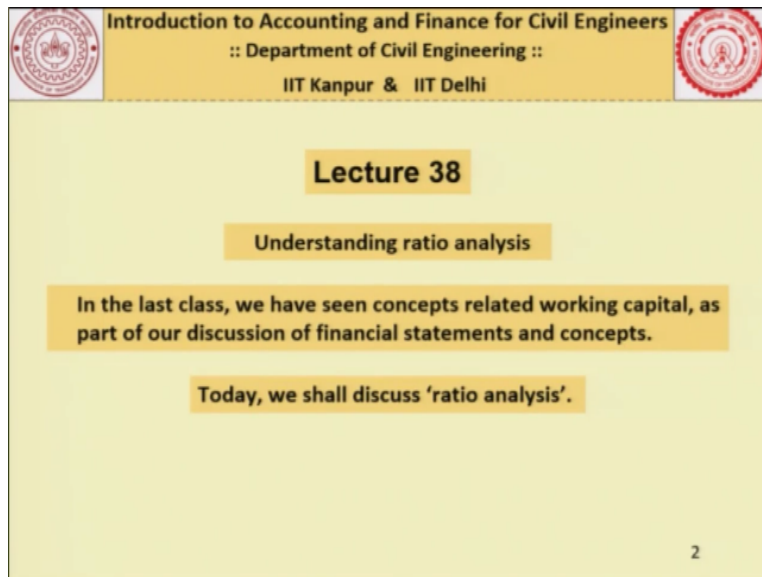**Introduction to Accounting and Finance for Civil Engineers**
Prof. Sudhir Misra
Dept. Civil Engineering
Indian Institute of Technology-Kanpur

Prof. Kumar Neeraj Jha
Dept. of Civil Engineering
Indian Institute of Technology-Delhi

Lecture-38
Ratio Analysis

Namaskar, welcome to back to this course once again. Accounting and finance for civil engineers.

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And this is lecture 38 and what will be talking of today after we have discussed concepts relating to working capital, financial statements and concepts is a discussion on ratio analysis. So, basically we spent time understanding what is called ratio analysis in the balance of construction management.

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Now before we get started with ratio analysis, let us try to look at this illustrative example, this table here gives the data for sales and profit for organizations A and B, the B will be added shortly. If you look at organization A we have the numbers given here for year 1 and year 2, we see that the sales from 2 lakhs, have gone 3 lakhs the profits have increased from 50,000 to 1,00,000, now there is one way of looking at it that is in terms of these absolute numbers.

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Now if we add corresponding figures for another organization, let us say organization B please note that they began together that is their sales in year 1 was the same 2 lakhs. Now this guy grew to 3 lakhs, this guy grew to 1,50,000. This guy had 50,000 but his profit was only 20,000, he grew from 50,000 to 1,00,000 and this guy grew from 20,000 to 50,000. Now given this

information or given this data there are just so many ways in which these 8 numbers can be looked at.

And before we go to the next slide I would like you to spend sometime and try to interpret and make notes as to what you can conclude from this information which is given. Some of the points we can discuss here.

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One is that the sales for both A and B were identical in the first year that is what I pointed out to you. However they grew a different levels, the sales of A grew by 50% that is 2,00,000 became 3,00,000 that is the 50% growth. In the case of B this growth is only 25%.

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Observations and comments

Item	Organization A		Organization B	
	Year 1	Year 2	Year 1	Year 2
Sales	2,00,000	3,00,000	2,00,000	2,50,000
Profit	50,000	1,00,000	20,000	50,000

- In the first year, profits of A and B are 25% and 10% and these numbers became 33% and 20% in the next year
- The profits of A doubled in the second year, B managed a 250% growth in profits.

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Then we can say that in the first year the profits of A and B are 25% and 10% and these numbers become 33% and 20% in the next year. So what does this 25% refer to, if we try to take the ratio of the profit with respect to the sales, this is 25%, here it was 10% but this became 33% and this becomes 20%. Similarly the profits of A doubled in the second year that is the 50,000 became 1,00,000 whereas in the case of B there is a jump of 250%.

So, what these 4 points, these 2 here and the 2 that we talked about in the previous slide what do they tell us. They tell us that apart from the absolute numbers themselves there is a lot of story which the ratios tell us, they also tell us the different ratios can be taken you can take the ratio of profit to sales. You can take the ratio of the growth of profit from 1 year to another year, you can compare 1 organization was as another organization but you should do it on a level playing field, that is you should have comparable data all the time.

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- Ratio is the representation of one quantity (say, X) as a proportion of another (say, Y) and expressed as X/Y.
- To calculate the ratio X is divided by Y, and the quotient (Z) multiplied by 100, in case the result is to be expressed as a percentage
- Ratio analysis is a powerful tool as it makes related information comparable.

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But in ratio analysis one should also remember always that ratios are essentially representation of one quantity say X as a proportion of another quantity say Y and it is expressed as X upon Y, what it means is that both X and Y should be known to you. Therefore the ratio X upon Y in a manner of speaking does not give you any new information, what it how was does is to put the information of X and Y in some perspective.

There is something which we will talk about again later on, to calculate the ratio X/Y and the quotient which is Z. If it is multiplied by 100 they express it in terms of percentages that is elementary. And ratio analysis of powerful tool as it makes information comparable. So for example in the previous example that we took deliberately we started with the sales to be identical, they did not be identical of cost if you can take 2 different companies their sales could be quite different.

And then the only way you can really compare them would be to talk in terms of how much they have grown, what is the market share and so on and so forth. So that is why ratio analysis as I said is a tool which helps you organize the information that you have it does not really add new information, it only gives you a different perspective.

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- Ratios as such do not add any new dimension.
- Company XYZ spends 1% of revenue in R&D does not convey much.
- Thus, ratios and absolute values both complement each other.
- Ratios are useful for comparison also.

So, that is what written here ratios are such do not add a new dimension, for example if it says that company XYZ is spends 1% of it is revenue in R and D this does not convey anything. So, what we need in this case is what is the revenue and that will give us an idea as to what is this spending on R and D, thus ratios and absolute values are actually complement each other, when we want to make evaluations and decisions, values for the comparisons as well.

And what we have to understand keep in mind is that when we are taking ratios we should also remember that by taking ratio making a comparison and so on. We are also making certain simplifying assumptions and one has to be careful what ratio to use at what point and time for what kind of comparison is that valid, invalid, what is the limitations of taking that ratio and so on. So thus something which we should be always careful about it.

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So as far as the industries concerned there are 3 types of comparisons which are made, trend ratios, inter-firm comparisons and comparisons with standards or plans. Now let us try to examine them in little bit more.

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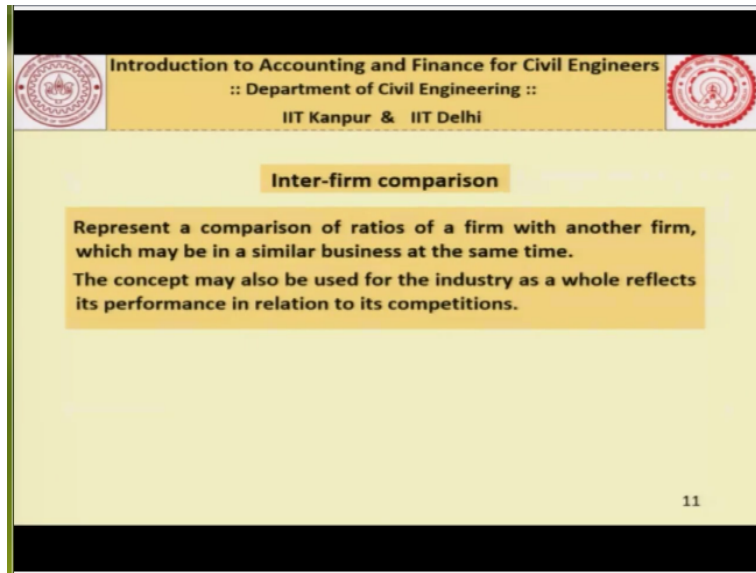
As for trend ratios are concern they involve a comparison of ratios of a firm overtime that is present ratios are compared with the past ratios, how has a given company performed overtime, so that is what we were trying to do when we trying to see how has the ratio changed for a company A or a company B from year 1 to year 2, it could be year 2 to year 5 and so on. So, that

is what is the trend, for example a comparison of a profitability of a firm over a period say 1981 to 1985 is an illustration of the trend ratio.
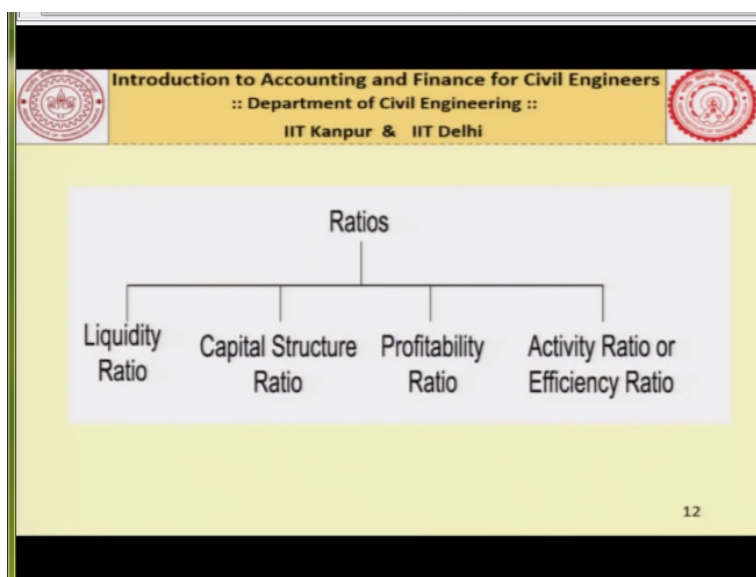
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Then there is inter-firm comparison represents a comparison of ratios of a firm with another firm which maybe in a similar business in the same time, you can compare to construction companies, you can compare to automobile manufactures, you can compare to electronics manufacturers and so on. The concept may also be used for the industry as a whole and it reflects the performance in relation to its competitors.

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When it comes to ratios there are different ratios that are defined liquidity, capital structure, profitability, activity or efficiency. So we will see how there are different ratios that we take and all of them have their own relevance as far as accounting finances concerned which is the part of construction management, coming to the liquidity ratio.

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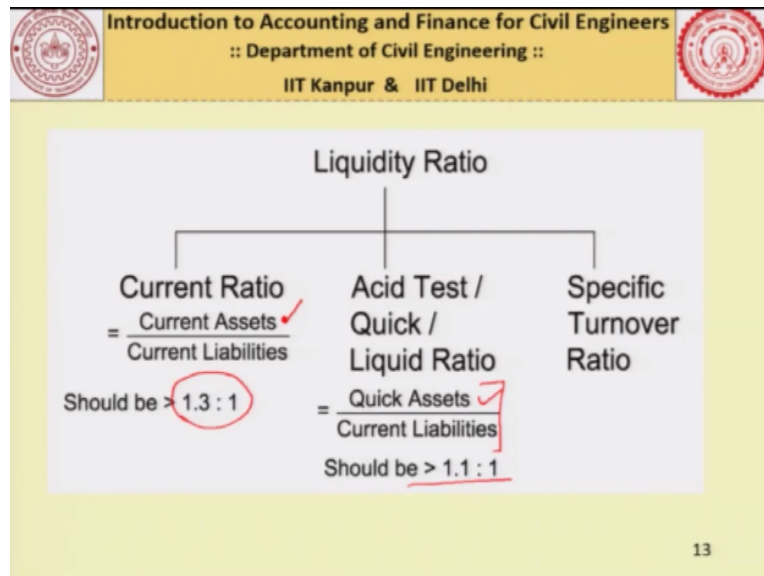
We have the current ratio or the acid test or the specific turnover ratio. In this lecture I were not really spent too much time in defining each of these ratios. We will define some of them and try to upload some basic definitions on the forum and the idea will be that you should be aware of how to calculate these numbers if it is comes to that and the fact that these numbers are important from the point of view of finance and accounts, I do not think will be able prove justice to all these numbers at the same time in the short expand that we have a art disposal today.

So now coming to current ratios there is a standard that normally as for as construction companies is concerned we would like a company to have the current assets to current liabilities ratio to be greater than 1.3:1. That is their current assets should be at least 30% more than the current liabilities, what is current assets and current liabilities that is something which we talk about in the first lecture which we did for this module.

And there we had talked about that at the end of it with current liabilities are suppose to be met from current assets. And therefore the ability of a construction company or any company for that

matter to be able to make it is day to day expenses is largely dependent on the current assets and those day to day expenses are there current liabilities. So in order to be financially sound or adjust to be financially sound, the current assets should be 30% more than your current liabilities.

Similarly when you come to acid test there is a concept of quick assets and current liabilities. So, here we are talking of current assets, here we are talking of quick assets, we will try to take an illustrative example and try to see how they are different. And here we find that the norm is your quick assets should be at least 10% more than the current liabilities without going into the details of this specific turnover ratio.

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Let us try to look at an illustrative example, this shows the description of assets for a particular company cash is lesser 2000, debtor are 2000, the inventory is 12000. So now the total current assets is a+b+c which is all these 3 and that total 16,000. The quick assets which does not include the inventory is 4000. And now let us say is given that the current liabilities are 8000. So with this information we can calculate the current ratio which is basically d upon g.

That is the total current assets to the total current liabilities which is 16,000 upon 8000 which is 2:1. Similarly we can calculate the acid test ratio which is e upon g which is the quick assets part of it, the quick assets to be same current liabilities and that we find is 0.5:1. So, now if you want

to go back and compare with the norms what is expected, this here is greater than 1.3 but this here is less than 1.1 which is expected from a sound company.

So you can see that actually that if your total assets are 16,000 most of them are actually blocked as for as the inventories concerned. So you have very little quick assets, so that is the kind of information or that is the kind of discussion, that somebody has to keep in mind that if I am increasing my inventory at the cost of cash and debtors my acid test ratio will go down, that is will not be able to immediately make our payments, will not be able to honor our immediate commitments.

And that commitment is coming from current liabilities, so that is how we use these ratios in this case the current ratio and the acid test ratio.

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Now we come to the capital structure ratio which indicates the long term solvency and soundness of a company, when a firm makes a long term borrowing it commits to paying the interest regularly and to repay the principle when it is due in installments at due dates or in a single payment at the time of maturity. So, the company commits to that when it makes a long term borrowing.

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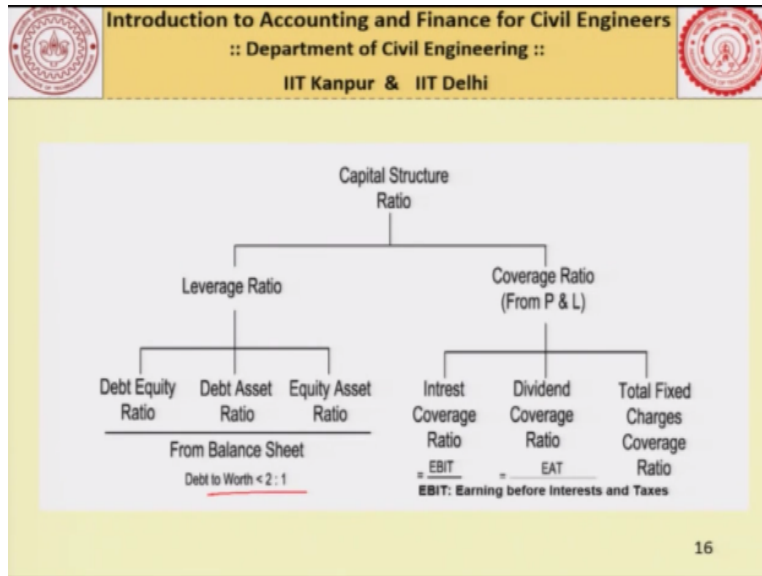
As for as the different types of capital structure ratio are concern there is the leverage ratio and the coverage ratio, debt equity, debt asset, equity asset and so on and so forth. So again debt to work should be less than 2:1 these are the kind standards, these are the kind of norms in the industry.

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Then there are profitability ratios, profitability is a keyword for a commercial company and is also measure of the efficiency and indicates the public acceptance of the product. Profits also provide funds for repaying debts, incurred while finance in the project and mobilizing resources. And profitability ratios have been defined to establish quantitative measures of the profitability of the company and or of interest to owners, management, creditors and regulatory bodies.

Profitability ratios can be determined based either on sales or on investment and in the former class that is those based on sales, the ratios commonly used or gross or net profit margin and the expenses or operating ratio. And on the other hand such ratios as goes defined in terms of return on assets or the total capital employed and equity shareholders are based on investment. So we have the sales based numbers and we have investment based numbers.
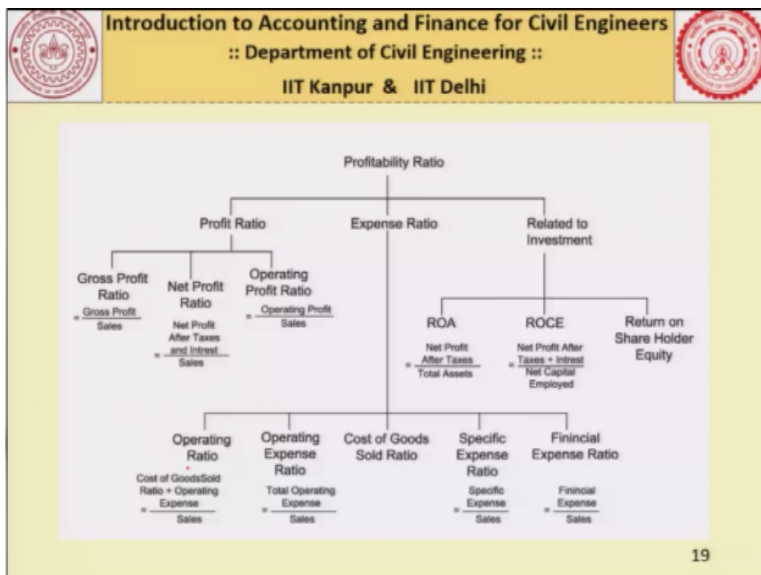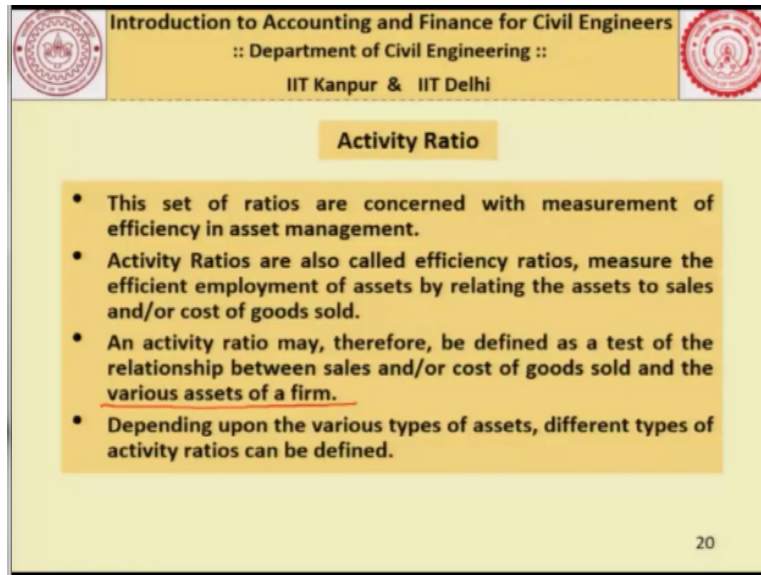
So this is sometimes refer to as ROA and this is we called ROCE that is the return on capital employed, this is the return on assets.

So, this chart actually gives you the kind of description of the different types of profitability ratios.

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Then there is something called an activity ratio, this set of ratios are concern with the measurement of efficiency in asset management. Activity ratios are also called efficiency ratios and measure, the efficient employment of assets by relating the assets to sales and/or the cost of the goods sold. And therefore the activity ratios may therefore be defined as a test of the relationship between sales and a cost of the goods sold and the various assets of the firm.

So here we are talking about various assets of the firm that is cash, land and so on and so forth we talked about the different assets and in relation to those assets the different assets how is the sales performing. And depending on the different types of assets, different types of activity ratios can be defined.

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For example we can talk of the inventory or the stock turnover ratio which is the cost of goods sold to be average inventory. We can talk in terms of the debtors turnover ratio or the receivables turnover ratio which is credit sales to the average debtors. Then we have the asset turnover ratios which is total assets to total turnover, fixed assets to the total turnover, current assets to the turnover and working capital to the turnover ratios, so these here are basically assets turnover ratios.

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Coming to the last part of our discussion today we have the productivity ratios, which is the turnover to the number of employees, the turnover to the plants and equipment, the profit to the number of employees and so on. Let me give you an illustrative example, there was a news item

recently couple of months ago maybe a year or 2 that India wants to increase it is investment or spending in the construction industry.

They want to pump in a trillion dollars equivalent into the creation of infrastructure, now that is an absolute numbers, somebody wants to pump in a trillion dollars or a equivalent of that money into the construction industry, construction of infrastructure. Now if we want to understand whether we will be actually able to consume that, that is even if the money is available or made available to the construction industry, how will it get distributed, what do we need to do as a construction industry to be able to raise to the occasion.

And consume or deliver goods and services equivalent of that trillion dollars, where do we start, we could start with what is the total turnover of all our construction companies, total that and finds some number. And see that ok, if we are at number X you want to go to X- what is the percentage of increase in the turnover that we are looking at in terms of turnover, if we want to reach or consume that trillion dollars additionally.

Similarly let us look at the number of people which are employed in that industries and say that if you want to increase the amount of money being spend or consumed in that industry what should be the productivity. See at the end of it if there is a company which has a turnover of 1 crore and has a 1000 employees that company wants to grow from 1 crore to 10 crores, how does it do that the only way to do it would be to increase it is efficiency of the employees.

The efficiency of the employees is 1 crore/1000, so basically per employee they are having a certain amount of turnover. If that has to go 10 times, so either the number of employees have to grow 10 times or the efficiency of those employees has to be come 10 times or somewhere in between there will be some growth of employees, some increase in efficiency, in order to get that increase in efficiency what is the kind of measure that we need to take.

That can be certain amount of mechanization, there it can be a certain amount of automation and so on. So that will increase the productivity of those employees as far as the number of employees is concerned and it goes back to education more or less. If we talk of construction, do

we have the right amount of engineers who want to work or who will be available to work in the construction industry in order that a certain target as for as productivity is concern can be met.
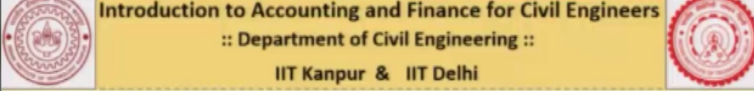
So this is the larger picture of how ratio analysis, how relating 1 number verse another would help us understand the facts of the ground. So, with this we come to an end of our discussion and of course there are some references which we have always been following.

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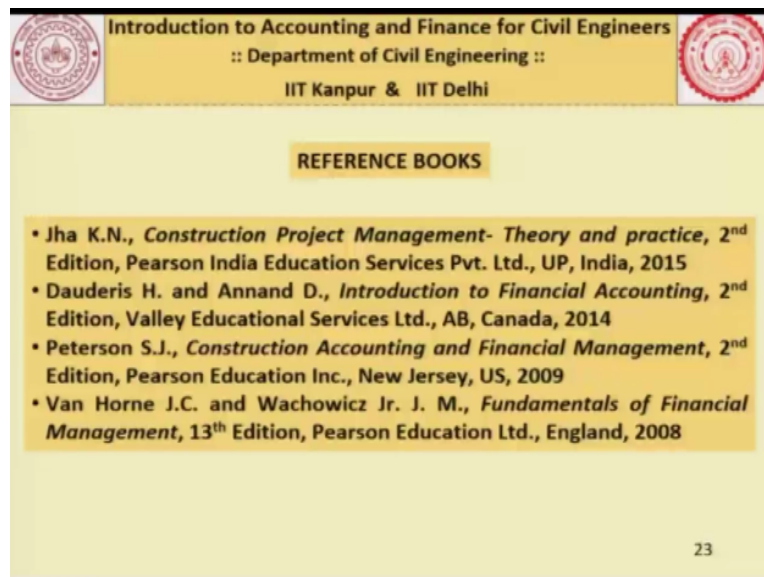
Some of them are probably added to this, some of them are taken off from the previous lectures and so on. That will help you understand some of the concepts better and now before we close the discussion in this course.

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The key concepts:

- Introduction and overview (time value of money)
- Economic decision making (Cash flow, sensitivity analysis, incremental rate of return, break-even analysis, depreciation)
- Risk analysis, simulation, bidding
- Accounting (Balance sheets, profit and loss statements, assets/liabilities, working capital)

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Let me just go over very quickly about some of the key concepts that we have covered in this course. We talked about an overview of the course, we will be primarily talked about different ways how civil engineers or all engineers is the matter of fact should know about financing and accounts. And we talked about the concept of time value of money, then we had a lot of discussion on economic decision making which had concepts like cash flows sensitivity analysis.

Incremental rate of return, break-even analysis, depreciation methods of depreciation, book value and so on. Then we spend some time on risk analysis, simulation, bidding processes, then we spend time on accounting, balance sheets, profit and loss statements, assets liabilities, working capital and now today we spend time on ratio analysis. So we will talk about this a little bit more in the forum with some examples which will be added.

And we will try to finally go to the exam and as far as the exam is concerned of course I can tell you what the exam would be like. But it will be very similar to the kind of questions that we have been asking you in the assignments. So those of you has been trying to do the assignments regularly, should not find it very difficult to do well in the exam. Only thing I would like to mention is that we will post a few notes and aids to you in the forum, please watch out and follow.

So you are better prepared like I have always insisted we do not expect you to memorize any formulae which we have given. We will try to make sure that the either the formulae are available or some tables are available to you during the exam to be able to solve a certain problem. I wish you all the best and it has been a pleasure talking to you on behalf of my friend professor Jha and myself, thank you once again for being with us, thank you.

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