 100,000; meaning day to day expenses like buying diesel then some money for maintenance some money to be paid to the driver for road like say toll tax or something.

Then measure overhauling happens after 3 years 3 years of operation you are foreseeing that maybe you will have to invest something like 300,000 rupees for overhauling the truck. Because you are going to run for continuously salvage value after 5 years because the contract is for 5 years you do not want to keep the truck after 5 years. After 5 years you think that the 1,600,000 rupees worth of truck will be facing something like 500,000 rupees done.

Now, what is your annual revenue and annual cost? Your sales every year is 1,000,000 rupees that is the agreement with the company that they will give you 1,000,000 rupees every year. Cost of diesel will be 250000 rupees salary maintenance will be 250000 rupees interest on loan will be 200,000; because you are borrowing money say weighted average cost of capital should we accept this proposition is it profitable?

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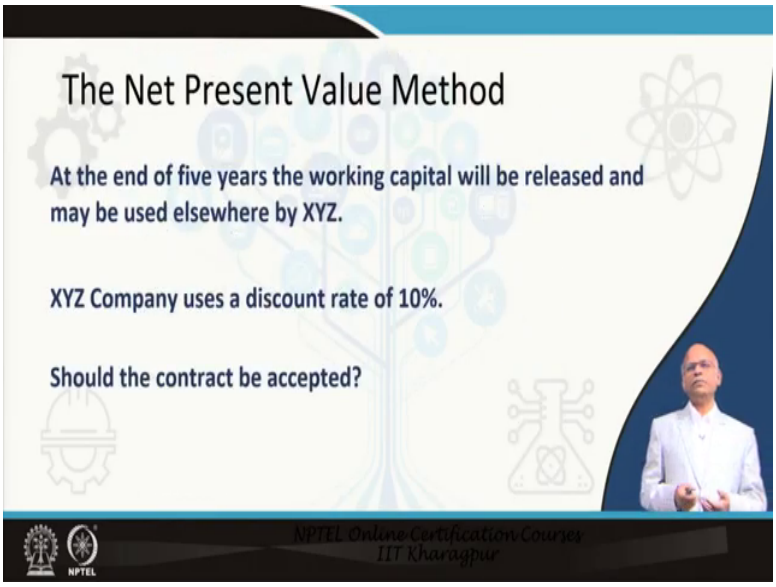

If our expected rate of return is 10 percent, our discount rate should be 10 percent because our expected rate of return is 10 percent, bank loan is 10 percent. My I have some little bit of capital also there and if I put that money in the bank I get 6 percent, if I get 10 percent I am happy. So, my weighted average cost of capital is 10 percent should we accept this?

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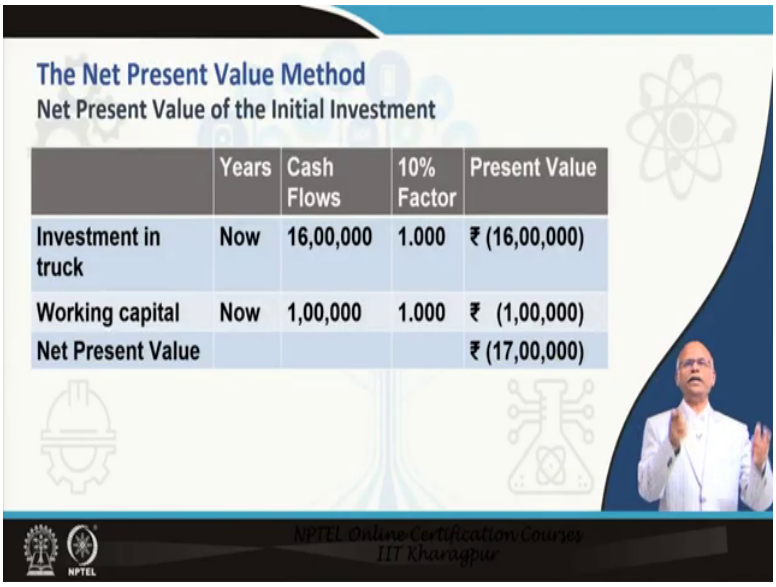

Now, these are the consideration initial capital investment, investment in truck 16,00,000 rupees working capital investment upfront is 1,00,000, total outflow in the zeroth year is 17,00,000 rupees.

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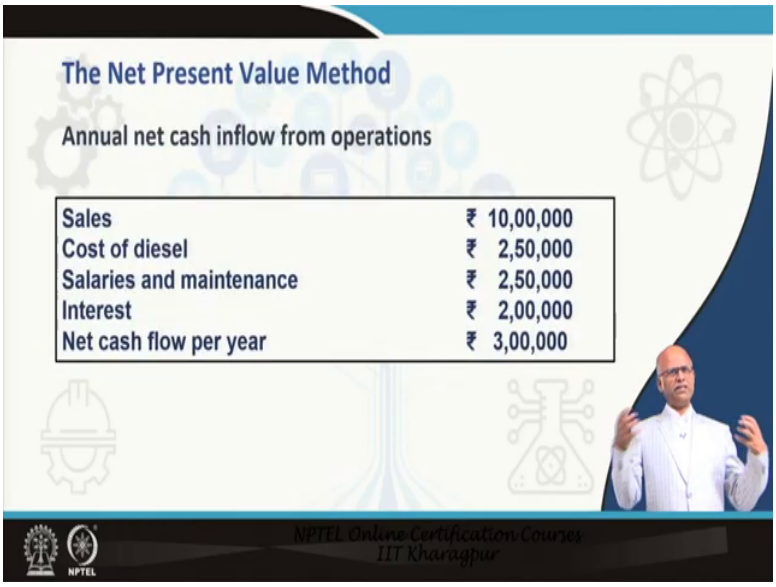

What is the revenue net cash flow every year? First year sales is 10,00,000 rupees cost of diesel is 250000 etcetera. So, net cash flow per year in the first year is 3,00,000 not every year.

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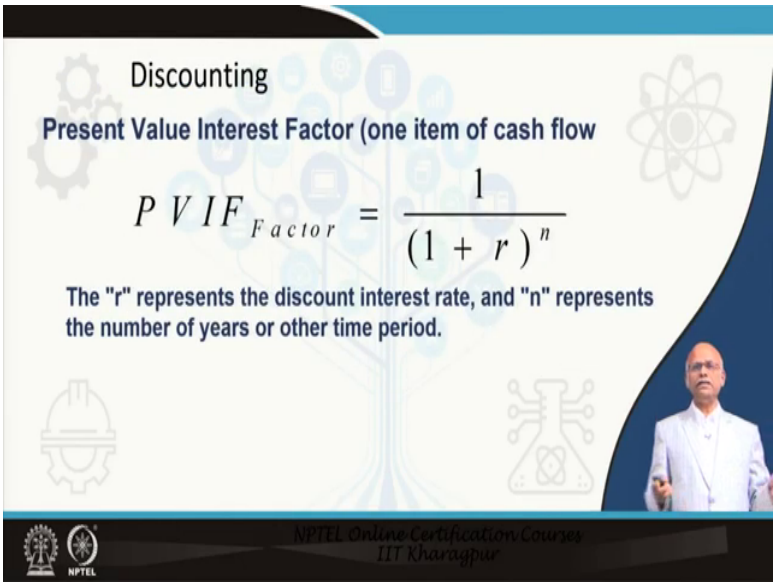

Because in the third year we have some especial expenses you for each item you can use this formula for estimating net present value each we have put it in a table.

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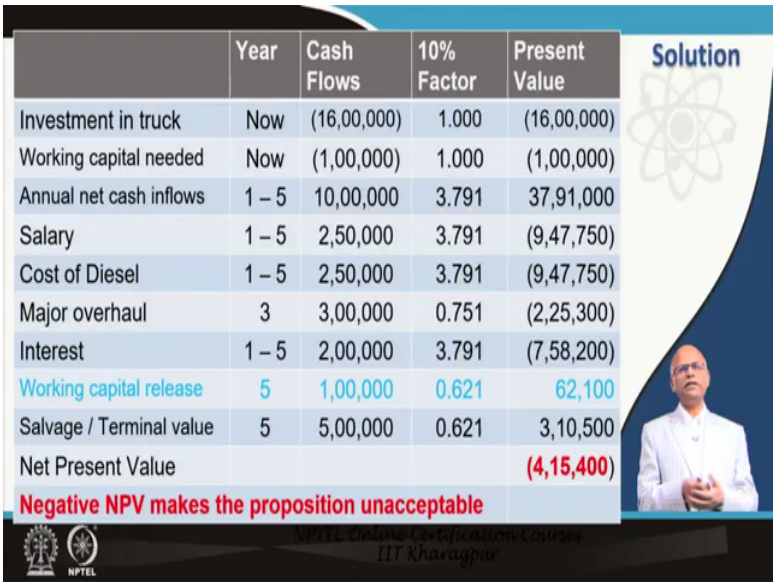

So, investment in the truck is 16,00,000 rupees present value is 1600000 negative; because we are put making net present value present day value. So, 16,00,000 rupees today is 16,00,000 rupees working capital again we are sinking working capital of 1,00,000. So, negative 1,00,000 annual net cash flow from 1 to 5 we can use a formula. And find out the 10 percent factor that gives 3.791 I will show the factor in the next session. For the timing just assume that there is a formula for estimating net present value factor and that is 3.791 multiply that with 10,00,000 you get 37,91,000.

Salary likewise you estimate all of them and find out the discounted find out the factor and then discounted value. Eventually the net present value becomes 4,15,400 negative. So, it is negative; that means, their business is not promising to return even at 10 percent which is my expectation.

So; obviously, I am not going to go for this business. Look at this working capital release after 5th year you have to remember this that working capital will be returned. So, working capital of 100,000 rupees will be return in the 5th year. So, the present value factor is 0.621. So, we multiplied with that to find the net present value of working capital that has been returned.

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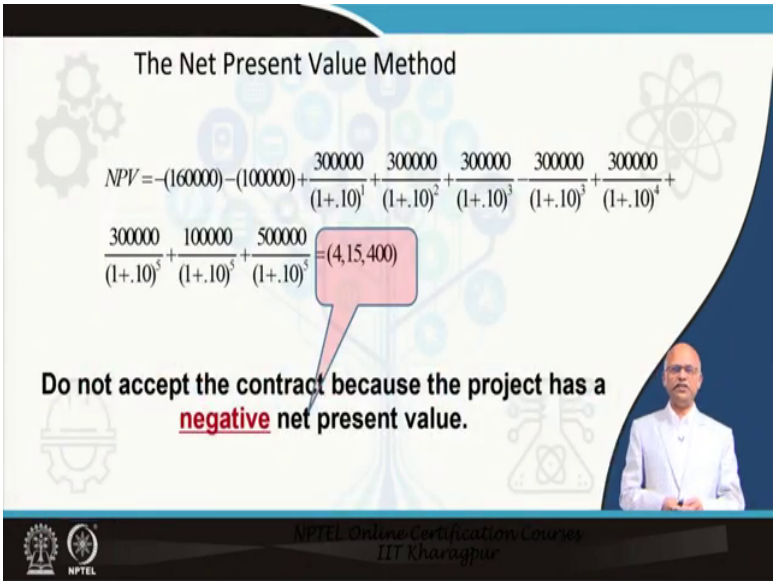

So, this is the formula you can put it this way, instead of estimating the net present value factor for different cash flows, you can estimate this net present value for each and every item separately using the formula look at that how we have estimated. So, we will continue this discussion in the next session.

Thank you very much.