NBA Accreditation and Teaching - Learning in Engineering (NATE)
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Lecture 28 - Assessment Plan and Assessment Instruments

Greetings. Welcome to Module 2, Unit 7 on assessment plan and assessment instruments.

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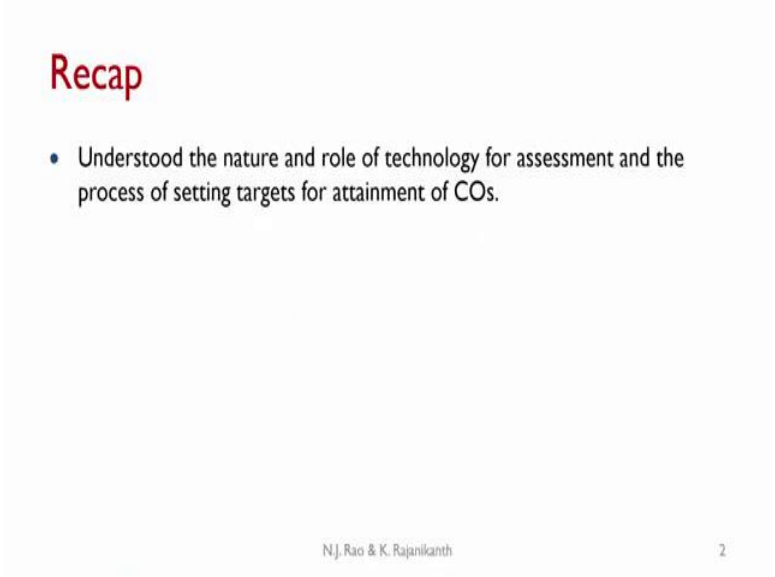

In the earlier unit, we understood the nature and role of technology for assessment and the process of setting targets for attainment of COs.

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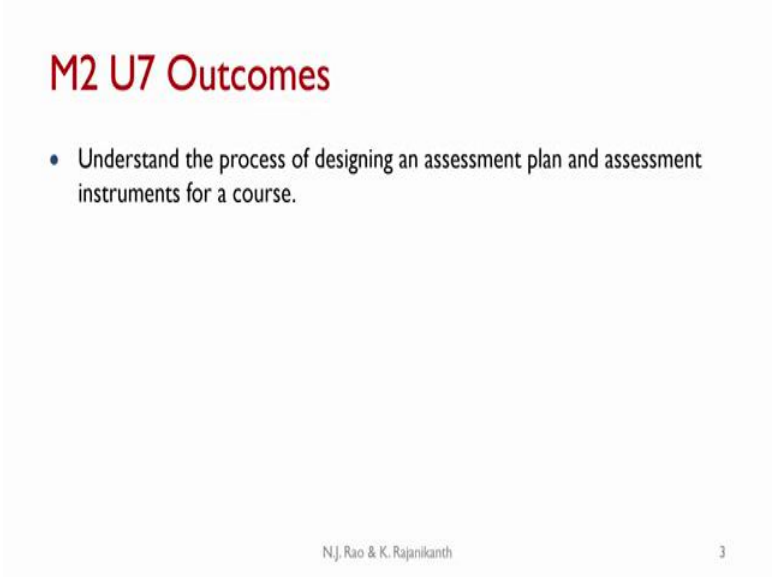

The outcome for this unit is understand the process of designing and assessment plan and assessment instruments for a course.

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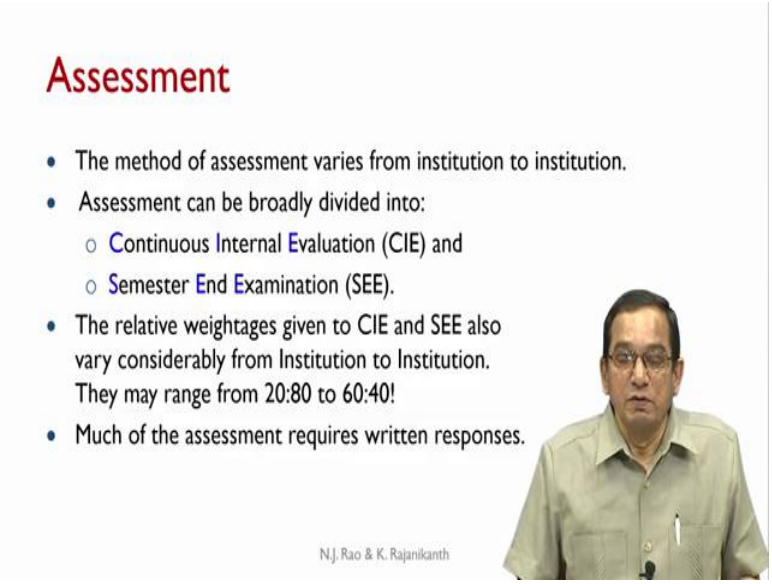

Method of assessment varies from institution to institution from university to university. But very broadly, we can classify the assessment into two categories, Continuous Internal Evaluation, or CIE and Semester End Examination or SEE. CIE is also called as CIA, in some institutes meaning Continuous Internal Assessment. The relative weightage is given to CIE and SEE also vary considerably from institution to institution and from university to university from tier two to tier one institutes, there is considerable variation, they may range from 20 is to 80 to 60 is to 40. Even much of the assessment requires written responses still.

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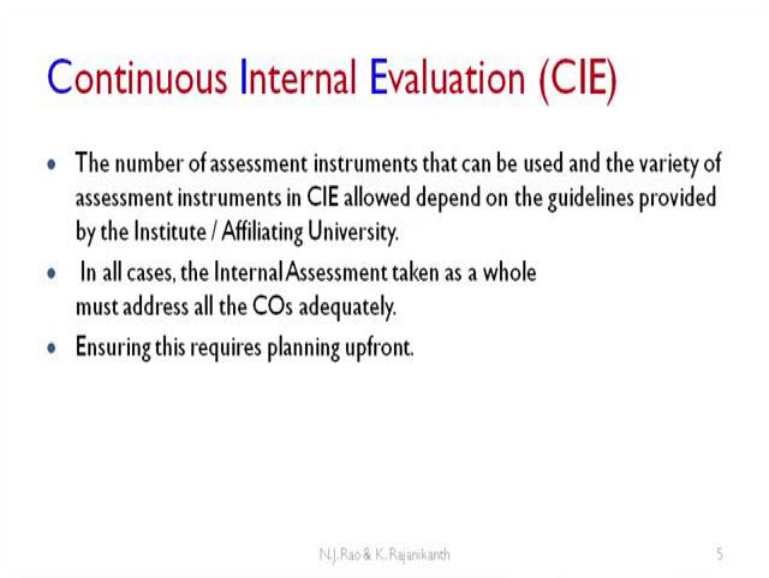

Continues internal assessment or continuous internal evaluation, the number of assessment instruments that can be used and the variety of assessment instruments in CIE allowed depend on the guidelines provided by the Institute or the affiliating University. If it is the tier one Institute, it will have its own academic regulations. If it is a tier two Institute, it will be following the regulations specified by the university.

These regulations will indicate what is the number of assessment instruments that need to be used during CIE and what should be the variety of assessment instruments that can be used in CIE by a variety of assessment instruments which mean quizzes, tests, assignments and so on. In all cases, the internal assessment taken as a whole must address all the COs adequately.

Ensuring this requires planning upfront, ensuring that taken as a whole, the continuous internal evaluation addresses all the COs adequately request planning upfront.

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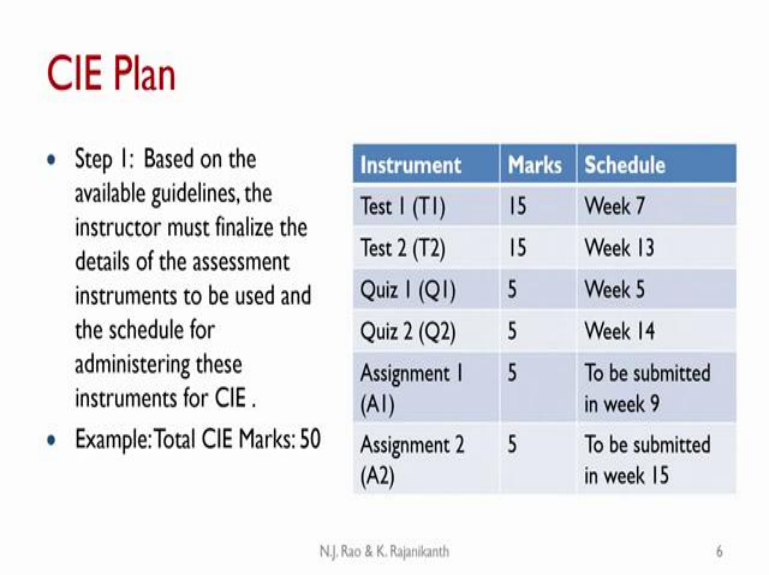

Let us look at one possible way of having a CIE plan. The first step would be to plan when the assessment instruments need to be scheduled. Based on the available guidelines, the instructor must finalize the details of the assessment instruments to be used and the schedule for administering these instruments for CIE.

In this example, the total CIE marks are 50. And there are two tests, two quizzes and two assignments. In other words, a total of six assessment instruments are planned for CIE. The total marks allocated to each instrument are also shown in the table. Each test is for 15 marks. Each quiz is for 5 marks, and each assignment is also for 5 marks.

Thus we have a total of 15 marks. And the schedule for these instruments is shown in the last column. Test 1 is scheduled for week 7. Test 2 is scheduled for week 13. Similarly, Quiz 1 for week 5, Quiz 2 for week 14, Assignment 1 is to be submitted in week 9. It is assumed that the assignment is communicated to the students much earlier. Assignment 2 is to be submitted in week 15.

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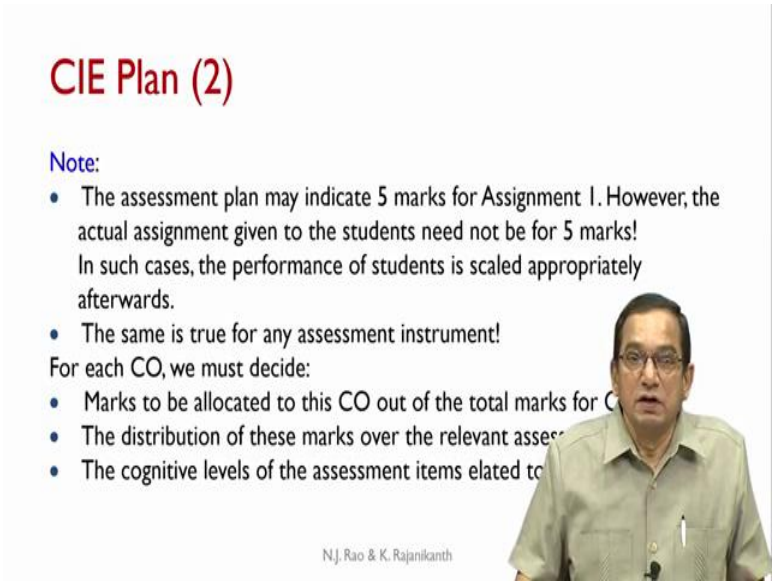

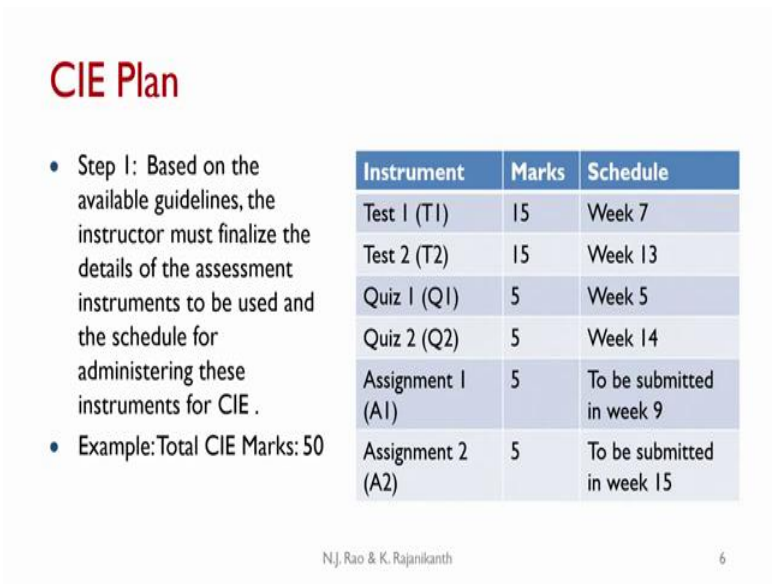

In the plan, the assignments are shown as for 5 marks. However, the actual assignment given to the students need not be for 5 marks. It can be for example for 20 marks, but finally they scale down to 5 marks. The same thing is true for any other assessment instrument. The actual marks for which the instrument is administered can be different, but ultimately they are scaled down to the values shown in this plan.

That means I can conduct the Test 1 for 30 marks but then I will scale it down to 15. I may conduct the Quiz 1 for 10 marks but then I will scale it down to 5, this is optional. So what is shown in the plan is the final marks that allocated to the assessment instrument.

For each CO, now, we must decide three things marks to be allocated to this CO out of the total marks for CIE, in this case, the total marks for CIE is equal to 50. Out of these 50 what should be the marks that have to be allocated to each CO? That is the first step, then we need to decide on the distribution of these marks over the relevant assessment instruments.

If we allocate certain number of marks to CO1 then what are the assessment instruments in which the CO1 is to be addressed, the distribution of these marks over the relevant assessment instruments. Then finally, the cognitive levels of the assessment items related to this CO also need to be finalized.

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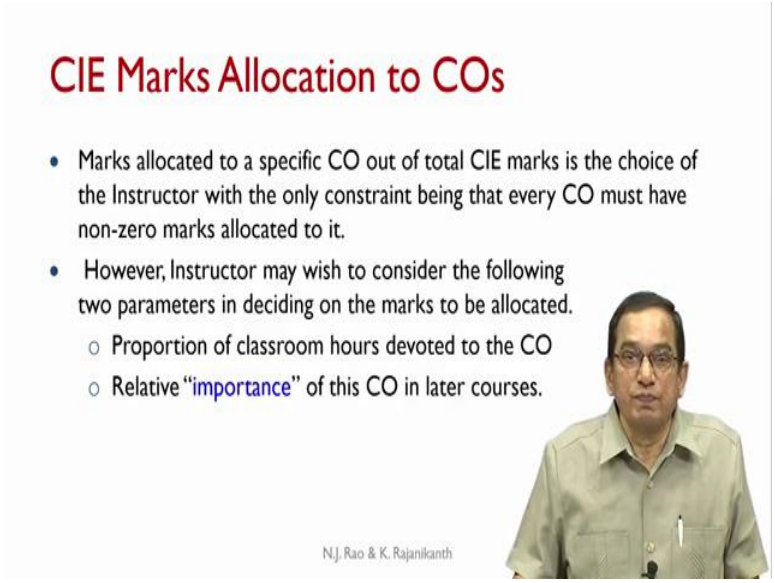

The first step is the marks allocation to the Cos, marks allocated to a specific CO out of total CIE marks is the choice of the instructor with only constraint being that every CO must have nonzero marks allocated to it. Certain marks we will allocate to every CO barring that, there is no other restriction, instructor can decide what should be the marks that should be allocated to a particular CO.

However, instructor may wish to consider the following two parameters in deciding on the marks to be allocated. The proportion of the classroom hours devoted to this particular CO that is one important parameter. Higher the number of classroom hours devoted to a

particular CO, higher should be the weightage given to that CO in CIE. It is a very broad general principle.

Next is the relative importance of this CO in later courses. This is subject to perception of the instructor. If the instructor feels that the particular CO is extremely important, she may wish to allocate more marks to that CO. Based on these two criteria, the number of marks allocated to a specific CO needs to be decided.

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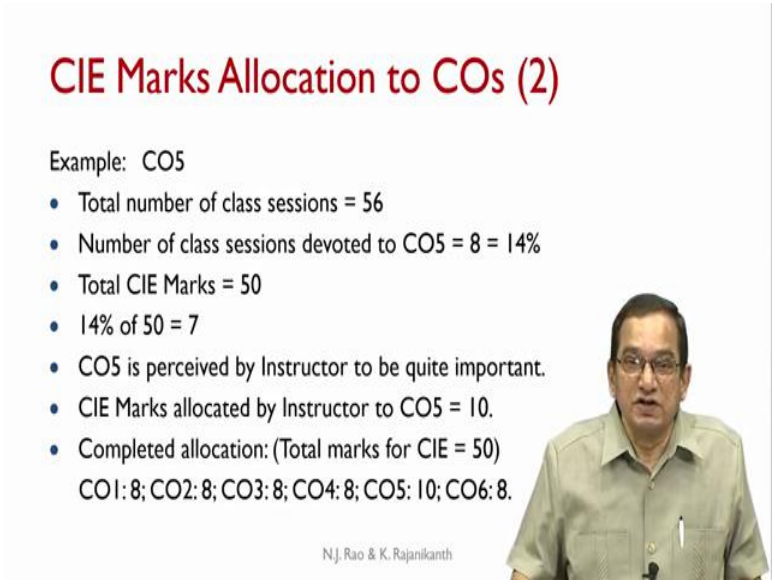

Example, consider CO5, assume that the total number of classroom sessions devoted to CO5 is equal to fifty eight sorry, eight out of the total sessions of 56, that means the proportion of classroom sessions devoted to CO5 is 14 percent. Total CIE marks is equal to 50 so, 14 percent of 50 is equal to 7. From the criterion of percentage of classroom sessions devoted to CO, we get 7 marks for CO5.

But CO5 is pursued by instructor to be quite important. So, CIE marks allocated by instructor to CO5 is 10. In this way, once the allocation of marks to all COs is done by the instructor, we get a final allocation. The example shows the completed allocation for all the Cos, out of the total of 50 marks 8 marks are allocated to CO1, CO2, CO3, CO4, as well as CO6. 10 marks are allocated to CO5 making up a total of 50 marks.

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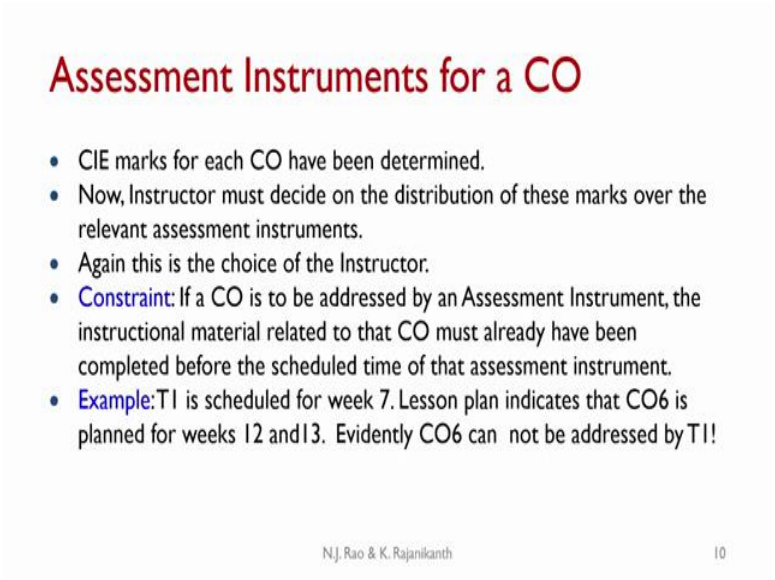

Now the CIE marks for each CO have been determined. Instructor must decide on the distribution of these marks over the relevant assessment instruments. Again, this is the choice of the instructor. The only constraint is that if a CO is to be addressed by an assessment instrument, the instructional material related to that CO must already have been completed before the scheduled time of that assessment instrument.

For example, we saw that Test 1 is scheduled for week 7. If we assume that the lesson plan indicates that CO6 is planned for weeks 12 and 13 then evidently, CO6 cannot be addressed by T1, T1 is scheduled for week 7 but CO6 is addressed only in weeks 12 and 13 when it comes to instruction. So, the only constraint is that if CO is to be addressed by an assessment instrument, the instructional material related to that CO must already have been completed before the scheduled time of the that particular assessment instrument.

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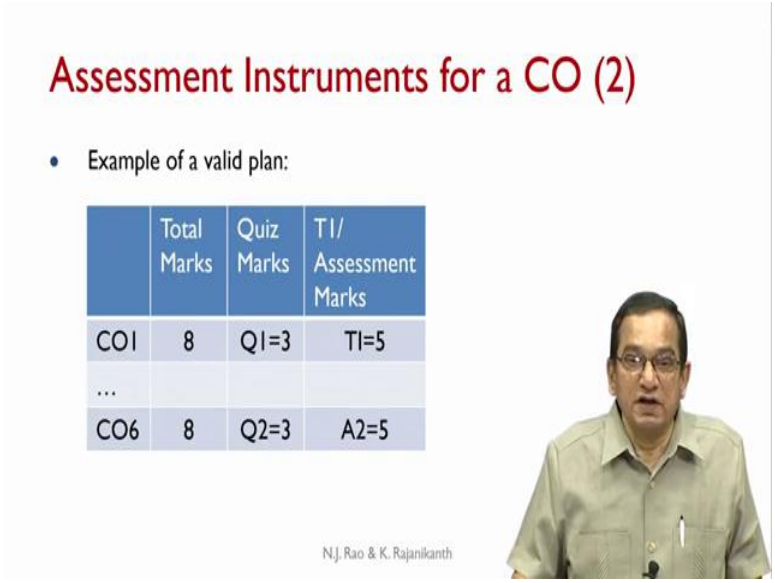

This is an example of a valid plan CO1, total marks allocated 8. Quiz marks are for 3 and Test 1, 5 marks. Similarly, all the other COs finally, CO6 total marks allocated 8, increase to 3 marks and in assignment 2, 5 marks. This is how we must make a plan.

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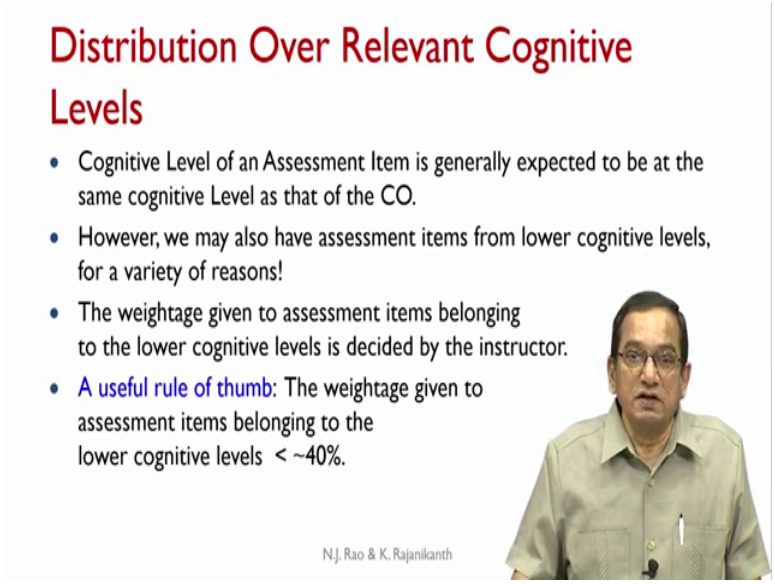

The next important question is the distribution of the marks to relevant cognitive levels. Cognitive level of an assessment item is generally expected to be at the same cognitive level as that of the CO. If the CO is at apply level, it is expected that the relevant assessment item is also at apply level. However, we may also have assessment items from lower cognitive levels for a variety of reasons.

The weightage given to assessment items belong to the lower cognitive levels is decided by the instructor. A general rule of thumb can be the weightage given to assessment items belonging to the lower cognitive levels be kept as lower than 40 percent. If there are too many items at lower cognitive levels, the assessment instrument is generally considered to be of inferior quality, it is better to have assessment items at the same cognitive level as the COs concerned.

However, if lower cognitive level items are to be used, the weightage given to them should be kept low, maybe less than 40 percent or even less than 30 percent, it is the choice of the instructor.

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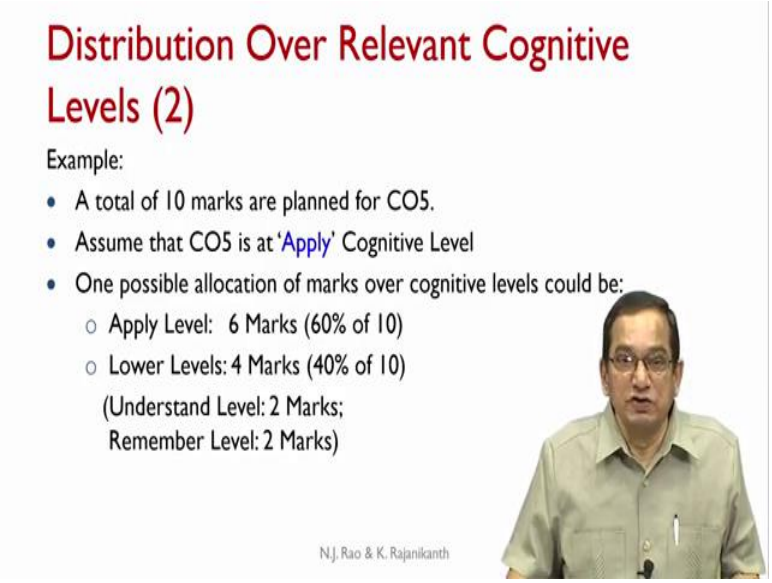

Continuing, the same example, a total of 10 marks are planned for CO5, assume that CO5 is at apply cognitive level. One possible allocation of marks for the cognitive levels could be apply level. Notice that this is the level at which the CO is stated. CO5 is at apply level. So, at apply level we have 6 marks that is 60 percent of the total of 10 marks allocated, then lower levels 40 percent of the 10 marks allocated that is 4 marks. These 4 marks in turn could be distributed as 2 marks at understand level and 2 marks at remember level.

So instructor has to decide what should be the allocation of marks for assessment items, which are at the same cognitive level as the CO. And what should be the marks allocated to assessment items, which are at lower cognitive levels. In this case, the choice of the instructor is to have 6 marks at apply level and 4 marks at lower levels.

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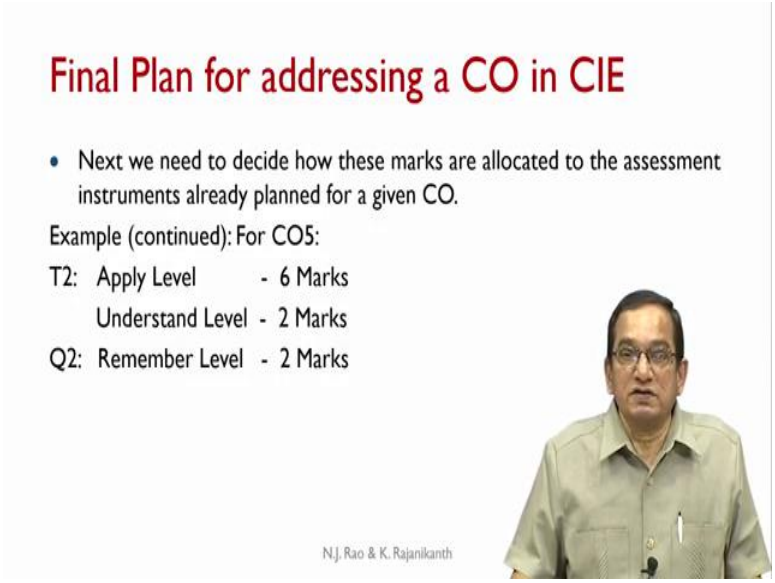

The final step would be to decide how these marks are allocated to the assessment instruments already planned for a given CO example, for CO5, we decided to have 6 marks at apply level, 2 marks at understand level and 2 marks at remember level. Now, which assessment instrument should contain these assessment items, this is the decision that instructor has to make.

So, in this case, the apply level assessment item and understand level assessment items are planned to be included in Test 2. So, test 2 will have two items, one at apply level for 6 marks and another one at understand level for 2 marks. And these two items will be related to CO5. Then in Quiz 2 there will be one assessment item. Probably two separate questions or one question worth 2 marks and this item would be concerning CO5.

So, the marks which are allocated to CO5 are now distributed over two assessment instruments T2 and Q2.

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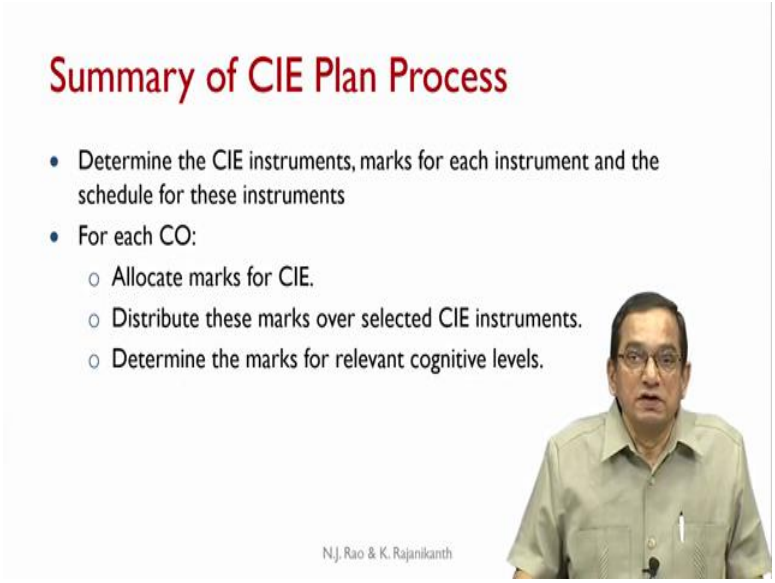

Thus if you look at the summary of the CIE plan process, determine the CIE instruments, marks for each instrument and the schedule for these instruments that would be the first step and this will be governed by the regulations in force at that time. In our example, we have decided on two tests, two quizzes and two assignments and the marks allocated was fixed and the schedule was also planned, that would be the first step.

Then for each CO we will have to allocate marks for that CO in the CIE. Then distribute these marks over selected CIE instruments. Determine the marks for relevant cognitive levels. These three steps have to be repeated for every CO.

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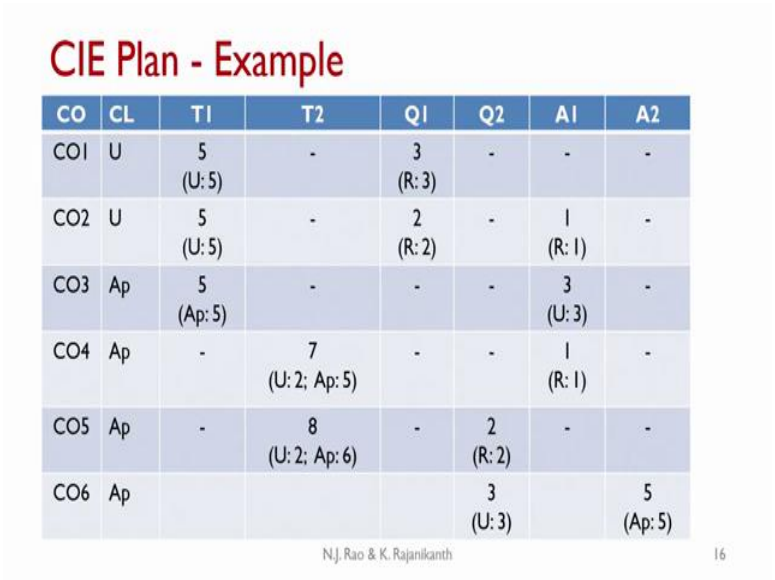

This is a completed CIE plan example, there are six Cos, CO1 to CO6. CO1 and 2 are at understand level. CO3, CO4, CO5, and CO6 are at apply level. The marks allocated to CO1 are 8, to CO2 also 8, to CO3 also 8, then CO4 again 8 marks, CO6 8 marks, for CO5 it is 10 marks and the distribution of this Cos over the assessment instruments is shown in the plan. CO1 is addressed in test 1 and quiz 1. CO 2 is addressed in test 1 again, quiz 1 as well as in assignment 1.

That way if we see, we will notice how each CO is addressed in separate assessment instruments. It is interesting to note that CO6 is not addressed in any of the tests or even quiz 1. If you see CO1 is not addressed in test 1, nor in test 2, only quiz 2 and assignment 2 address the CO6, this could be because of the reason that by the time the material related to CO6 is completed, the schedule for test 2 is over.

So, one has to plan these items upfront to ensure that all the Cos are adequately addressed. And the breakup is also shown. For example, for CO4 which is at apply level, in test 2 we have one item for 2 marks at understand level; another item at apply level for 5 marks making up a total of 7 marks in test 2.

Then in assignment 1, there is a 1 mark question at remember level and this makes up the total of 8 marks. So, 5 marks are at apply level and 3 marks are at lower levels. So that is how we have to make CIE plan. And this can be scrutinized for validity, for appropriate coverage of the Cos, for appropriate cognitive level distributions and other quality factors.

Once this plan is made up front, and it is verified to be a good plan, then we are ensuring that the COs are addressed adequately at appropriate cognitive levels during the CIE. Though it looks somewhat involved, it is worth having this plan upfront to ensure quality CIE activities.

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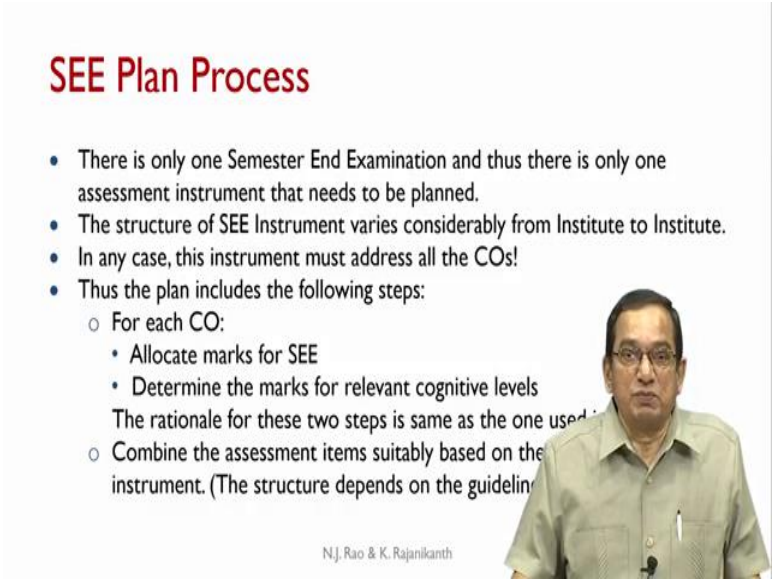

Now, let us look at the SEE plan process. There is only one semester end examination and thus there is only one assessment instrument that needs to be planned. The structure of the SEE instrument varies considerably from institute to institute from university to university. In any case, it is absolutely essential, but this instrument addresses all the COs. So one single SEE instrument must address all the COs.

Thus the plan includes the following two steps: for each CO allocate marks for the SEE. For example, how many marks should be allocated to CO1 in SEE. Similarly for CO2, CO3 and so on. So, for each CO allocate marks for SEE. Determine the marks for relevant cognitive levels. The rationale for these two steps is same as the one used in CIE, look at the proportion of classroom hours devoted to that CO.

The relative importance of that CO in the perception of the instructor and based on that the instructor makes a decision as to how these two decisions have to be made for the SEE. Of course, if it is tier 2 institute, the SEE instrument is the responsibility of the affiliating university. But if the university follows a similar process, then it can ensure that SEE is of good quality.

Then combine assessment items suitably based on the structure of the SEE instrument. The structure depends upon the guidelines in use, how many sub questions are allowed for a given question and so on.

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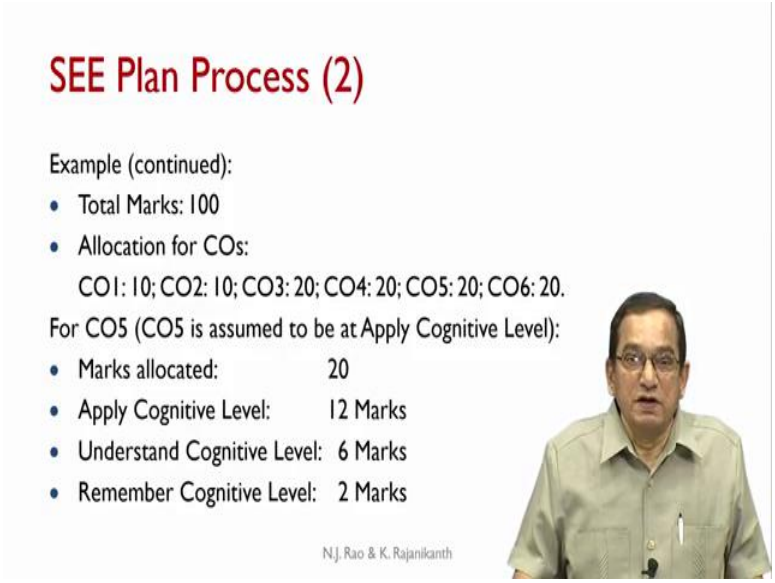

As an example, let us assume that we are looking at the structure of an SEE in which the total marks is for 100 and the allocation of the marks for COs is as shown here, for CO1 it is 10 marks, for CO2 again 10 marks, CO3, CO4, CO5 and CO6 carry 20 marks each, that is the allocation of the marks for the Cos.

For CO5 the marks allocated we have seen is 20. CO5 is at apply cognitive level so, assessment items at the same cognitive level will be for 12 marks. So, questions at apply cognitive level will be for 12 marks, then for the lower levels, we have 8 marks and for the understand cognitive level instructor has decided 6 marks and for the remember cognitive level instructor has decided 2 marks.

It could as well be that instructor decides to have 8 marks for understand level and no marks for remember level, it is perfectly alright for the instructor to make decisions as to the marks to be allocated to lower cognitive levels. So, in this case, the allocation is 12 marks at apply level, 6 marks at understand level and 2 marks at the remember level.

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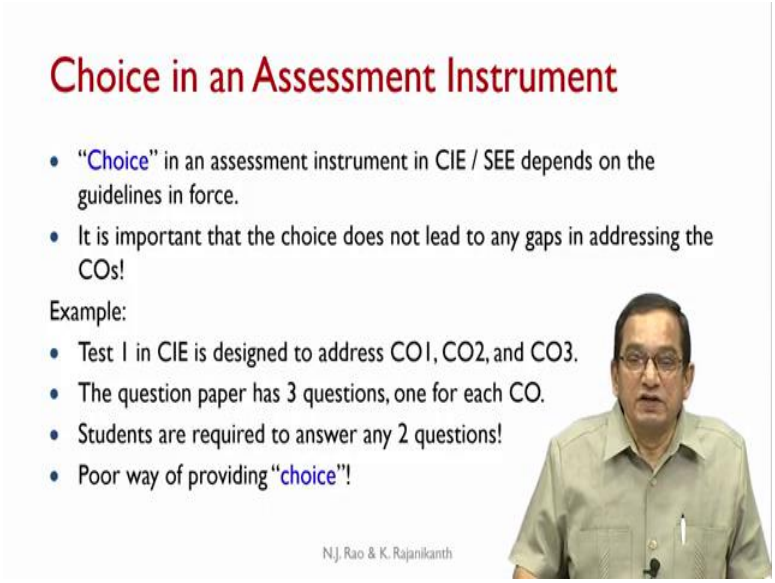

There is one issue of choice in an assessment instrument whether the assessment instrument is belonging to CIE or SEE, the choice has to be implemented carefully. It is important that the choice does not lead to any gaps in addressing the COs. For example, let us look at test 1 in CIE it is designed to address three COs, CO1, CO2, and CO3.

The question paper has three questions, one for each CO. That means one question allocated to the CO1, one question allocated to CO2 and one question allocated to CO3. Now, the choice is that students are required to answer any two questions. Now, this is evidently a poor way of providing choice to the students. It is quite possible that a substantial number of students answer only the questions related to CO1 and CO2 and the question related to CO3 is left out as choice then this instrument will fail to provide adequate data for computing the attainment of CO3. In the worst case, it is possible that we do not get any performance data regarding CO3. So, this will be a poor way of providing choice to the students.

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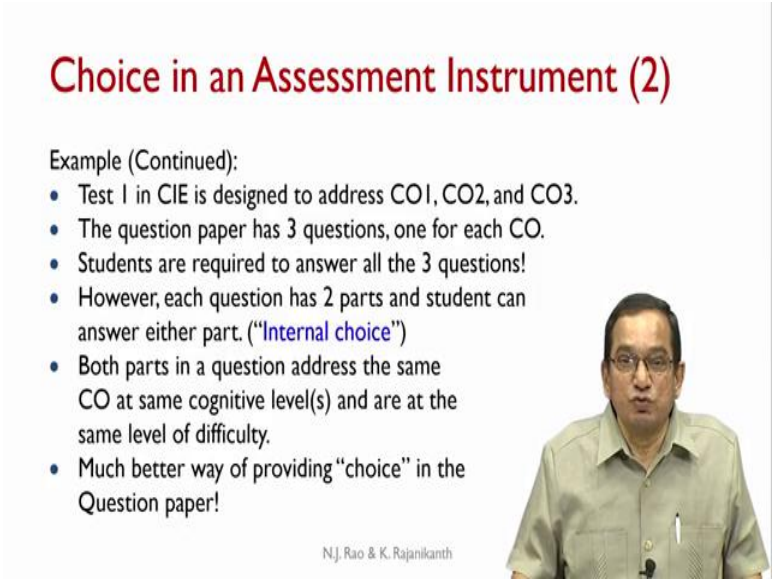

What is a better way of providing the choice? Same test 1 which addresses the three COs, CO1, CO2 and CO3. The question paper has three questions, one for each CO. Students are required to answer all the three questions. It does not mean that there is no choice, there is a choice. However, the choice is what is called as internal choice.

Each question has two parts, and the student can answer either part. Question 1 has two parts A and B. Students can answer either part A or part B. Both these choice items belong to the same CO or generally at the same cognitive level and generally, are at the same difficulty level also. Thus the parts in a question address the same CO at the same cognitive levels and are at the same level of difficulty.

This is a much better way of providing choice in the question paper. Actually, here the student is answering 3 questions out of 6 questions. It looks like a wider choice, but it is internal choice. And this way, we can get reasonable performance data regarding every CO. So a choice provided to the students must always be internal choice.

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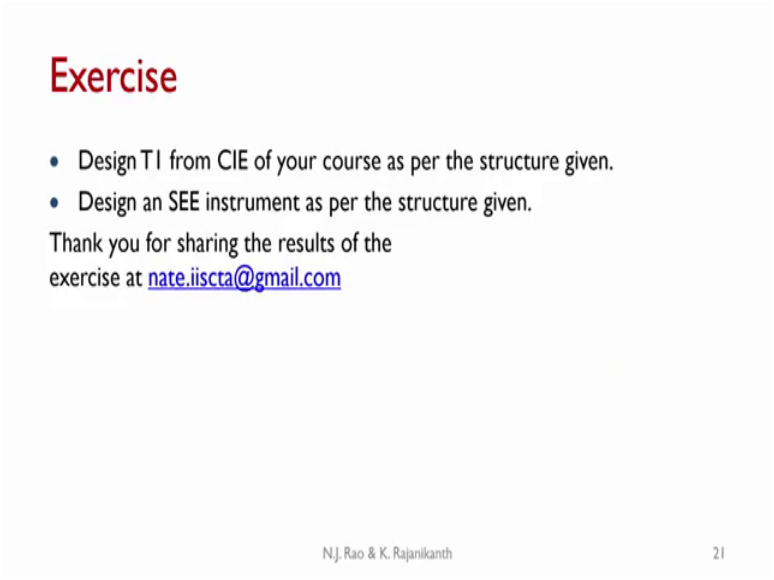

Now design, T1 from CIE of your course as per the structure given and design SEE instrument also as per the structure given.

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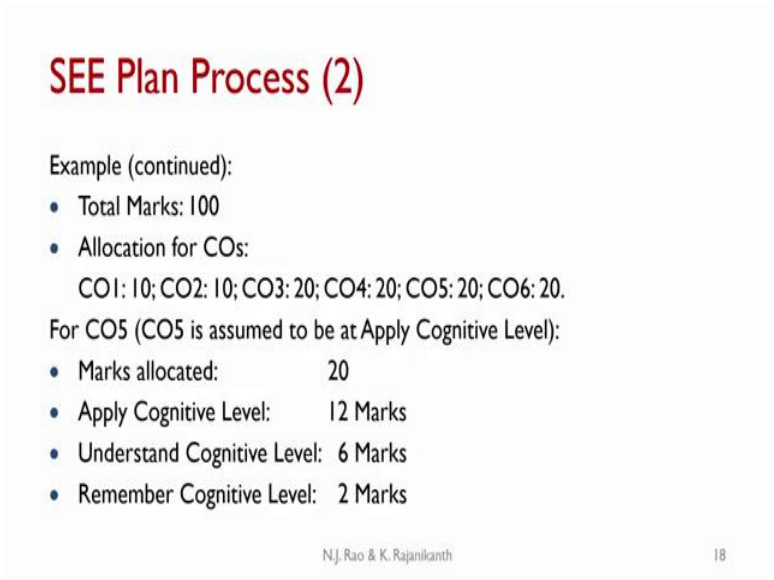

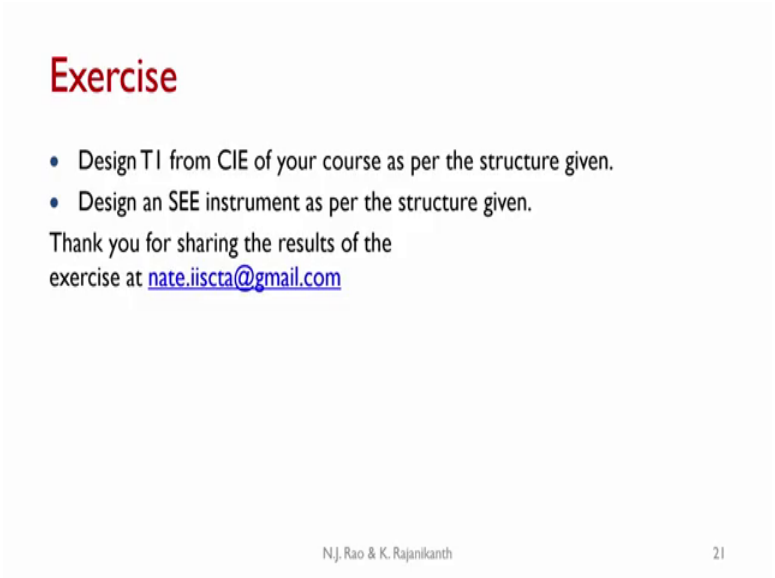

And we will look at the SEE structure again and this shows that there are 12 marks at apply level and 6 marks at understand level and 2 marks at remember level. Now, how do we make up these 12 marks? Maybe using two 6 marks questions and accordingly, we should decide on providing the SEE questions. So, based on this structure, we will have to decide how the questions have to be allocated.

The plan should be as per that instrument. So design SEE instrument as per the structure given. Thank you for sharing the results of the exercise at the email address given nate.iiscta@gmail.com.

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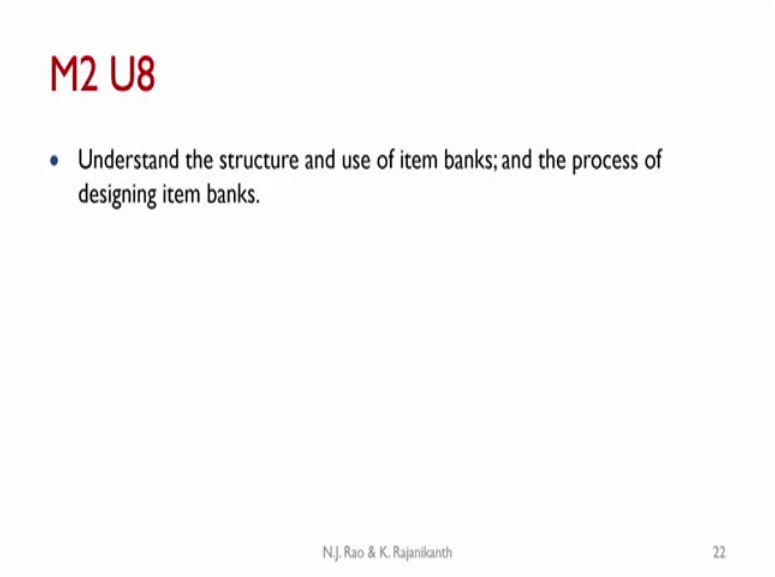

And in the next unit we will understand the nature and use of item banks and the process of designing item banks. Thank you and we will meet with the next unit. Thank you.