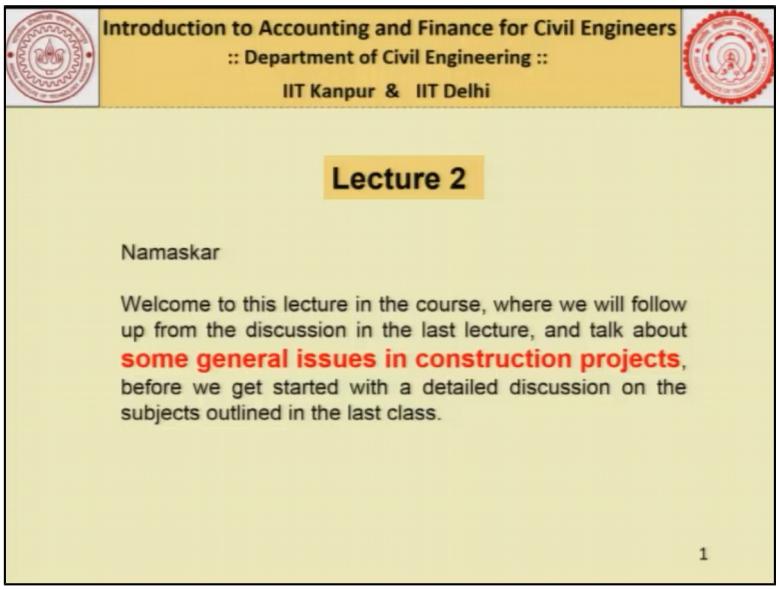
Introduction to Accounting and Finance for Civil Engineers
Professor. Sudhir Misra
Department of Civil Engineering IIT Kanpur
Professor. Kumar Neeraj Jha
Department of Civil Engineering IIT Delhi

Module No. #01
Lecture No. #02
Introduction

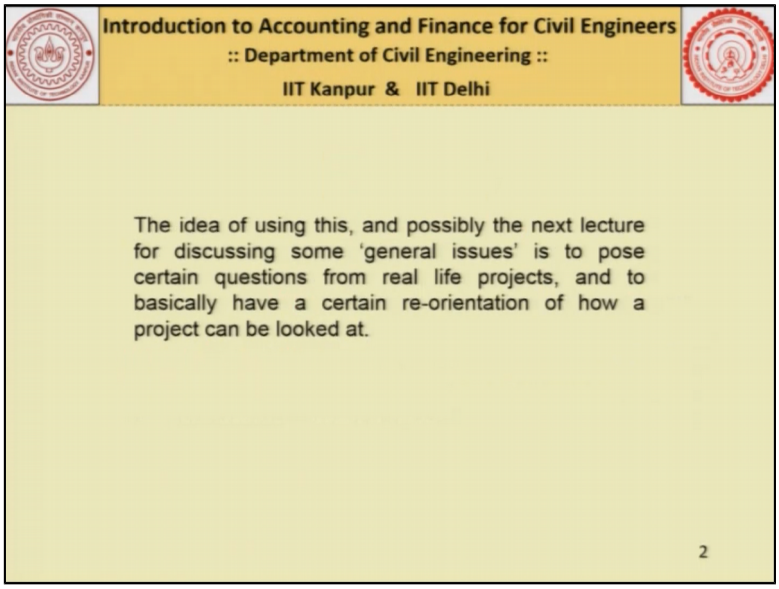
Namaskar, welcome to this lecture in this course on, Accounting and Finance for Civil Engineers.

(Refer Slide Time: 00:19)



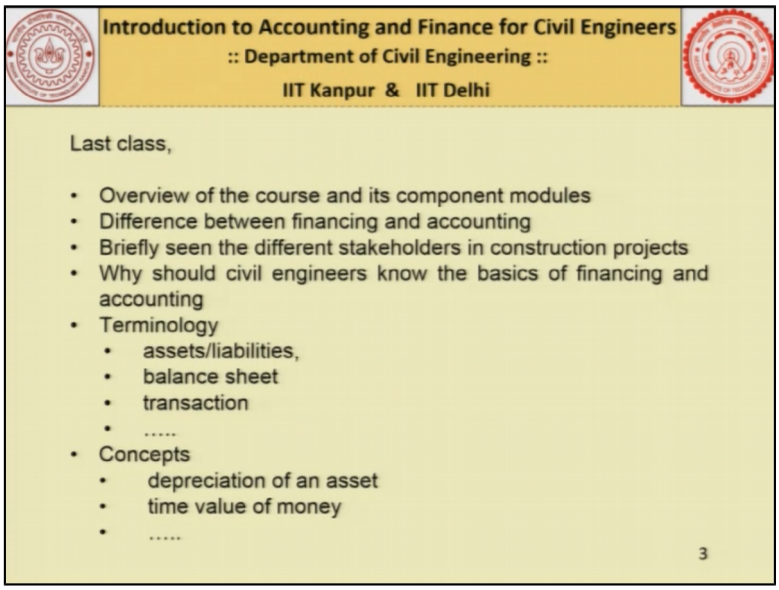
And, in this lecture, we will follow up from the discussion in the last class, and learn about some general issues in construction projects, before we get started with a detailed discussion on the subjects outlined in the last class.

(Refer Slide Time: 00:35)



The idea of using this, and possibly the next lecture, for discussing some general issues, is to pose certain questions, from real life projects, and to basically have a certain re-orientation of, how a project can be looked at. There are various ways of looking at a construction project, the design perspective, the construction perspective, the legal perspective, safety, and so on and so forth. The idea in the class today, and possibly the next class, is to re-orient your thinking in a manner, that is relevant from our point of view, that is, learning about Accounting and Finance for Civil Engineers.

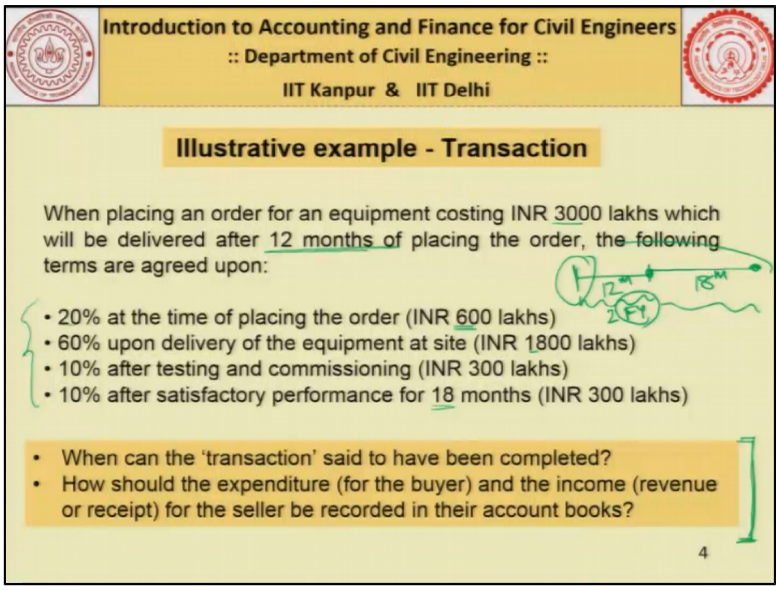
(Refer Slide Time: 01:16)



Now, in the last class, what we had done was, we had covered an overview of the course, and its component modules. We have talked about, the difference between financing and accounting. Briefly seen, the different stakeholders in the construction projects. We had also talked about, why civil engineers should know the basics of financing and accounting. And,

we talked a little bit about terminology, which is relevant to us, like assets, liabilities, balance-sheet, transaction, and so on and so forth. And then, we have talked a little bit about, concepts such as, depreciation of an asset, time value of money, and so on.

(Refer Slide Time: 01:58)



So, what we will do today is to, talk about some general issues. And, to begin the discussion, let us talk of a simple concept of transaction. Let us consider, the following example. When placing an order for an equipment costing 30 Crores of rupees, which will be delivered in 12 months of placing the order, the following terms are agreed upon. 20% of the payment has to be made to the manufacturer, at the time of placing the order, that is about 6 Crores.

60% has to be made upon, the delivery of the equipment at site, which is 18 Crores. 10% of the testing and commissioning of the equipment at site, which is 3 Crores. And, the last 10%, after satisfactory performance for 18 months. Now, this is an illustrative example, of course. But, this is more or less the kind of discussion, that we have in construction projects, where the equipment is such, that it is not sometimes available off the shelf.

And, the manufacturers often, make it to order. Because, each site, each construction company possibly, they have certain specific requirements, of even a simple construction equipment. And, that has to be incorporated into the manufacturing process, and therefore, it could take some time. Now, if this is what has been agreed upon, it is different from, just going to the department store, and trying to buy a shirt, where you say okay, you take a shirt, pay the money, and the matter is closed.

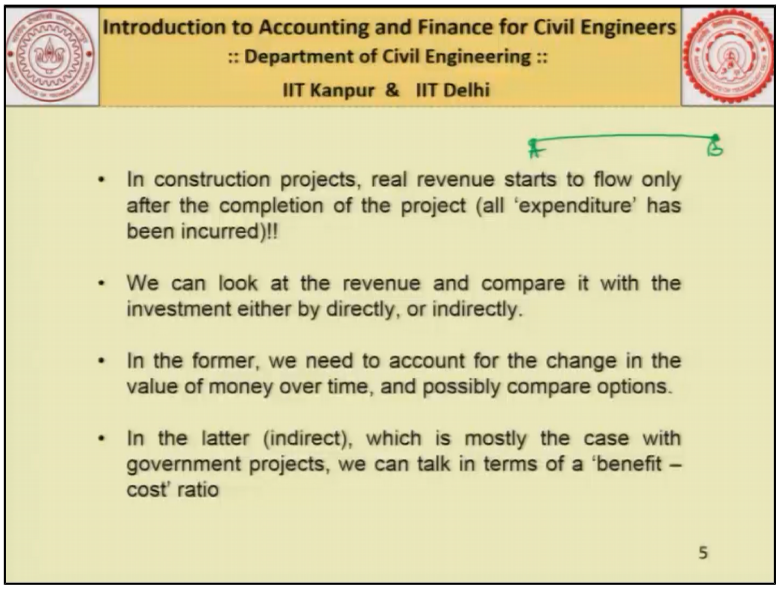
Here, the transaction of purchasing the construction equipment, is going to last for 12 months. The total cost involved, which is 3000 Lakhs or 30 Crores, is to be spread over these 12 months. And, it has to be paid in 4 instalments. And, these instalments are to be paid, at different points in time. 20% is at the time of placing the order. 60% is when the equipment is delivered. 10% after it is commissioned. And, 10% after it performs satisfactorily for 18 months.

The first question that arises is, when can the transaction said to have been completed. Then is the question, when should the expenditure for the buyer, and the income which is revenue received for the seller, be recorded in their account books. So, what we are looking at, is that, if we start the order here, it we will take 12 months, for the equipment to be delivered at site. And then, another 18 months for the final payment to be made.

So, depending on, where we are in a particular financial year, this itself could spread into 2 financial years. And, this again, would spread into 2 financial years. So now, the first instalment of 6 Crores, will be paid in one financial year. The 18 Crores, which is the next instalment, will be paid in the next financial year. And, the final 10% at a much later point in time.

So, these two questions become very, very relevant, to ponder about. We will give the answer, in subsequent discussions, as far as this course is concerned. But, for the time being, this is the kind of problem, or this is the kind of up situation, that we are faced with, as construction managers, as managers of funds.

(Refer Slide Time: 05:37)



With this example, I think, you understand a little bit about, how construction projects work, as far as the inflow and outflow of funds is concerned. We must remember that, in construction projects, real revenue starts to flow, only after the completion of the project. That is, all the expenditure has been incurred. So, if we talk of a highway project, let us say, we are making highway from Point-A to Point-B. Before, any revenue accrues from this project, the project has to be completed.

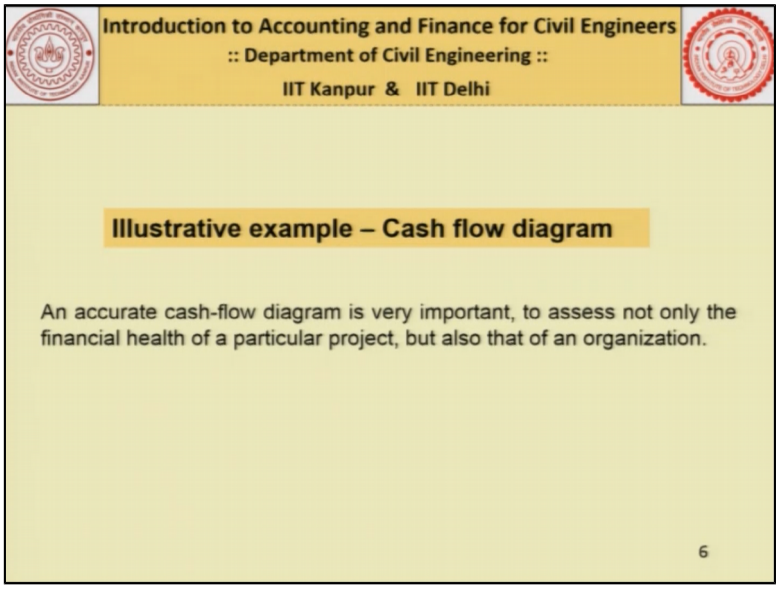
Which means, that all the expenditure in constructing this highway, whether it involves only roadwork, or involve some bridges, or whatever it is, all that expenditure has to be incurred first, and then the revenue will start to flow. And, that is something, which we must keep in mind, when we are trying to evaluate, options and so on, as we will see in a discussion subsequently. We can look at the revenue, and compare it with the investment, either directly or indirectly.

So, if you are looking at the revenue generated from a project, that revenue can be compared to the investment made, or the expenditure made, on that project, either directly, rupee to rupee, or in an indirect manner. In the former case, when we are trying to make a direct comparison, between the revenue and investment, we must account for the change in the value of money over time, and possibly compare options.

So, we have to see that, okay, if this is an investment that we make, and this is the returns that we get, is the return acceptable to us. Is there any other way by which, the investment that we make, will give us better returns, and so on? So, that is the kind of thing, which we think about, when we talk of, a direct comparison between the, investment and the revenue generated.

In the latter case, when we are trying to do an indirect comparison, and that is mostly the case in government projects, we often talk in terms of, the benefit cost ratio. That is, we are talking of a social good kind of a thing. We will not look at, the revenue in rupee form. We will try to say that, okay, here is an investment, which has been made. And, this is what is the social good, that has happened. The people, for example, in a remote area, have now been connected by this road.

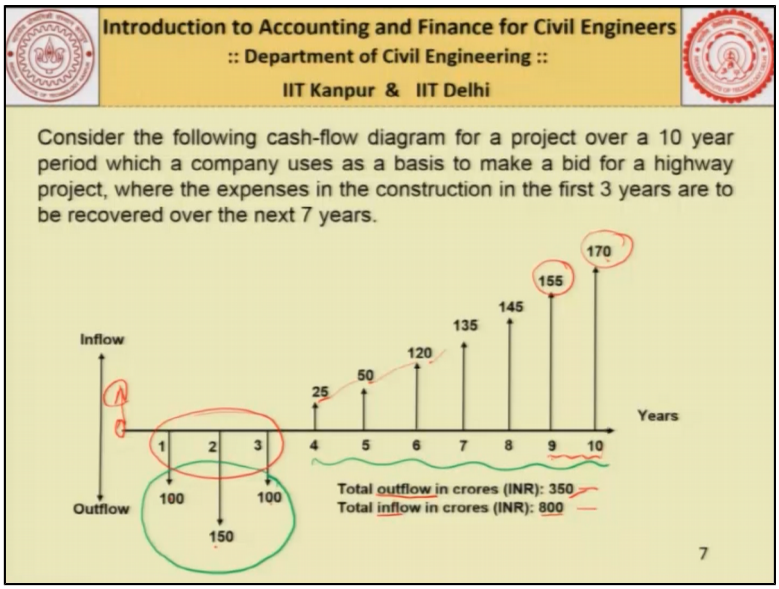
(Refer Slide Time: 07:56)



So now, coming to another illustrative example, where we will talk about a cash flow diagram, illustrating this issue of revenue and the investment. Let us look at the following situation. Now, before we look at the illustrative example of the cash flow diagram, which shows us a mechanism of comparing the investment made and the revenue.

We must understand, that an accurate cash flow diagram, is very important to assess, not only the financial health of a particular project, but also that of an organisation. This is a point, which we will come out very clearly, as we go through this illustrative example, and come back to discuss it again.

(Refer Slide Time: 08:34)



So, if you consider the example, which is given here, let us look at the cash flow diagram, for a project over a 10-year period, which a company uses, as a basis to make a bid for a highway

project, where the expenses in the construction are in the first 3 years, and they are to be recovered over the next 7 years. So, this here is the construction phase of the project. And, this is the phase, where the project is in operation, and is giving a certain revenue.

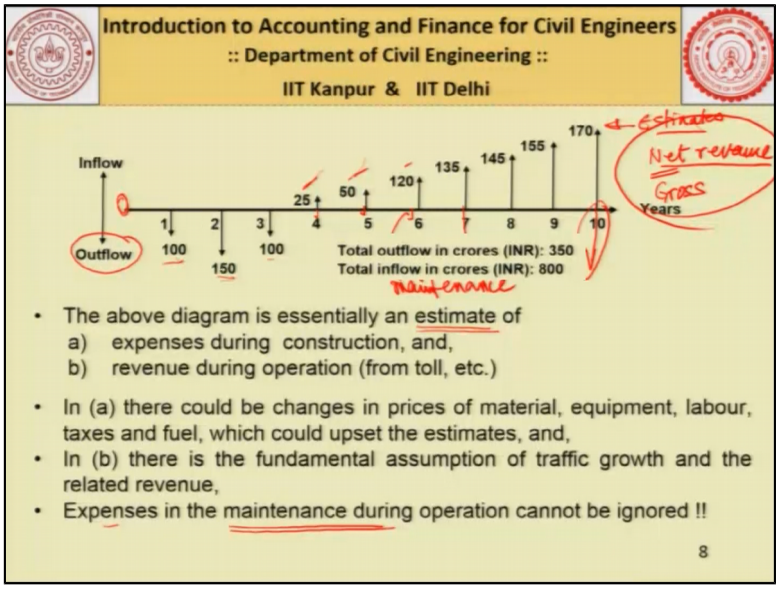
So, if you simply add the numbers here, we realise that, the total outflow, that is the expenditure that we make over these 3 years, is 350 Crores. And, the total inflow, that is this revenue, which we expect over the next 7 years, totals to 800 Crores. Now, one way of looking at this would be, that this investment of 350 is yielding receipt, or a revenue of 800 Crores.

What we must understand is, that this 170 Crores or 155 Crores or whatever it is, is coming to us, only after 9 or 10 years from the present point in time. Now, that is where the concept of time value of money is very, very important. This 170 Crores, or 155 Crores, and so on and so forth, is coming to us, only 9 years or 10 years, after this point in time.

That is, if we actually make an investment of 100 Crores, or any such number, put it in the bank, and let it be there, it we will attract a certain amount of interest. What will this grow up to, in 10 years. Then, we really need to compare, that value, with respect to 170. This kind of an exercise, need not be done, when we are just comparing over a small period of time, which may be just about 1 year, 2 years, or 3 years.

That depends on the company, that depends on our thought process, whether we want to incorporate this idea of time value of money, for every month, every year, and so on and so forth. However, the principle is that, if the time duration becomes longer, we must consider the concept of time value of money, the whole idea of interest rates and so on, when we compare options. Now, having said that, let us try to look at this cash flow diagram, a little better.

(Refer Slide Time: 10:59)



This diagram, is essentially an estimate of expenses during construction, and revenue during operation from toll, or whatever it is. The bottom-line or the keyword is estimate. We do not know at this point in time, when we are starting this project, or when we are planning for the project that, at the end of 1 year, we will spend 100 Crores, in the second year we will spend 150 Crores, and in the third year we will spend 100 Crores.

These numbers could be accurate, very accurate, or sometimes only approximate. These could change. And, that is what is very important to appreciate, when we draw the cash flow diagram. Similarly, when we talk of this revenues, whether it is 25 or 50 or 120 or whatever it is, this also is an estimate based on, let us say for example, the kind of traffic that we have today, the kind of traffic which we expect in 4 years, 5 years, 7 years, and 10 years.

So, the growth of traffic, the likely growth in the toll per vehicle, that is going to be collected, all that comes together, when we arrive at these numbers. And, these numbers are, what we are calling, estimates. Now, as far as A is concerned, which is the expenses during construction, there could be changes in the prices of material, equipment, labour, taxes and fuel, which could upset these estimates. And, as far as B is concerned, there is a fundamental assumption of traffic growth, and related revenue.

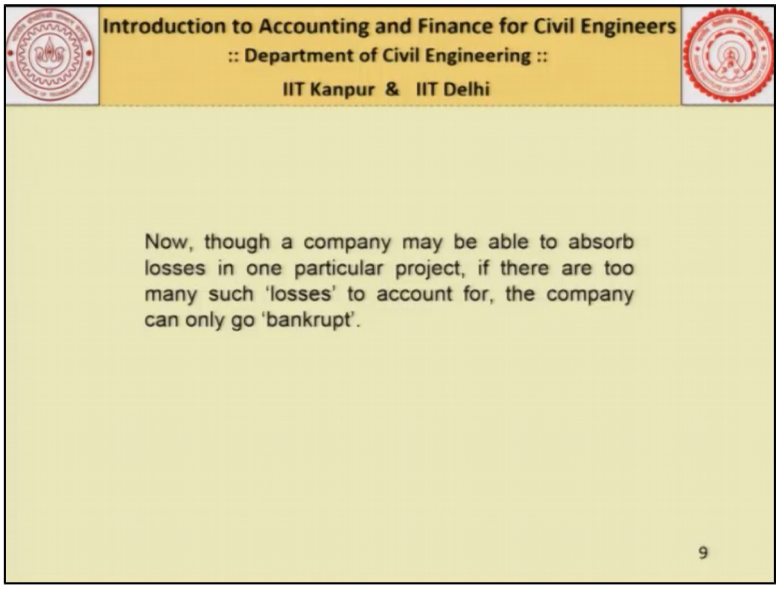
We could go wrong, in one or both, by a reasonable margin. Now, that is where we have to understand that, this estimate to the actual revenue, the actual investment or actual expenditures, they need to be as close as possible, in order for our planning to be good. We

must also remember that, even while the highway is in operation, there will be a certain amount of expenditure, in the maintenance phase.

That is, this revenue, which we are talking about, is really a net revenue. What we must remember is that, even after this construction phase is over, every year, there will be certain amount of outflow, which will occur from our pockets, in terms of maintenance. It is likely, that at some point in time, there may be some major maintenance jobs, that may have to be undertaken.

And, that amount of money, or those funds, have also to be accounted for, when we talk in terms of financial planning for projects. And therefore, when we are drawing a cash flow diagram, we should account for the net, as well as the gross. So, these are the kind of concepts, which are very, very important for us to understand, when we draw cash flow diagrams, when we try to plan from one project to another, and so on.

(Refer Slide Time: 14:03)

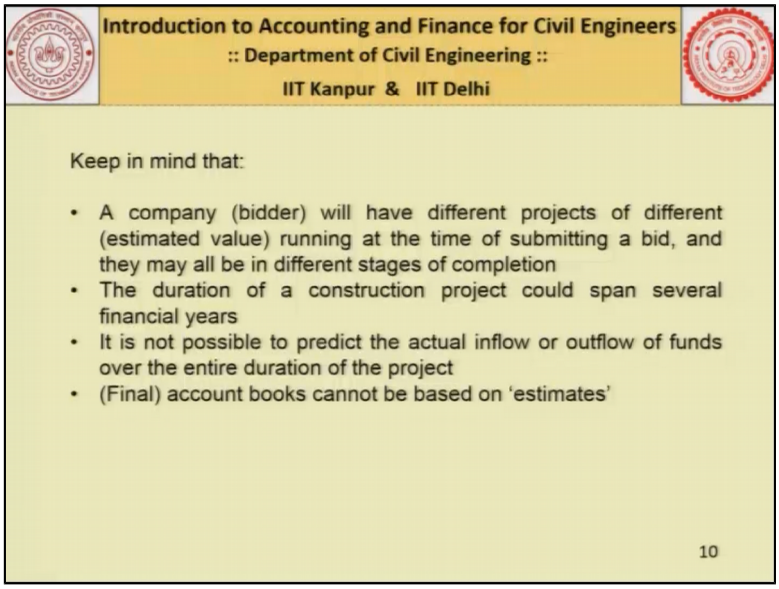


Now, as far as a company is concerned, it may be able to absorb losses, in one particular project. But, if there are too many such losses to account for, the company can only go bankrupt. What is being said here, is the following. If for a particular project, a company makes an error in judgement. And, maybe these numbers, or maybe the revenue side these numbers, they are off by 10%, 15%, or whatever it is, it will result in the loss, as far as the total project is concerned.

Those losses have to be made up, as far as the company is concerned, from profits in other projects. But, if the situation is such, that the company has several projects, where these kind of losses are occurring, then it is a very, very difficult situation for the company, as for as survival is concerned. And, this is something, which is very, very important, for civil engineers to understand that, the success of a construction company, depends largely on its ability to predict, accurately the cash flow.

What are the kind of actual expenditures, which will occur, in a construction project? How do we intend to recover those expenses, either by way of toll, and so on and so forth, or from the client? Sometimes, it happens that, it is the inability of the client, by which, the running account bills are not paid. And, that leads to a resource crunch, as far as the contractor is concerned. We will probably talk about it, in some subsequent lecture. So, now this slide, we have already seen. And, we know, what it says. Now, let us go to another slide.

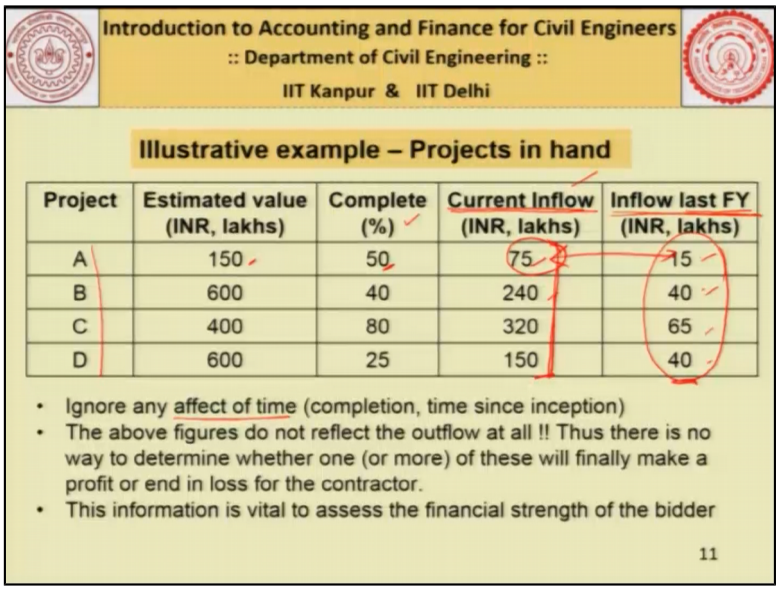
(Refer Slide Time: 15:53)



We should keep in mind that, a company, or a bidder, will have several projects of different estimated values running, at a time of submitting a bid. And, they may all be, in different stages of completion. The duration of a construction project, we have already talked about, could span several financial years.

It is not possible to predict, the actual inflow or outflow of funds, over the entire duration of the project. And obviously, the final account books, cannot be based on estimates. Now, with these things in mind, let us try to look at another illustrative example, where we will analyse or discuss, the concept of projects in hand, as far as a bidder is concerned.

(Refer Slide Time: 16:30)



So, here is a table. It says that, there is a bidder. A Company-X, let us say. They have 4 ongoing projects A, B, C, and D, which have estimated values in Lakhs, is 150, 600, 400, and 600. And, at the time of submitting the bid for a new project, they are completed to the extent of 50%, 40%, 80% or 25%, and so on. And therefore, the current inflow, that is, from wherever these projects is started, we are not talking about the time axis, as far as the slide is concerned.

So, whenever this project started is not really relevant, as far as this discussion is concerned. Now, as far as the current inflow is concerned, if we just take the percentage completion, and the estimated value, so these are the numbers that we get. 50% of 150 is 75, 40% of 600 is 240, and so on. So, this here, is the current inflow. We have already stated that, this is an estimate of complete.

We have already stated, that these values are actual values, need not be actually reflecting the percentage of completion. In fact, one of the tools by which this percentage completion is judged is, comparing how much has been billed, as against the estimated value. But, of course here, we are putting the other way around. It said that, okay, these projects are completed to some extent, or a certain extent. The current total inflow, as far as funds is concerned, is these numbers here.

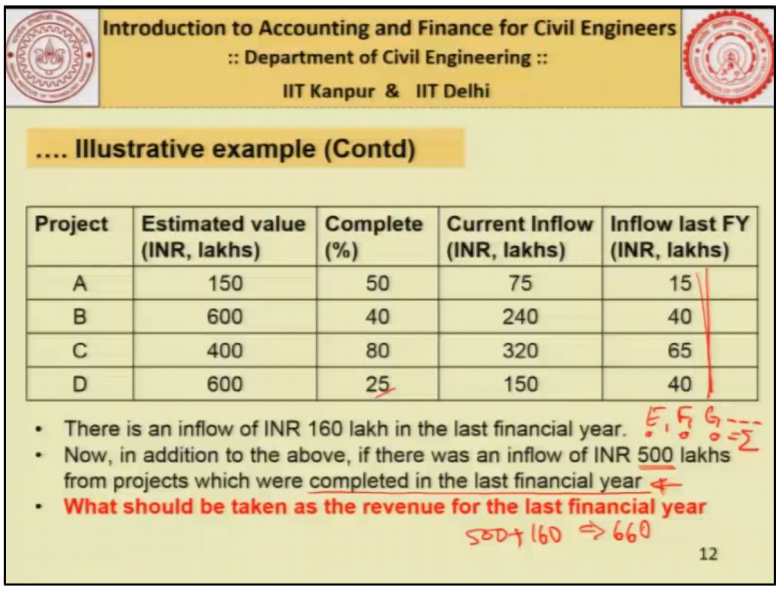
Now, out of these numbers here, this kind of inflow need not have obviously happened, in a single financial year. And therefore, this column tells us, what is the inflow, from these 4

projects A, B, C, and D, to the company, which is executing these projects. Let us say, that is only 15, 40, 65, and 40. So, if this is the inflow in the last financial year, and these are the inflows total. These are the cumulative inflows, in these projects. In this discussion, what we must remember is, that we have ignored any effect of time.

That is, how much more time to completion, when the project was started. That is, we are not really bothered, when the remaining 60 Crores in this case came from. Whether, they came in the previous year, or the previous year, or whatever happened. What we are interested to see is only, the inflow total, and in the last financial year. So, we are ignoring any effect of time, in terms of completion, and time since inception, as far as these projects are concerned. And, we must also remember that, the above figures, do not reflect the outflow at all.

Thus, there is no way to determine, whether one or more of these, will finally make a profit or ending loss, for the contractor. Now, this information is critical, as far as evaluation of a bid is concerned, to assess the financial strength of the bidder. So, this is the kind of information, that we have with us. And now, we have to make a decision, as far as the client is concerned, as to what kind of strength, does this particular contractor or bidder have.

(Refer Slide Time: 20:03)



So, if we look at this numbers once again, the table is reproduced here. What it really shows is, that there is an inflow of 160 Lakhs in the last financial year. And, now if also it is available to us by way of information, that in addition to these, there was an inflow of 500 Lakhs from projects, which were completed in the last financial year. So, as far as the

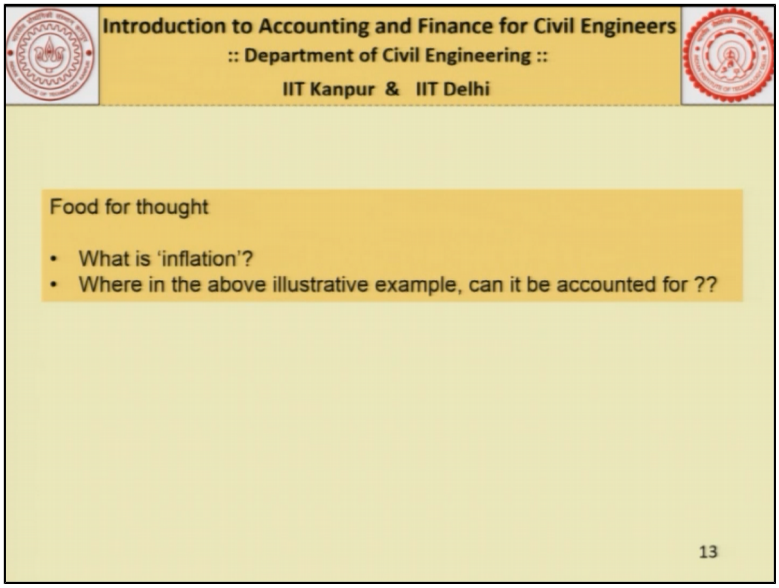
company is concerned, what is being said is, that it completed projects, during that financial year.

And, in that year, from those projects, which have been completed, there could be a project like E, F, G, or whatever it is, in this column, if we were to make a similar table for these projects, and we add the amount of revenue we generated, in these projects in the last financial year, this totals to 500 Lakhs. Then, the question is, what should be taken as the revenue, for the last financial year. One way is that, these 500 Lakhs came from the project, which have been completed.

And, this 160, from projects, which are underway. So, we can add this, and get it to 660. Another way is that, well, these projects have not been completed. And therefore, it is not fair to include these revenues, especially if the projects are not completing. Because, it is possible that, some money may have to be repaid, and so on, depending on, whether the project is actually completed, and so on.

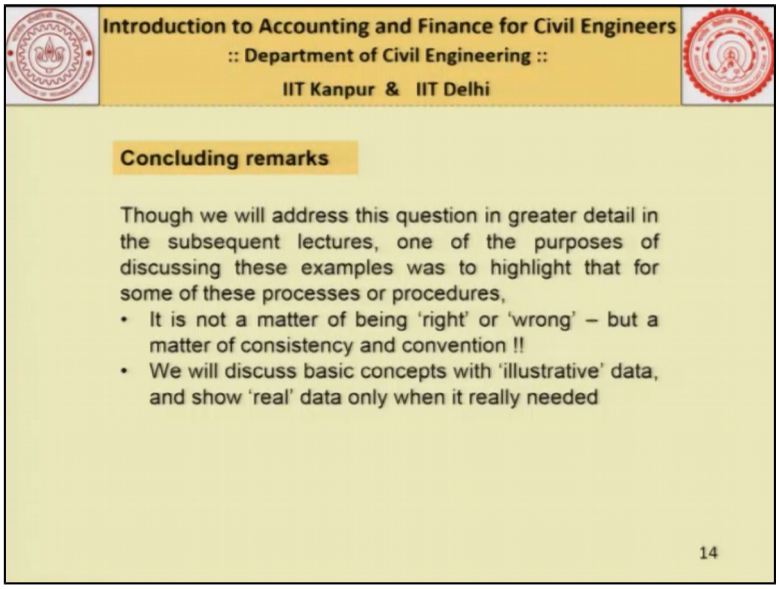
There is reason to believe that, at least some of these numbers, need not be, or should not be, taken into the financial statements of the company, as far as a particular financial year is concerned. Now, we leave this question, unanswered. And, this is the kind of questions, which we would like to address, when we come back, and start talking of each of these concepts, in a more detailed manner, possibly after a lecturer or two. Now, why we have talked about these ideas. Let me just leave you with, a couple of questions.

(Refer Slide Time: 20:03)



We often hear of the word, inflation. Now, what is inflation. And, where in the above illustrative examples, the concept of inflation, be seen to be accounted for. Or, how would we understand the concept of inflation, in the context of discussion that we have had so far. Now, with this, we come to an end of the discussion for today.

(Refer Slide Time: 22:40)



And, I must add that, though we will address the questions, that we have raised in this brief introduction today, in greater detail in the subsequent lectures. One of the purpose of discussing these examples, was to highlight that, for some of the procedures or processes that we follow, it is not a matter of being right or wrong, but a matter of consistency and convention. So, you will find a lot of places in this course, where one could look at it one way or another.

And, it is not so much a matter of being right or wrong, but only a matter of consistency and convention, not only within the company, but also across companies, so that the financial statements prepared, actually can be compared. Then, we should remember that, we will discuss basic concepts, with illustrative data, as we have seen today, and show real data, only when it is really needed, or when we just want to make a point.

Please remember that, the real data is a lot more complex. And sometimes, it becomes difficult to illustrate single concepts, with that kind of data. So, what we would do is to, create the data for you, have schematic diagrams, illustrative calculations, to make a point. And, with that, I would like to thank you for your attention, and look forward to see you next time. Thank you.