Technical Arts 101
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Lecture - 23

So, this is what I will do, if you can shell down, let me speak that be one spoke, thank you. So, this what I would do, I would briefly explain the cutting plane method and there was little bit of confusion with regard to how to determine the visibility using the cutting plane method. I would actually tell you not to worry about that. So, find the intersection between the two planes using the cutting plane method, and then use the projection method to figure out the visibility.

So, I will talk about that. So, let me get started, cutting plane method. So, stay with me. So, given two planes a b c and d e f, we figure the line of intersection between these two planes using the cutting plane method. So, the trick is very straight forward pretty much along the lines of what we had discussed, when we studied the interaction between a line and a plane. Just imagine that you have to treat one of the planes as planes, and the other planes as a set of three lines. For example, you can treat plane a b c as plane a b c, and d e f as a set of three different lines.

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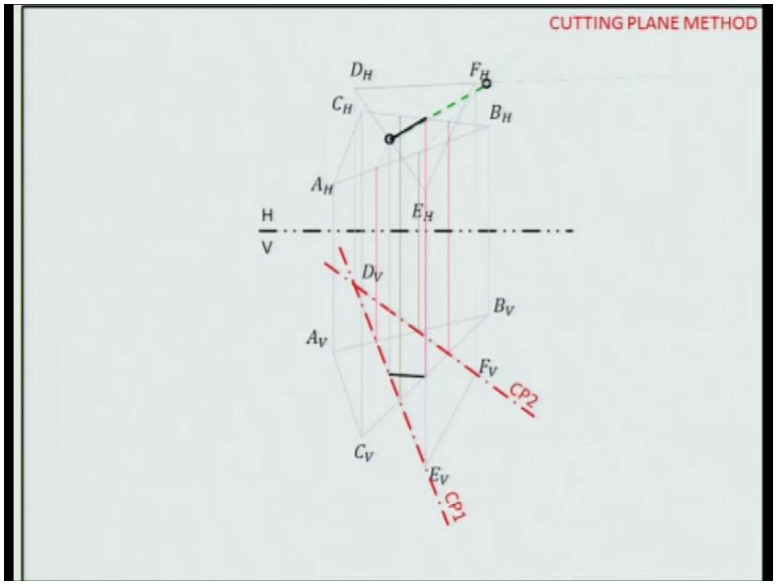

Now, for example, if I treat d e f as a set of three different lines, let me pass and imaginary cutting plane through the edge D v, let me call at c p 1. Now this edge D v is going to be intersecting with a b c at this point and this point. So, between and imaginary cutting plane and the plane a b c what you expect, do you expect a line intersection or point of a intersection? Line, right project this point up, so this point will be lying on a b project this point up its lies on a b. This point it lies on b c project that point up this would be the line of intersection between the imaginary plane that passes through d e and the plane a b c and that could be the projection of that line.

Now, this line is going to be intersecting the edge d e at this point. So, this point would represent the point of intersection between the line d e and the plane a b c, fine with me so far. No? Yes?

Student: (( ))

Professor: Good, take another plane that plane passes through d f, let me call this C P 2. This plane is going to be intersecting a b c at this point and this point this point lies on a b this point lies on b c, project this point up on a b lies over here. Project the other point from here lies on b c this would be the line of intersection between the plane a b c and the imaginary plane C P 2. Now, the corresponding point of intersection will have to lie on d f. So, to get that point of intersection, you have to extend d f and get this point of intersection. So, it is for that point of intersection to not line on a plane and a line as of now.

So, this is your first point of intersection, and this is your second point of intersection, join these two guys and the line segment that could be the line of intersection between the two planes has to be common between both planes. So, this would be the line of intersection got that term and you will get the corresponding projection in the front view, straight forward with regard to computing the line of intersection between the two planes. Now to get the visibility, go for projection.

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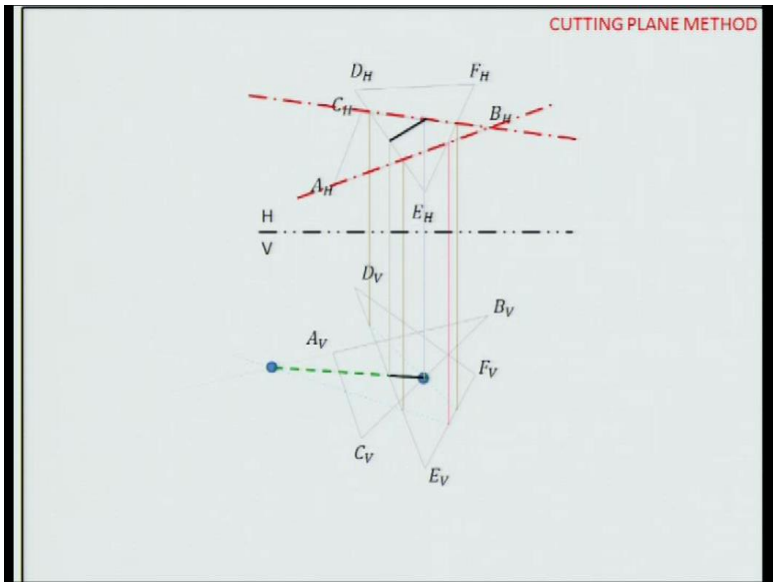

Now, I choose this view for absolutely no reason, I could have chosen the top view, I could have perform the same thing and I could have expected the same result. I could as well I could have treated a b c as a set of three lines instead of d e f. I could have still expected the same result. I could have as well choose this as my cutting plane, the result would have been the same. So, keep that in mind. Are you with me now yes?

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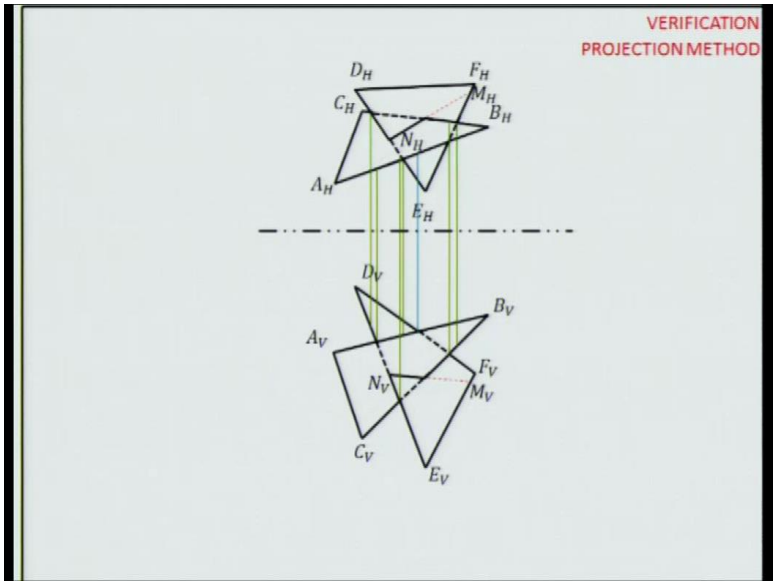

Now, to figure out the visibility using projection method; so few lectures ago, I said that I did not get in logic behind the projection method, but looks like there is some logic, and

the logic is as follows. First things first, you realize that all these edges they are going to be visible. All these edges they will be visible. Even the line of intersection will be visible. So, keep that mind. So, we need to figure out the visibility of this segment, this segment, this segment, this segment, this one, this one here, and this one, this one, this one, this one, this one, and this one here. Now, look at this point for example, draw a vertical. What for this point represent, what for this point represent? Is it a common point between two edges?

Student: (( ))

Professor: No, they just may be intersecting at that point, may not be intersecting at that point. So the edges are D e and C e, so D e is like so for example and B c is like so for example. Now what you see is the top view and what you see is this point here, look at my finger at the thumb of the right hand, and the finger thumb of the left hand. So these two points, they are at the same positions, in both edges in top view. Now which of the stick is visible to you, or is it closer to you? The one on my right hand, the one on my left hand.

Students: Right hand.

Professor: Right hand is visible right? You could see that, but there it is not clear. Now what I will do is I would just flip this over so that you could see the front view of this. Once again, I would just flip it out, so that could see the front view containing the projection these two lines, which of the point is up, this guy here right, so that is up. Here it is visible; here it is up. Once again it is visible here, in the top view; in the front view, it is above this point the logic is precise the same.

If you draw a vertical from here, whichever edge is up in height in the front view will be visible in the top view logic is precise the same. So, if you draw a vertical from here, d e seems to be getting head before b c. So, it is this portion of d e that could be visible and for solid, agreed, how about this one? If I draw a vertical from this intersection points, so now that intersection between e f and b c which of the edges will be encountered first by this vertical b c so that means, that b c is going to be visible here. So, this portion is going to be visible here, and therefore, it is going to be solid with me.

Now, if you look at this one back again. So, it is d e which is visible when this portion is visible this portion of a b c should be here in, one thing more that you would want to notice what has this intersection line of intersection done to this edge. It is change the status of that edge. So, this edge was visible from b after the point of intersection and from here it is hidden. Likewise also, you can expects something very similar over here. So, this is visible here, and from this point onwards edge d e should be hidden. You can verify that.

For this vertical what you expect what you expect for this vertical point of intersection between d e and a b a b gets hit first. So, it is a which is visible right and of course, this will be hidden and likewise we can figure out visibility same thing from this view also. So, extend the vertical upwards from any of these point of intersections see which of the corresponding edge is before and that edge is going visible in this, same same logic with me everybody?

Students: Yes sir.

Professor: Absolutely confident?

Students: Yes sir.

Professor: So, this is what I would do, this what I would do. I would distributed the question papers, I have them, I have them.

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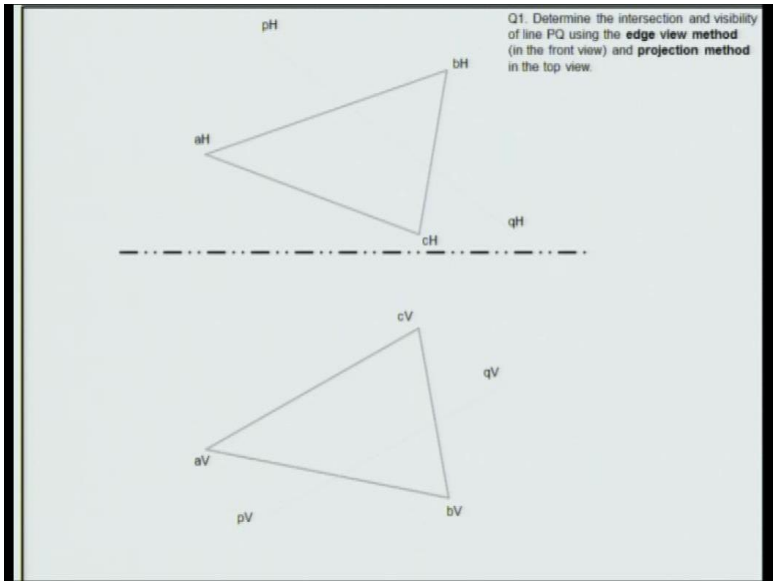

Question one.

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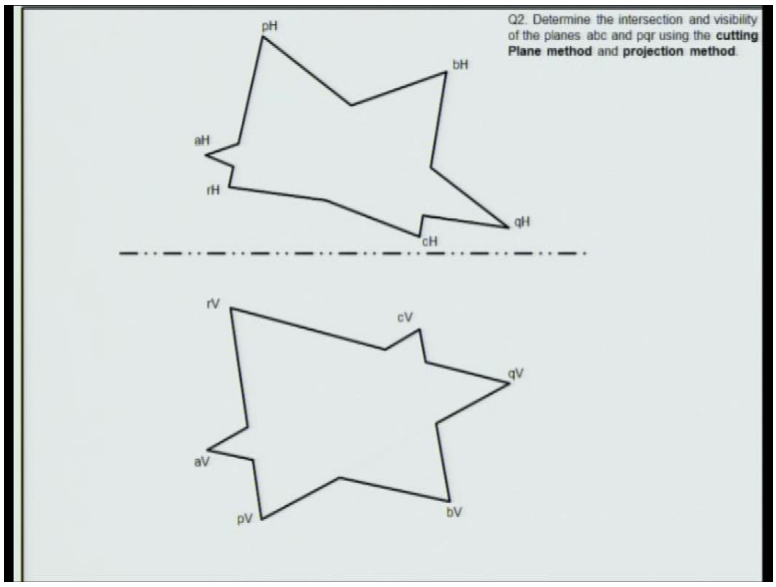

Question two, two questions. Relax, I given time to solve these questions. So, I will give you a single paper and these two questions are on the two sides of that paper. While you are solving that for reference, I will keep this slide in front of you. So, that if you are stuck, you can refer to this and solve.

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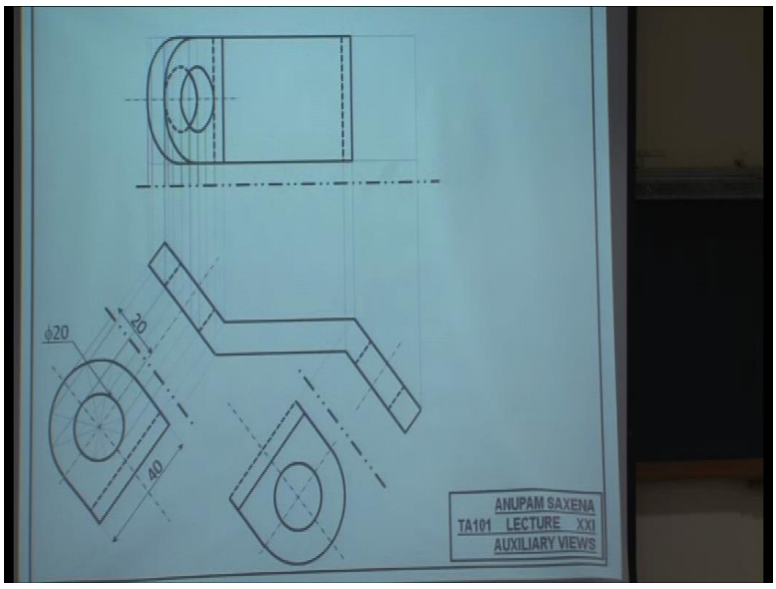

So, this is the front view of the object; this is the auxiliary plane one, auxiliary plane two, and looks like I will able to show the two shape only in or only using auxiliary plane not

otherwise. Now question is this. Given the partial auxiliary views of the subject containing two shapes of the planes of the faces; if we have to draw the orthographic projection, like the full top view and the side view of this subject, is to possible for us to do that that is for the questions. So, this is the object and you like to draw the full top view of this and full side view of this.

Now, this part is straightforward; I can always take vertical projections draw the square or rectangle or whatever. So, this part is going to be visible, this edge will be hidden, and likewise I can take to vertical projection from these edges. So, likewise these edges going to be hidden over there, I can take the vertical projection from there. This edge is going to be visible, likewise this edge and over here vertical projection up, horizontal, horizontal, the centerline. And now the question is, how do we transfer the features over here on to this part of the drawing in top view, how do we do that?

Step one break this arc into a number of segments right, and then look at these projection transfer these projection over here and from here up to the top view. So, these two points they get transferred over here. Let us first look at the bottom face from here, transfer them up right there. Second thing transfer, these two points over there; likewise the centerline up there. And here comes the critical part, and of course, these two views they are going to be separate by hinge line. How do you find the position of this hinge line? Now to do that, look at this feature and compute the distance or take the distance of this point from the hinge line over here. This feature is going to be lying where over there, take it up this features going to be lying over there measure that distance and then look at the hinge line.

So, once you have the hinge line not becomes so easier for you to transfer whatever distances you are going to measuring over here up to here; same thing the concept of auxiliary planes. So, this view is happens to be common view, get the distances from the auxiliary plane and then transfer all of them on to the top view straight forward clear. So, I do not have to speak much. Get this distance, now this point lies on this vertical projection - this one measure that, get that distance, this one lies over here measure that get this distance from here to here this guy lies over here measure that straight-forward.

Now, take this distance and placed over there; likewise take this distance placed over there. So, looks like you have got on these point to lie on some sort of arc, this is how the

arc is going to look like. So, this is the bottom arc remember that. So, this is the arc corresponding to this part of the object. You could do the same thing for the top part of the object. We will quick same thing for the top part of the object. So, the top arc is going to be visible. So, it is going to be solid the bottom arc is also going to be visible, look at this. So, this part is going to be visible, therefore solid; this part is also going to be visible, therefore solid.

Then this edge going to be visible, half of the circle, so there is a wide over here at the bottom surface there is wide over here at the top surface treat them one by one same thing same distances concept. So, divide the circle also into equal parts, and take distances of the points lying over the circle from the hinge line and transfer them. So, once you understand the basics, it is all straight forward procedure. Transfer the distances and this corresponds this circle on the top face or the bottom face, top face likewise do the same for the bottom face, I am just transferring the distances, they are going to be many lines, I am just transferring the distances. So, this is possibly this part of the circle and a part of which is going to be visible in top view, so this would be solid.

The other part same thing transfer distances a part of this circle is going to be visible. So, this would be solid, the rest will be hidden. Do precisely the same thing on the other side.

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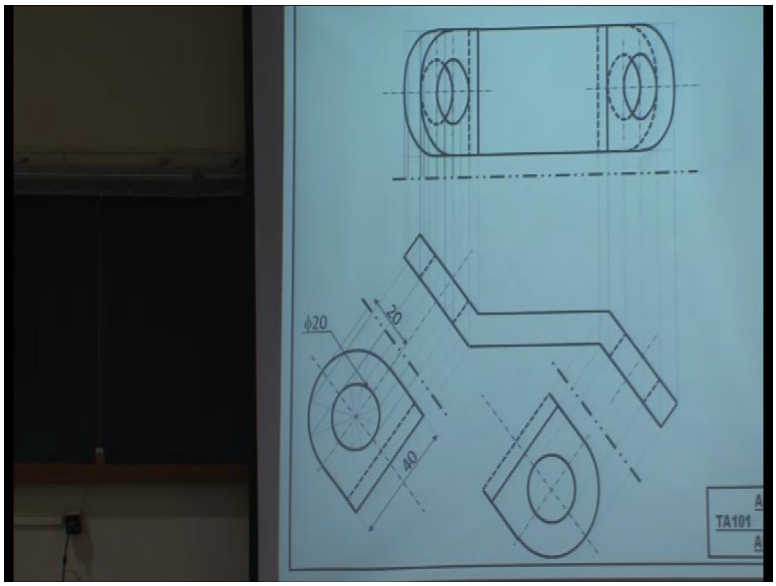

Now for that you are going to be using this auxiliary view, precisely the same thing, measure distances and transfer distances. When you do that you would get that part of

the arc now this part of the arc is going to be visible this arc from the top face this going to be visible half of the bottom face. The arc corresponding to the arc lying of this face not visible hidden how about the circles or circle voids same thing. So, the void on this face is going to be visible, the void on this face a part of it is going to be visible a part of it is going to be hidden. So, this part is visible, this part is hidden.

Now, you can do a smart thing, observe the following the shape of this arc and the shape of this arc. What you observe, are they the same or different? They are the same. So, if you get one arc all you need to do is, transfer the corresponding points over here by equal distances and then get the other; likewise from the other side. Once you get this arc, just shift this arc by some amount what is that amount going to be what is that amount going to be that amount is going to be this, is it?

Students: (( ))

Professor: Yes or no?

Students: (( ))

Professor: It is gets, so this arc gets shifted inward by about this amount; likewise from there, so this arc gets shifted by about this much amount. Side view again the same thing. Of course, finish the top view by adding centerlines.

So, side view again very similar concept. So, I will not say much just that I will show you the animation. So, if you had asked what we have been doing in last five or ten lectures, we actually had been preparing a primer for such problems. What if the planes are not parallel to the conventional orthographic planes x, y, y c and x c and what happens then so we have to take the help of auxiliary views that reason by we call them auxiliary planes helping planes. So, unless you get the two features in the auxiliary views you not be able to capture them and conventional orthographic projections. Any questions, are you with me on this, everybody?

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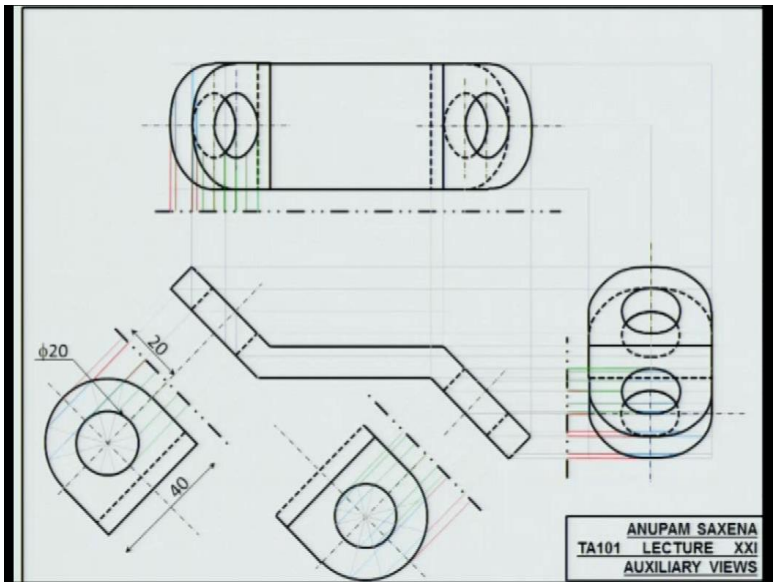

So, I have made the speed of this animation quite slow, so that you can follow what is going on. The lab next time that you are going to be doing I think as going to be after break, so that is when you are going to be solving this problems, Jan twenty fifth with me. So, while you are watching this, I have to benefit of having not many of you. So, we can talk about the exam is going to be a four hour exam, seven questions, four hour exam. The first batch is going to be writing the exam between nine and one - four hours, the second batch is going to be writing the exam between two and six. We will do something very similar to what we did last time. We will have to time batch one for half an hour and then will have to let batch two n and only then batch one gets released.

Now, this time what I done is I just reverse the batches. So, batch one in the mid sem now batch two; and batch two is batch one. The question are going to be tough, the question are going to be tough, it might happen that four hours may not be require to solve these questions. I will think about whether I should be providing you some sample questions or sample papers, I think about that. But I would request you guys to practice and practice hard, because these concepts are difficult to follow unless you practice you will not able to get the concepts and if you do not get this concepts, you will not be able to solve the questions.

Student: Sir, (( ))

Professor: No, so the questions will be from perspective to development, perspective one question on perspective, three questions on lines in plane, one question on this, one question on intersection and one question on development seven questions.

Students: (( ))

Professor: You have to wait for five more lectures. So, we have not yet discussed interpenetration solids and development, so five more lectures.

Students: (( ))

Professor: Yeah none this was the bonus quiz - ten marks, ten marks getting added to your score straight out.

Students: (( ))

Professor: What?

Students: (( ))

Professor: Two hundred marks - seven questions; forty, thirty-five, thirty- five, twenty, twenty, I can give the paper, if you want.

Students: (( ))

Professor: None,

Students: (( ))

Professor: What is the meaning of a bonus question; to me, it means you get extra credit for extra work, added.

Students: (( ))

Professor: It is more. So, if you have let say eight question for example, essentially you can get hundred and twenty out of hundred as in next mid semester exam. So, I must warn you, if you are not careful and the labs that you are going to be working now or cannot careful in the lectures to come. If you not attentive it might be a little difficult for you. In your position, I would probably try to understand everything that I learn from

now. I am here I am committed. So, I can give you n number of extra classes I am committed. The question I just want a make sure that you understand.

What you guys are already tried TA 101 is it? This is something interesting, a few days ago myself and two colleagues of my professor Sudhir Mishra and professor Jayadeep Dutta mathematics and civil engineering. So, we having dinner and we having conversation. So, TA 101 is going up and we start discussing TA 101 and I was I want camera, but I will be honest. So, you know I kind of confidence that I was having a half time teaching t a one not one looks like I am not able to deliver the concept properly. I must I mean I look at the faces I look at the eyes in they like, and I really want I am doing a good job teaching TA 101. And they said well I am thinks become a little difficult starting from space geometry, a lot of imagination and a lot of visualization and Prof. Jayadeep dutta he is a mathematician he is like what is the use of TA 101.

Students: (( ))

Professor: I mean why I am teaching to TA 101, and Prof. Sudhir Mishra is like you know you have to teach the language of drawing, I mean you have to teach the language of drawing. I mean have to be able to convey without using words what you mean when we have consider design, for design what you want to convey when have consider a design you should not able to use a single word that. Like for example, if a designer from there comes to manufacture from here he or she would come with a drawing and she or he would able to interpret without an exchange of a single verbal word that is for he met.

Seems to ok, but then I began thinking and I was like you know the first thing that you concede the first idea that you concede, if you want to convey to yourself, and if you want to develop it further what you do. You take a paper you take a pen and you draw line, you draw curve, you draw sketch, does the first thing you would do when you want to concede an idea and develop it further. This helps with this helps you with that, no numbers involved, no words involved, only drawing, it helps you imagine things a lot better if you are doing right.

So, it is important, take (( )) for example or you know galaxy. This is art production in galaxy you build a structure, we have seen that you build huge structures. Many of them are new once many of them are new constructs, what you do in that. Imagine things you try to convey new ideas, but this is where this your foundation, this is why you develop,

this is a factory, this is why you develop the ideas, build it. Convince yourself that your ideas is going to work and then implement it. This is how important TA 101, is basic course to thinking and analyze think and analyze only, but I still convey have this feeling that I am having a hard time conveying what I know or what I do not know to you. So, hopefully thinks will get better these only five lectures to spare. So, I would release you, because you have a quiz at six o clock.