Financial Management for Managers
Professor Anil K. Sharma
Department of Management Studies
Indian Institute of Technology, Roorkee
Time Value for Money Part 1
Lecture 10

Welcome all. So, now we are going to start very important concept in finance Time Value of Money. The Time Value of Money which is a very, very important concept and without learning about the Time Value of Money I think the discussion on any subject on the finance or the financial management will not be complete. This is basically the you can call it as the, the back bone of any financial learning or the learning about the finance and the financial management.

Without time, value of money you cannot complete any discussion on finance, you cannot take any financial decision and we cannot arrive at on very reasonable say conclusion that if you want to take any investment decision, if you want to take any yes or no decision with regard to any investment than largely we have to take that say decision in the light of the total discussion which is in terms of the time, value of money.

Because, value of the money changes as the time changes. Value of money is not static, because value of money is always dynamic this, this concept is always dynamic it changes always changes it does not remain static, it does not remain stable. Money a 1 rupee in hand today is not equal to the 1 rupee we are earning after 1 year.

Number of reasons are their, number of factors are their so when you talk about the time, value of money you talk about 2 important things present value of the future earnings or that present value of the future cash flows and the second important concept is the future value of the present cash flows, future value of the present cash flows.

For example, we have 1000 rupee today, I have 1000 rupee today in my hands, I want to grow with that amount, now I have different options if am totally risk evers then what will happened? I will go deposit that 1000 rupee in the, in the bank and after depending upon the rate of interest for example the, if the simple rate of interest is 10 percent then after 1 year bank will give back me not 100 rupee 1000 rupees but say its 1100 rupees.

So, 10 percent addition they will make. So, in a way we call it as a addition earning on my investment that is at the rate of 10 percent. I have earn that interest on that 1000 rupees so my

1000 rupee which I deposited in the bank today has become 1100 rupees so that is on the one side called as a earning on my investment but if you calculate in terms of the time value of money then my 1000 rupees is equal to the 1000 rupee, 1000 rupee of today will be after 1 year equal to 1100 rupees, because the value of that 1000 rupees of today is equal to the value of the 1100 rupees after 1 year period of time.

So, why we want to means calculate the future value of the present amount? And why we want to say earn something on that? Why we want to invest in such a manner that at least there is no appreciation in my investment but at least there should not be any kind of the depreciation also which is called is a real depreciation because of the time factor that should also not be there.

So, after 1 year when the bank is returning you back 1100 rupees against the investment of 1000 rupees which we made today they are not making any kind of obligation. They are returning you only 1000 rupees back if you calculate that their value of that 1100 rupees after 1 year that will be almost equal to that 1000 rupees.

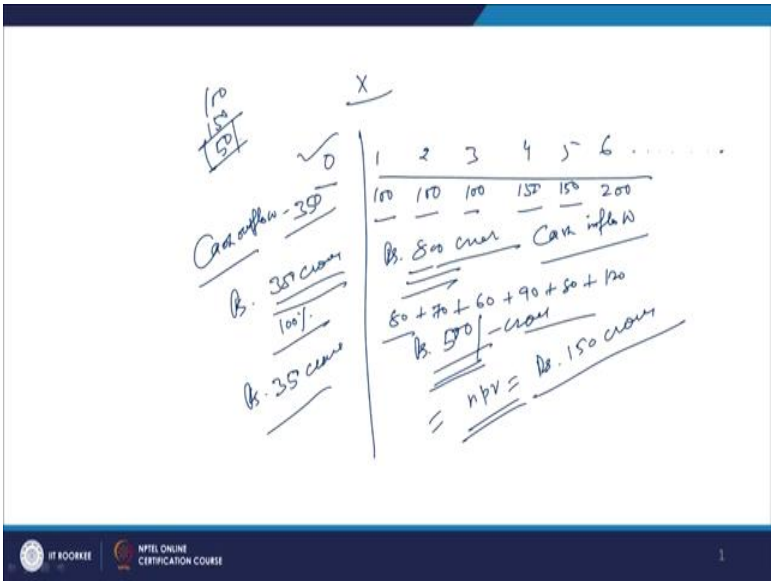
Because if they are returning you 1000 rupee they taken today and after 1 year they return you back 1000 rupees it means we gave them 1000 rupees and after 1 year they are returning me something lesser maybe 900 rupees, because the value of that 1000 rupees after 1 year will be equal to 900 rupees. So, value of the money comes down with the period of time.

Second important concept is the, say present value of the future amount, present value of the future amount. So, for example, we have the present value of the future amount means that we use this concept in the project evaluations. When we go for any investment, business investment proposal evaluation of business investment proposals we call it as a independent project.

Maybe it is a addition of the 1 new product into the existing line of the products or maybe say, say (())(5:11) diversification or you call it as a say vertical growth or horizontal growth or maybe any kind of diversification the firm want to do when any new investment is planned we want to add a new product into the existing say the product mix or you want to move into a diversified area and you want to start the production of a new product at all every time its a new investment opportunity, new investment and it has to be evaluated in terms of a new project.

Once you have to evaluate it in terms of a new project so what happens? There comes a question of the say evaluating it and trying to find out that whatever the investment we are making today in that project the total funds which we are putting into that project are we able to recover the minimum decision making criteria is that minimum that whatever investment I am making in this project today that must be returned over a period of time when the cash flows from the project will be available.

(Refer Slide Time: 06:21)



So, for example, we have the say concept of the cash out flows and the cash inflows. So, for example there is a project which we want to start and this project is for example X, we want to maybe start a new product we are diversifying for example as in case of anchors I discussed with you, anchor diversified from the conventional electrical products segment to the fruit beer.

So, when they wanted to have this project so they thought that how amount they are going to invest in the current year in this period we call it as we divided into number of years 0, 1, 2, 3, 4, 5, 6 we want to have like this. So, it means this is the current period 0 period is the current period and these are the future periods one year, second year, third year, fourth year, fifth year, sixth years.

We can say that if we make a investment of this any amount in this present period, in the 0 period, in the current period and then the forcible life of that project which will come into existence after this investment will be next 6 years and all the 6 years over it will be giving us

some cash flows back so it means how much we are investing in the 0 period and how much it is returning with the life can be any, any number of years.

For the forcible years are today we can see look forward into the future is only up to 6 years. So, we have this 6 years we are seeing here that ok, it can run up to another 20 years but I can say that yes in the next 6 years this is going to happen with this particular company of particular this project.

Now, we have got 2 time periods 1 is a 0 time period which is a current period and these are a 6 future time period is a 6 years. I making investment of for example, 350 crores here so this is my investment and this will be known as the, what we will call it as? Cash out flow. This will be called as cash out flow of the 350 crores which I making in this period that is in the 0 period.

And over a period of this you are going to get back 100 here then you are going to back in the second year also 100, then you are going to get back again the 100, then you are going to get back here is a 150, then you are going to get back next year also 150 and now you are going to get back is the total 200 crores are coming back to us.

So, after making this investment of how much 350 crores we are going to get back some amount here and that amount is available to us over the period of time which we have assist basically on some say estimates and estimation is all based means any estimation begins always with the forecasting of the sales.

So, if you sum it up this becomes 1, 2, 3 300 then it is 450 then it becomes 600 plus 800. So, you invested how much? 350 crores and how much is coming back to us is the 800 crores. But would you call it as this is 350 crores rupees and this is 800 crore rupees would you call it as that this 800 crores which we are earning over a period of 6 years is equal to the 800 crores.

This 350 is equal to the 350 crores because this is currently in the 0 period we are investing so the time value, time value of this money 350 crores is equal to 100 percent that in the current period 350 crore I am shelling out of my pocket so this 350 rupees investment in the 0 period which is called as a cash out flow will be called as 100 percent equivalent to 350 rupees.

If I go with that 350 crore rupees in the market I can buy the goods and services worth this amount from the market and no reduction in the value of this will be there will be done by

anybody. But this cash flow is coming to us over a period of 6 years total in flow is coming to us this is called as cash inflow, this is called as cash inflow.

So, this is coming to us over a period of how many? 6 years. In the first year at the end of the first year after the operations of the first year I am getting back 100 crores cash flow I am talking about is not the profit. Second year we are getting another 100 crores, third year we are getting another 100 crores and then it is we are getting again the 150, then 150 and then 200 crores.

So, now what I have to do is, that 100 crores which are coming to me at the end of 1 year, next 1 year that is not equal to 100 crore it is something less than that. So, I have to calculate the time value of money of this 100 crores so it may be possible this is not say 100 crore but this is 80 crores, this is 70 crores and this is further coming down to 60 crores this comes out as plus 90 crores this comes up as again 80 crores and this comes up as 120 crores.

So, this amount will be how much? This may amount will become is the this 70 and this 80 and this 70, 150, 210 this is 200 and 300, 380, 380 and it is 480, 500 this becomes 500 rupees 500 is the discounted value. So, how much I invested? I invested is 350 crores this is my total investment. How much I got back is? My total amount coming back to me is that is rupees 500 crores.

So, we have to make a now our present value analysis, we have to calculate the present value analysis so my cash out flow and the discounted value of the present value of this so total cash out flow is 350 and total present discounted value of the cash inflows over the period of 6 years is 500, so it means what is my NPV?

Which is called as net present value of this project will be rupees 150 crores. This is called as rupees 150 crores which is called as the net present value, this is called as the net present value. If you call as a present value if you want to ask, present value of this project is 500 crores but if you want to calculate the net present value then from the discounted value of the cash inflows you have to subtract the present value of the cash out flows and then that is the present value of the cash inflows minus present value of the cash out flows will become the net present value and in this case this NPV becomes 150 crores.

Now, question arises that how this 100 crore came down to 80 crores? 100 crore came down to 70 crores we discount it against some discount factor and discount factor normally is basically the cost of capital, the cost of capital because this 100 crore means simple I in the simple terms we will be, I will take you to the intricacies of this time value of money in the literal meaning, in the literal financial language also but in the simple terms we can say that the present value of the future cash flows is the one important requirement working out those is the one important requirement and the future value of the present cash flows is another important requirement.

So, in the time value of money we will learn both what do we mean by the future value of the present cash flows? And what is do we mean by the present value of the future cash flows? This is a present value of the future cash flows. So, we have calculated and we are trying to find out as net present value.

So, whenever we take the decision about any kind of the projects, we have discussed in the beginning when you few remember that discussion of the this during the fundamentals of the financial management I have told you that ultimately the objective of the value maximization of the form will be achieved if the total return which is means the reward of shareholders investment which is returned back to the shareholders by the company over a period of time is more than whatever the investment this shareholders have made in the company.

So, if for example, the shareholders have invested 100 rupees you if you are returning 150 rupees back so it means this is the 50 rupees is the reward of their investment which they made into this company. This much of the risk they have taken they moved into the business and everything so it means we have achieved that our objective of the value maximization so shareholders wealth maximization we have attend.

Same is a case here in every project when we take the decision of the projects we apply the concept of the present value of the future cash flows so present investment is equal to 100 percent future cash flows have to be discounted against some discount factor and they have to be broad equal to present say value of that future cash flows so that both become comparable.

Now how, because you cannot compare the apples with the oranges and oranges with the bananas its not possible. So, what we have to do is one is the present cash flow another is the future cash flow so how the present cash flow can be equal to future or vice versa its not possible

so you have to convert both into the present cash flows. So, present is present that is their 350 crores but the future is coming to us which is estimated cash flow you have to convert that into present and then these two become comparable.

So, there we are able to take a decision that if we are investing 350 crores and we are getting back 500 crores so yes, we are going to have the net present value of the 150 crores so project is worthwhile. Plus you can add up the value over the next subsequent years also which is not forcible here that we are seeing only the 6 years the life of the project but it may be possible project is running for the 20 years.

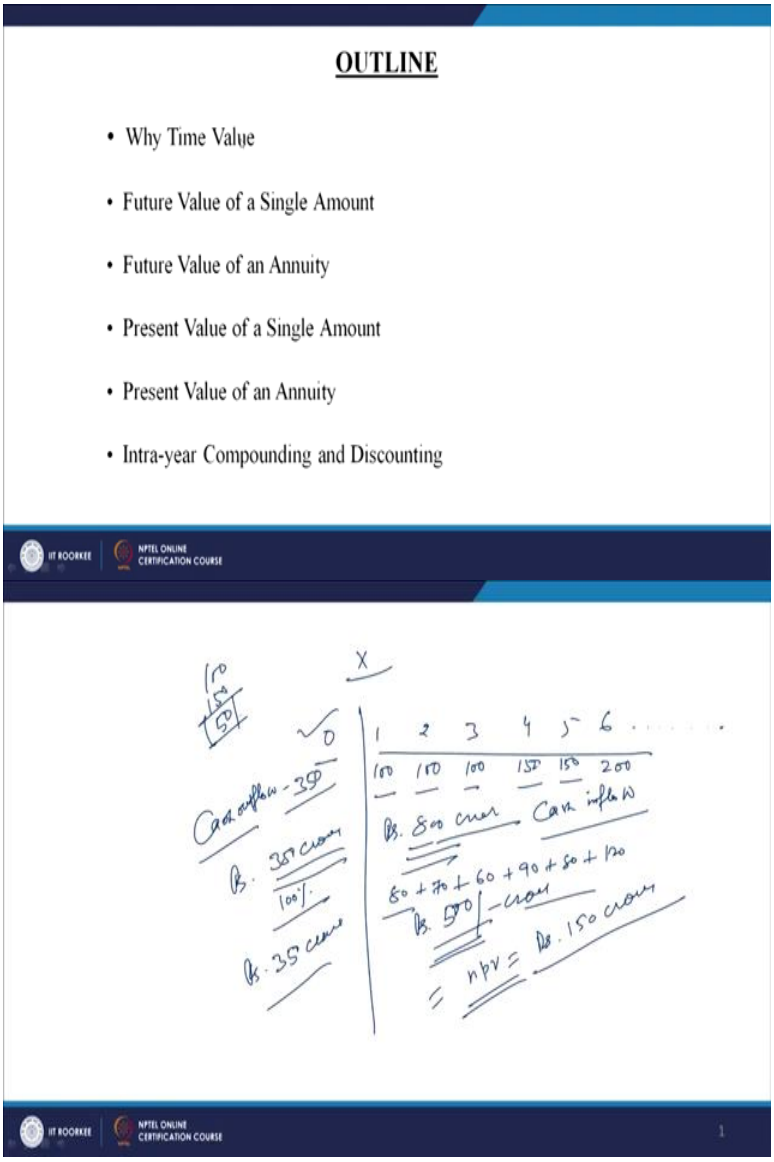
So, additional then when the cash flows will come to us they will keep on adding into this NPV and this project will become more means worth taking up or its economic might must further go up. So, here lies the importance of the concept of the future value of the present cash flows and the present value of the future cash flows and both the concepts are the two sides of the same coin and here these two important concepts make the time value of the money.

So, I told you that the future value of the present cash flows for example, the example of a bank you have 1000 rupee given it to the bank, so you are giving 1000 rupee after 1 year they are returning you back 1100 rupees so they have returned you not 1100 rupee if you discount that against 10 percent cost of capital you will means come back to the 1000 rupees.

So, 1000 is coming back to you as a 1000 so it means you kept your 1000 rupees safe with the bank and after 1 year, after using your money whatever the return on investment they earned part of that they have returned it to you and your money ultimate objective is I may not get 1050 rupees for an investment of 1000 rupees.

But at least I should be able to get back if I am investing 1000 rupees today I should be able to get back 1000 rupees after some period of time my investment should be safe. So, growth means keeping your investment intact. So, this both the concepts I am going to discuss with you in detail in this concept of the time value of the money.

(Refer Slide Time: 17:46)



So, now question arises here, time value of money some important things we are going to discuss here. What we are going to discuss here? These are the important things. Why time value of money? I discuss with you at detail why time value of money, why we talk about the present value of the future cash flows and why we talk about the future value of the present cash flows and how it is important.

Future value of a single amount now when we will be calculate it you have the different questions now arising here. If you have a single amount 1000 rupees you deposited in the bank after 1 year period of time at a given rate of interest how much it will become. After 2 years for a

given rate of interest how much will it become, after 3 years for a given rate of interest how much will it become.

So, we will calculate the future value of the single amount we can calculate the future value of the multiple amounts which are not same, which are not same which are the different amounts, so we will have to work out that also. Sometime we have to calculate the future value of an annuity that every year you are depositing the same amount in the first year you deposited 1000, second year you deposited 1000, third year you are deposited 1000, fourth year you deposited 1000.

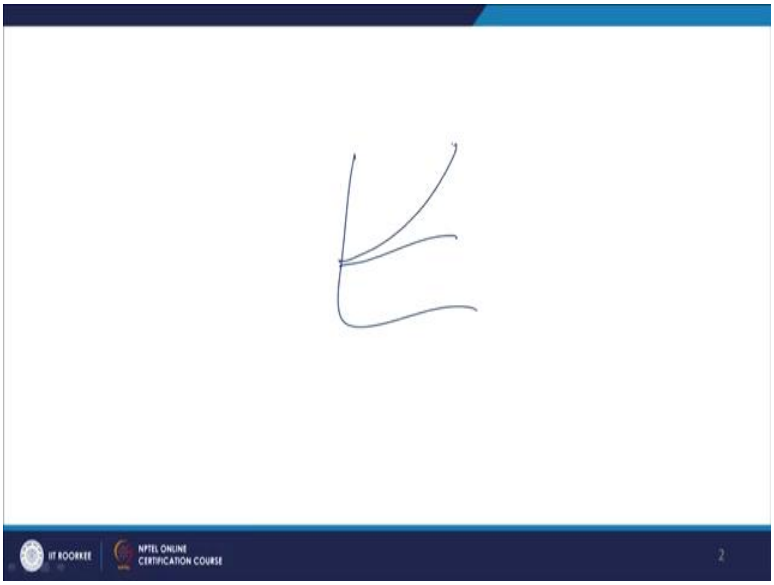
So, at the end of 5 years how much that amount will become at the given rate of interest. So, different questions will arise and we will answer the different questions under this future value of the single amount. Than is the present value of a single amount. So, when you are investing 350 crores in a project and the project forcible life is 6 years and over the years we are getting the different cash inflows if you calculate their discounted value and compare with the cash out flow of the 350 rupees, so what is going to be the net present value. That is going to be the present value of a single amount.

Present value of an annuity, that every year you are getting the same amount so 100 crore, 100 crore, 100 crore everywhere, so is that, that return is not changing focus what we discussed here in this? We have discussed the different amounts we have invested this and we are getting 100, 100,100, 150,150 and 200.

But for example if you get the same amount every time, every year at the end of every year you are getting the same amount so it means how to calculate the present annuity means when at the end of any period you get the same amount back that amount does not change and over a period of 5 years you are getting the same amount at the end of every year how to calculate the present value of that and what is the meaning of that?

Then the intra year compounding and discounting. So, these are the some other concepts we will be discussing. So, compounding is important when you calculate the future value of the present amount. Because you must have heard about there the 2 rates of interest in the market one is a simple rate of interest another is the compound rate of interest.

(Refer Slide Time: 20:31)



And the growth of your funds is different under the 2 rates of interest. If it is a simple rate of interest then you the funds of somebody grow like means this they grow like this as a straight line but if it is a compounding rate of interest it goes up like this. So, the growth rate is different because in the compounding rate of interest you get the interest on the interest.

But in the simple rate of interest what we say we earn the interest and we consume that interest only the principal amount is reinvested back. So, when the principal amount you are reinvested in back for the 1, 2, 3, 4, 5 years so ultimate you are going to get back the say lesser amount of the interest.

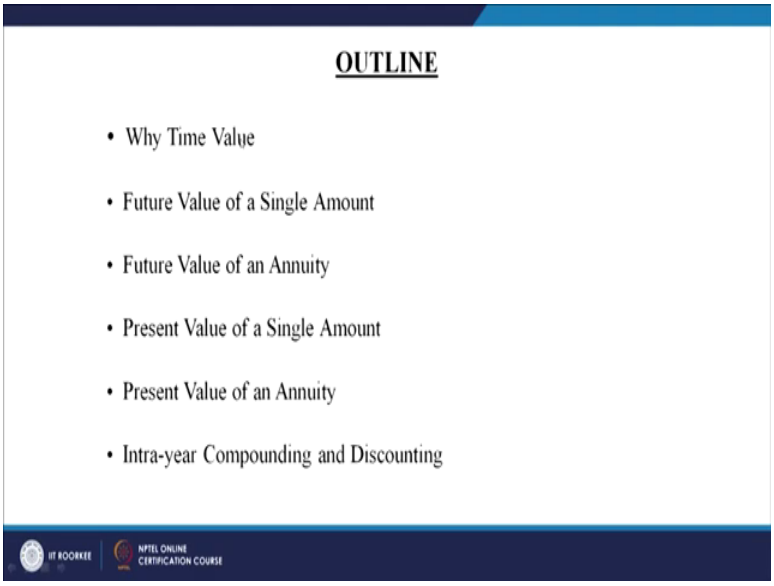
So, that difference of compounding and discounting, discounting comes into the picture I discussed with you in this case that when we are talking about this particular part how I have brought down the 100 to 80 and this 100 to 70 that is the by way of discounting and discounting is always done at the rate of the cost of capital.

Whatever the cost of capital of the firms cost of capital is that at the weighted average cost of capital we apply a discount rate and we say that whatever is my cost of capital minimum that has to be my return on investment, that has to be my return on investment, so either you call it as ()()(21:43) or you call it as cost of capital so that is called as denominator we use it as 1 plus R.

So, we use it as the discount factor and when you discount it against that discount factor the future cash flows then you get something lesser than what we are expecting to get after 1 year

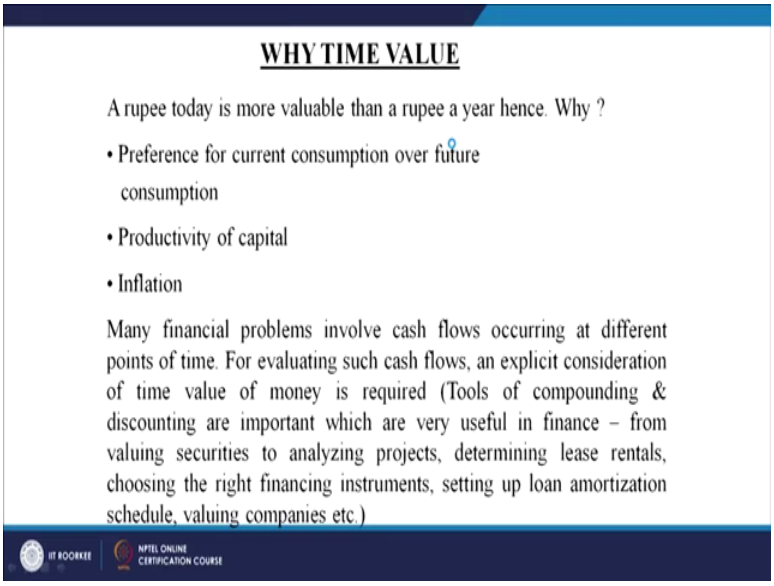
and that is called as the discounted value. So, the concept of compounding and the concept of discounting we will discuss at length and every point of time when we will be answer different questions under time value of money we will talk about all this things.

(Refer Slide Time: 22:20)



So, this is the total means the discussion we are going to have under the time value of money, so if you proceed further then now the question comes up I have discussed with you already but something is written here.

(Refer Slide Time: 22:31)



So, let us go through it why time value of money? A rupee today is more valuable than a rupee a year hence. Rupee in your hand today is more valuable than a rupee hence it means a world is in hand is better than to in the bush, simple thing. A world in hand is better than to in the bush so same is a case here a rupee today is more valuable than a rupee a year hence, why?

Number 1, preference for the current consumption over the future consumption people are more interested to use their resources for the current consumption and not for the they want to means go for the future consumption. So, when the preference for the future, present consumption is more as compared to the future consumption it means the rupee which is in your hand today and which will come after 1 year which one is more important the one which is in our hand today.

So, you can calculate how much is in my hand today when you are calculating the present value of the future cash flows it means I am shelling out 350 crores and after 6 years over a period of 6 years the total amount coming back to me is not 800 crores that has to be something less because that is now subject to the future earnings and that will come back to me not as 800 but actual value of that will be 500 crores.

So, preference for the current consumption over a future consumption so the time value of money is important. Productivity of the capital. You invest 1 rupee or 100 rupee in any investment or you invest a 100 rupee today or 100 rupee after 1 year because 100 rupee of today is equal to 100 rupee and 100 rupee after 1 year is not equal to 100 rupee because productivity of the capital changes.

When you are investing 100 rupees the return will be same means accordingly. When you are investing 100 rupees after 1 year but that is not 100 rupee that is less than rupee so your will also be accordingly less than 100 rupees. So, because productivity of the capital keep on changing because of the say the interest rates or because of the other important factors in the market.

So, you prefer to go for say having the resources and invested them today and whatever the return is available maybe coming in the future period of time but that has to compare with the today's investment that how much is my out flow, how much is I am getting the inflow discounted value of that I have to calculate.

So, that my objective is if I am investing 350 crores at least I should be able to get back 350 crores. If I get minimum because what is the decision criteria? NPV should be minimum 0, if the out flow is more 350 but the discounted value of total inflows is 300, so NPV is negative you will reject the project.

If it is 0, yes we can think about it. But if it is more than that if it is a plus positive, NPV is positive always you will go ahead with this because my objective is growing my investment or at least I should get back that if I am investing 350 crores my discounted value of all the inflows has to be that much.

And another important factor is inflation. Because of inflation the value of money keep on reducing. Inflation means the amount of goods and services which you can buy for a given amount of money today as compared to how much the amount of bundle of goods and services you can buy, the basket of goods and services you can buy for the same amount of the money after 1 year.

If you go with 100 rupee in the market and buy apples for example today you get say 1 kg of apple for 100 rupee because the price of the apple is 100 rupees today but if you save that 100 rupee and say that ok, I will save this 100 rupees and I will consume the apple after 1 year, after 12 months with the same 100 rupees if you go to market and want to buy the apple you may not end up buying 1 kg of the apple but sometimes 800 grams or 700 grams of the apple.

Because of the inflation the price of the apple is gone up. So, when the price of the apple has gone up, the value of your money has come down. That 100 rupees is 100 rupee but the amount of the apple we are able to buy today with that 100 rupee and the amount of the apple we are able to buy after 1 year there is a difference in the quantity of the goods and services.

So, because of the inflation, because of the rising prices when the say price is keep on rising then the say demand for the more money is there and the value of the money say continuous going down when the value of money reduces you have to adjust the future cash flows with the present cash flows.

So, that we can say that at least I should be able to buy same amount of the apple means for 100 rupee I am able to buy 1 kg of apple after 1 year it may be possible that for buying 1 kg of the

apple, same amount of the apple you have to sell out the 150 rupee. So, it means, because of inflation your 150 rupees of the next year are just equal to 100 rupee of this year.

So, because of three important reasons the time value of money becomes important. Finally, I would say here many financial problems involves cash flows occurring at the different points of times. Because cash flows in the business occur at the different points of time. For evaluating such cash flows an explicit consideration of time value of money is required.

Explicit consideration of the time value of money is required if you make investment anywhere always think of the your objective should be that if you are investing 1000 rupee at after 1 year or after 2 years whatever the return means comes back to you that is 1000 plus interest if you discount that, that should be equal to the 1000 rupee of today.

Because you have given the 1000 after 2 years if you get back 1000 it means you have not getting back 1000 you are getting something less than that maybe 700 or 800 that because of inflation the value of that 1000 has reduced to 700 rupees.

So, tools of compounding and discounting are important which are very useful in finance from valuing securities, shares what is a price of 1 share today that given 1000 rupees how much shares you can buy today you cannot buy maybe in the next year the same amount of the shares by that investment.

So, valuation of securities, to analyzing projects I just I made the analysis of the say cash out flow and in flow from a project determining least rentals. When we give anything on the least how much rent I have to take monthly for means allowing somebody to use my asset that also keep on changing.

Choosing the right financing instrument means if I want to borrow money then maybe different sources there rate of interest may change so I have to means choose the right amount of the financing and there also the time value of money will be more important because I have to see the rate of interest being charged by the different sources.

Setting up loan monetization schedule and valuing the companies. So, for valuing of 1 stock to valuing there company as a whole time value of money is important. Everywhere when you will take any financial investment decision or financial management decision every time we will be

talking in terms of the present value of the future cash flows or the future value of the present cash flows.

So, this is just beginning about the time value of money we will grow with this total discussion over a period of time and by the end when we will complete this discussion on the time value of money you would be very clear about all the concepts that why this concept of the time value of money is important.

How useful it is and how with the help of this concept of time value of money we can take the very important business and the financial decisions. For the moment I stop here and remaining discussion on this concept will be in the next class. Thank you very much.