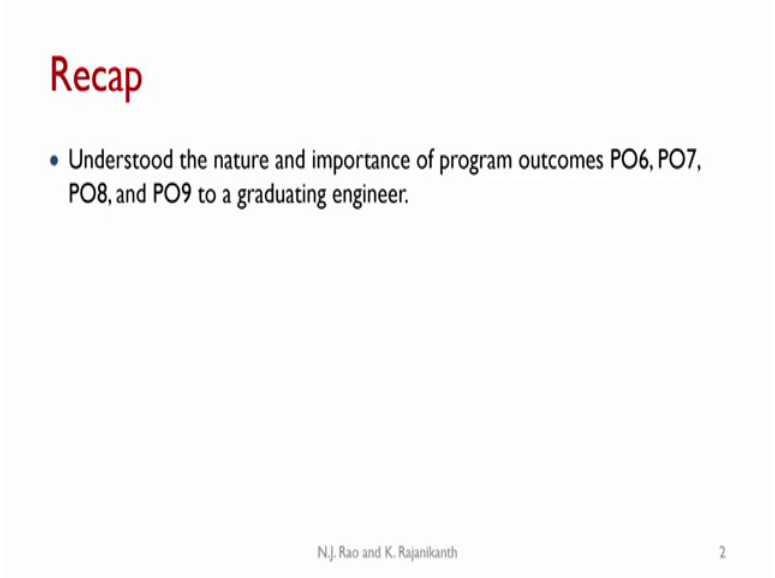
NBA Accredition and Teaching-Learning in Engineering
Professor N. J. Rao
Department of Electronics Systems Engineering
Indian Institute of Science, Bengaluru
Lecture 08
POs 10 12

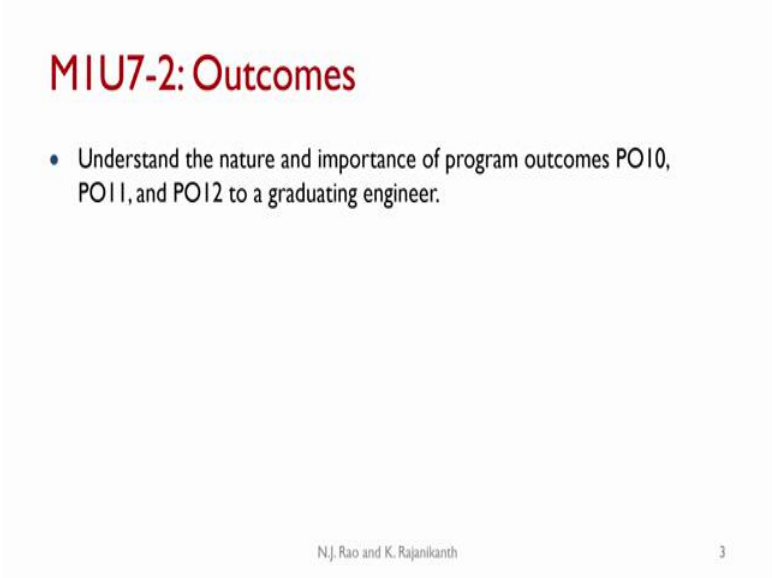
Greetings and welcome to MI U7 part two of NATE - NBA Accreditation and Teaching and Learning in Engineering. This is this unit is related to the program outcomes PO10 to PO12.

(Refer Slide Time: 0:55)



Now, in the earlier unit we understood the nature and importance of program outcomes of PO6, 7, 8 and 9, to a graduating engineer.

(Refer Slide Time: 01:10)



And in this we will try to understand the nature and importance of program outcomes PO 10, 11 and 12 to a graduating engineer.

(Refer Slide Time: 01:24)

Now, PO10 is communication. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions. It is a tall order, there are several elements to this. Look at the elements. First of all the engineers should be able to effectively communicate on complex engineering activities with the engineering community.

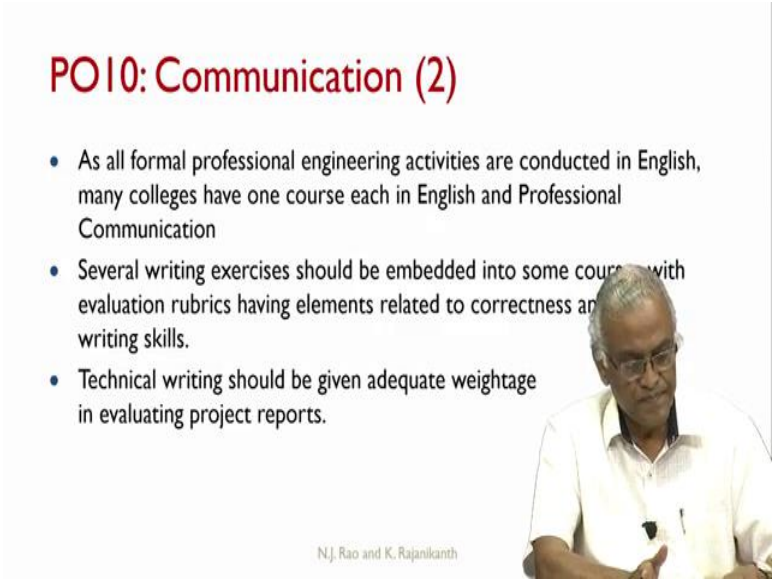
That means with your peers, if you are a member of a team, then you should be able to communicate with them. When you are communicating with your peers, you use all kinds of accepted terminology which will not make any sense to the outside world. So, one is you should be able to effectively communicate with peers and the other one with society at large. The society at large does not necessarily understand your acronyms you are language, the way use a particular word and so on.

And yet, you should be able to communicate with society at large will, will come to the details. And what this communications involves? You should be able to comprehend and write effective reports, so you should be able to read a report to understand what is presented to you. And also you should be able to write effective reports and not only write reports, but effective design documentation.

And you should be able to make effective presentations and while this is seems to be not so serious, but which is very important, namely, you should be able to give clear instructions to others and also should be capable of receiving clear instructions. So, as you can see, there are several elements to this particular PO. As we said an engineer needs to communicate effectively with his own community and is also required to communicate with lay educated persons including customers of one's own organization and society at large.

And another thing to remember all engineers work in groups, so this requires members to document and present their day to day work in a commonly agreed formats. That is one issue people have to accept, because each one of us might be use might have got used to certain using certain tools, certain ways of doing things. But once you work in a group, whatever the group leader, whatever the organization specifies, you have to document and present your day to day work in that format only.

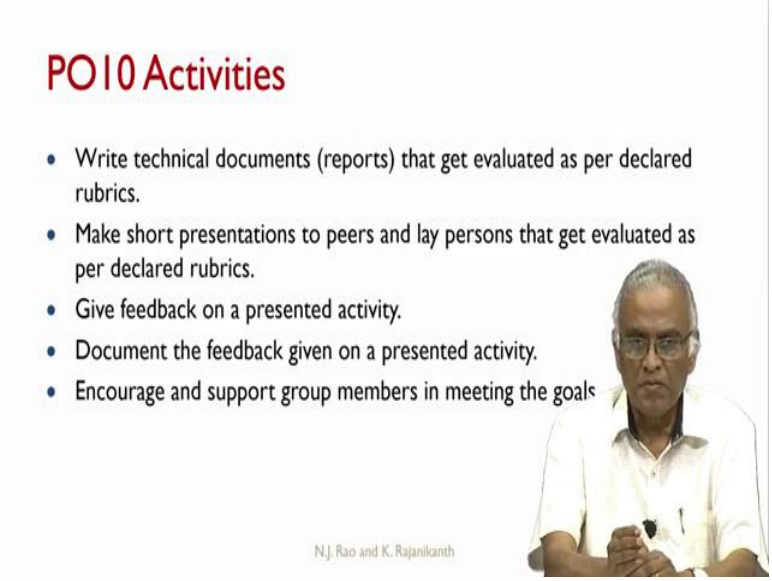
(Refer Slide Time: 04:38)



And, as we conduct all our formal professional engineering activities in English, so many colleges as of today have already included one course, each in English and professional communication. After all, English is not our native language but somehow as a nation, we have decided to conduct our professional activities in English. So one request to acquire enough proficiency in that. And the, the importance of this does not seem to be exactly understood or are realized are accepted by both the teachers and the students as of now, in my view.

So, one should organize several writing exercises. In some of the at least in some courses, with evaluation rubrics having elements related to the correctness and writing skills, there should be some marks associated, associated with writing correctly. If there are no marks for that, obviously nobody will pay attention to that and technical writing should be given adequate weightage in evaluating project reports, even there, I feel that people do not give enough wieghtage to the technical writing part of a report.

(Refer Slide Time: 06:16)



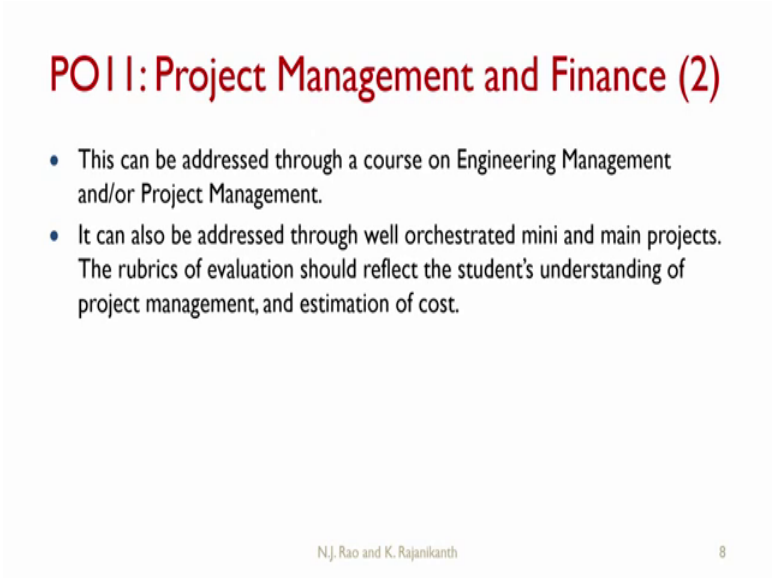
So, what are the activities that can promote communication? Right technical documents that get evaluated as per declared rubrics. Make short presentations to peers and lay persons that get evaluated as per declared rubrics. Give feedback on a presented activity even giving feedback can be practiced by the students. Document the feedback given on presented activity. Encourage and support group members in meeting the goals. These are all the some activities one can add to this list, which can promote the communication ability of the student.

(Refer Slide Time: 7:08)

Now, coming to PO11 which is related to project management and finance, it says demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member and leader in a team to manage projects and in multidisciplinary environments. This is also fairly large issues or elements involved in this. First thing that an engineer should realize that all engineering activities are conducted in project mode, maybe 95 percent of engineering activities are conducted in project mode.

So, first thing that you have to understand, an engineer has to understand what is a project? And projects have essentially projects have limited financial sources and a specified timelines. These are the two most important characteristics of a project. The number of people participating in the project may differ anywhere from a few single digit numbers to thousands of people working together. That will be the nature of project and it also can be multidisciplinary in nature.

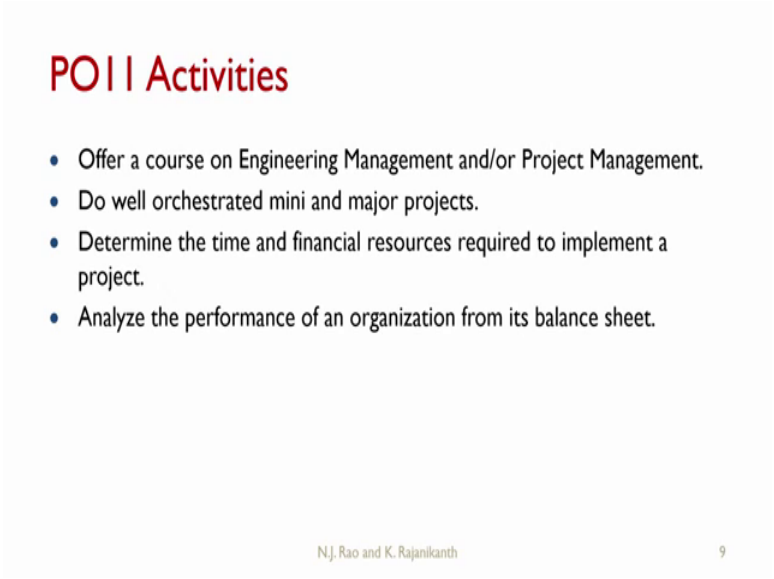
(Refer Slide Time: 8:38)



So, how can this can, how can this be addressed? There are enough number of courses designed on engineering management or project management. One of those courses can be adopted can be part of the curriculum and if it is done as a course, then many of the formal aspects of this PO11 are directly addressed in that course. It can also be addressed through well orchestrated mini and main projects.

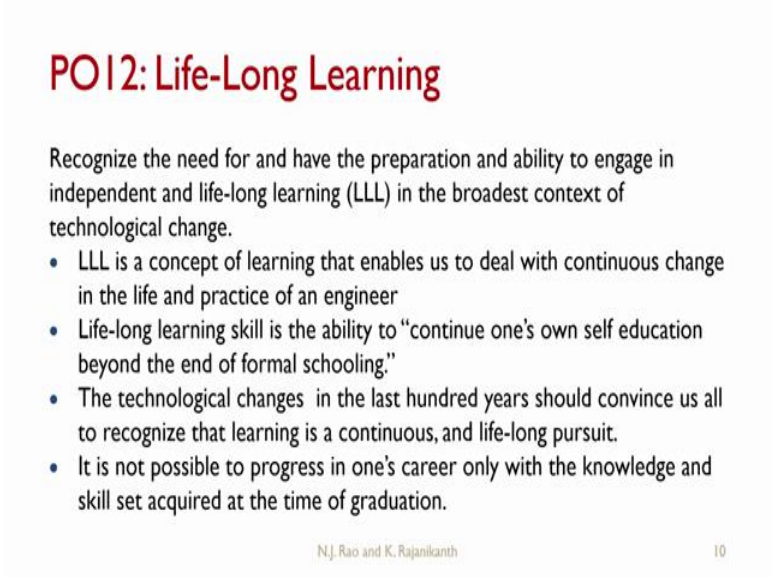
But the rubrics of evaluation should reflect the student's understanding of the project management and estimation of cost. Because we, we have a tendency to neglect all this and if technically, if the project that is done is successfully demonstrated, it is considered all the work is done, but the rubric should reflect whatever percentage weightage you want to give to the issues of project management and cost estimation.

(Refer Slide Time: 09:54)



And what are the activities? As we already said, offer a course on engineering management and or Project Management. Do well orchestrated mini and major projects. Determine the time and financial resources required to implement a project. Analyze the performance of an organization. For example, from its balance sheet that much should be taught to the students by because the finance, finance part of organization is very necessary to understand.

(Refer Slide Time: 10:29)



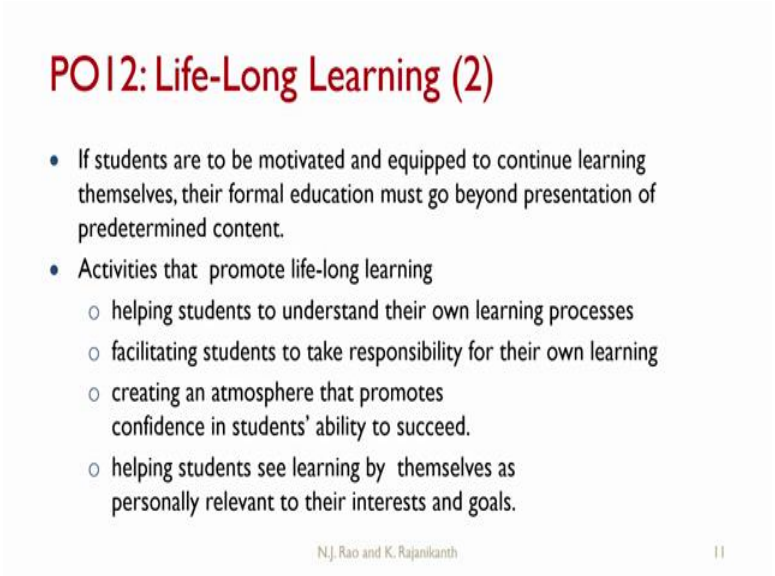
Now, PO12, the last one is related to lifelong learning. The statement is recognize the need for and have preparation and the ability to engage in independent and lifelong learning in the broadest context of technological change. This does not require any, any special effort to

convince anyone we know that technology is changing very fast. What was things change almost in a few years time? Whatever that you have understood, whatever you have learned, may become either outdated or but can become even the knowledge can become irrelevant in a short period of time.

What we say shelf-life of most of the knowledge is very limited and it differs from of course, one discipline to the other. And to that extent, one needs to keep on learning and keep on learning constantly otherwise you be a person can become irrelevant that is what is happening today a in even in Indian market. For example, today the dominant one everybody everyone is seems to at least from the advertisement they need to learn both about artificial intelligence and data management.

So, the ability that we need to give to a student while is in an engineering program is to not just stick to what is given in the classroom by the teacher and limit himself to that. He should be able to learn things by himself and some kind of experience that need to be given to him to learn by himself.

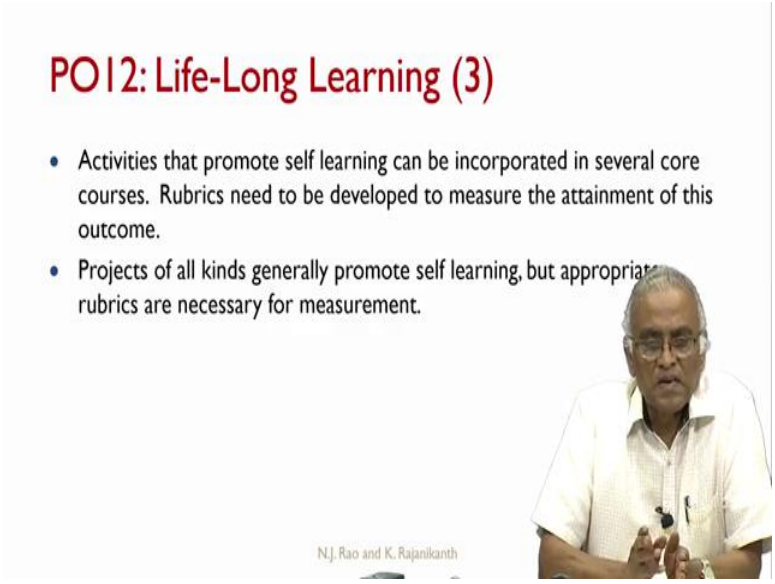
(Refer Slide Time: 12:39)



For example, activities that promote lifelong learning, helping students to understand their own learning processes. This comes in what we call later as metacognitive knowledge. So the student should be made aware of how he is learning and the teacher should be able to facilitate that particular process that is facilitate him, say not to constrain himself to what is being what is taught in the classroom or what is given in the notes. And facilitating students to take responsibility for their own learning.

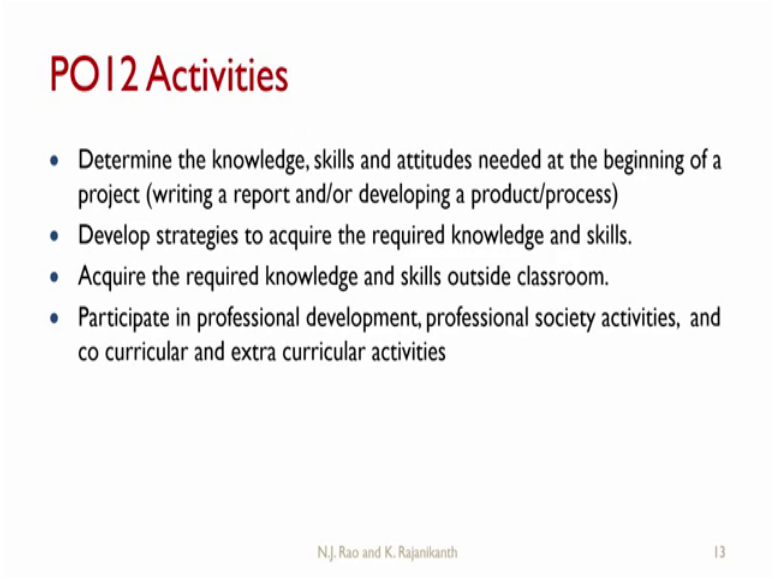
This is also comes under what we call metacognitive knowledge. Creating an atmosphere that promotes confidence in students' ability to succeed because when something is little unknown, you feel a little afraid of that one should venture out and take the risk and succeed. So, that kind of experiences need to be created and helping students see learning by themselves as personally relevant to their interests and goals. That is, if I have the ability to learn by myself I acquire that required confidence to pursue the goals or interests that I have.

(Refer Slide Time: 14:12)



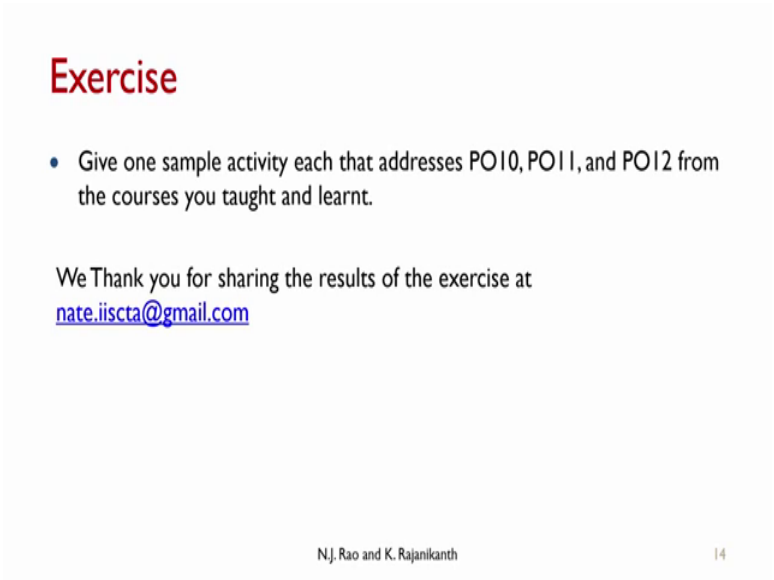
And activities that promote self learning can be incorporated in several core courses. There is you can give an assignment in such a way, it is not part of the exactly curriculum, but the student has to explore things on his own and then either make a report or make a presentation, whatever it is, and the rubrics need to be developed to measure the attainment of this outcome. Projects of all kinds generally promote self learning but appropriate rubrics are necessary for measurement.

(Refer Slide Time: 14:52)



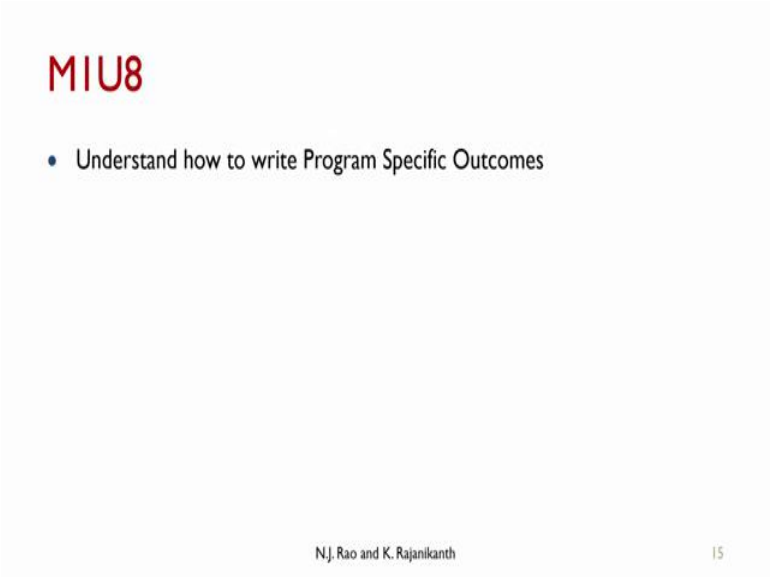
And what are the activities for PO12? Determine the knowledge, skills and attitudes needed at the beginning of a project, there is writing a report under developing a product or process. Develop strategies to acquire the required knowledge and skills. Acquire the required knowledge and skills outside classroom. Participate in professional development, professional society and also in co-curricular and extracurricular activities. So, all these activities can promote lifelong learning. And this is also considered one of the very important characteristics of an engineer and you can only pursue your carrier if you have the habit of learning by yourself.

(Refer Slide Time: 15:54)



And as an exercise, we request you to give one sample activity each that addresses PO10, PO11 and PO12 from the courses you taught and learned, does not matter how peripheral it looks or how unimportant it looks, but just give one sample activity. Will thank you for sharing the results of the exercise at this particular mail, email

(Refer Slide Time: 16:23)



And in the next unit will understand how to write programs specific outcomes. Okay, thank you very much for your attention.