Engineering Drawing and Computer Graphics
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Module - 03
Lecture - 23
Orthographic Projections I (Part- 3)

Hello all. Welcome to our NPTEL Online Certification Courses on Engineering Drawing and Computer Graphics. We are in module number 3, lecture number 23, where we are covering Orthographic Projections. In the last class, we have learned about 1st quadrant projections and 3rd quadrant projections.

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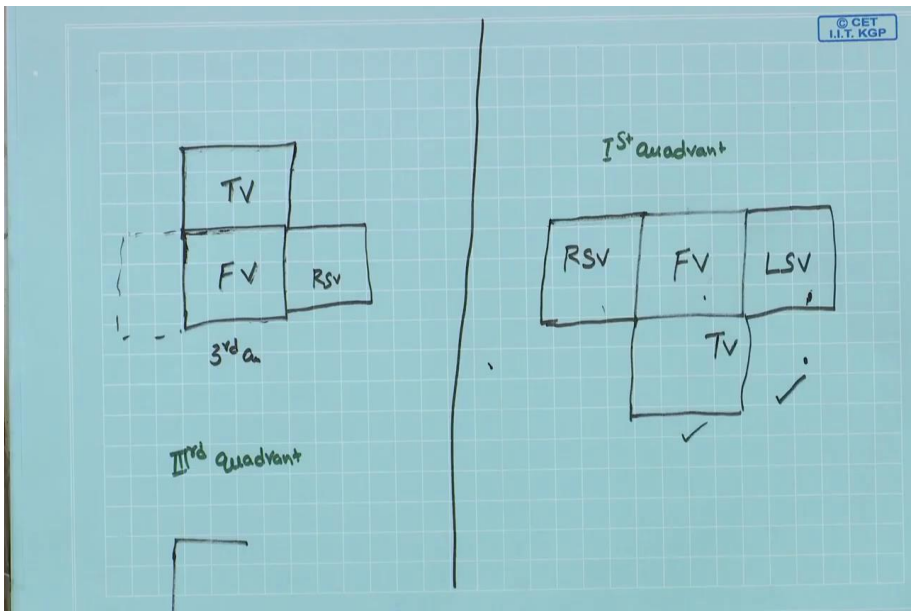
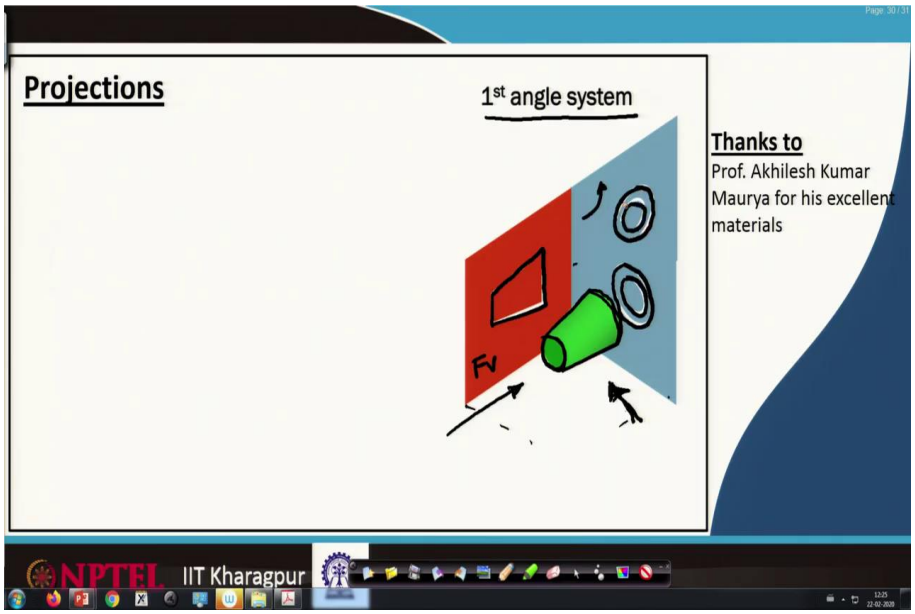


In these 1st and 3rd quadrant projections, what we have seen? After projection onto the planes, we will get a front view. The top view will be below that. From the right side, if we are trying to look at, the projection will be on the left-hand side; so, right side view. If we are observing something from the left-hand side and projection if we can get it, that will be left side view. On the right-hand side, this is the standard convention what we follow for 1st quadrant systems.

In case of 3rd quadrant systems, what we are going to get is a front view; let us draw it here, a front view. The top view will be on top and perhaps, right side view on the right-hand side left side view will be on the left-hand side, this is the way we will get for 3rd quadrant systems. In case of 1st quadrant system, the front view after folding it from top view comes at the bottom

and if we are looking from the left-hand side, the view comes on to the projection onto this opaque plane of left-hand side uh to the right side.

And if we are looking from the right-hand side, ah the projection on to the opaque plane comes at left side. This is the way we go ahead and most of the cases, at least for Indian standards and also ah for our engineering drawing course, we extensively follow this 1st quadrant system. (Refer Slide Time: 02:46)



So, let us learn more about this 1st quadrant system. Let us look at this picture in the 1st angle our 1st quadrant kind of system. There is a tapered cylinder having such dimensions.

If we are observing from this direction because this is a transparent plane through which what we are trying to look at and this one also another transparent plane. Usually, the maximum dimensions available in that direction we try to look at. So, if that is the case, if we are observing from this direction, the projection of this taper cylinder comes as a trapezium on the other plane.

Because this is the first one, what we are going to observe. So, let us call that one front view. If we are looking from the top, again it looks like trapezium; the same symmetric object comes from this view and also from the top view.

If we are looking from this view, it looks like a circle followed by another big circle. So, on the plane, it looks like a circle followed by circle because we are looking at the inclined direction, it

might look like an ellipse. But we have to flip or fold this page. Once we fold that, it forms a complete circle on the plane.

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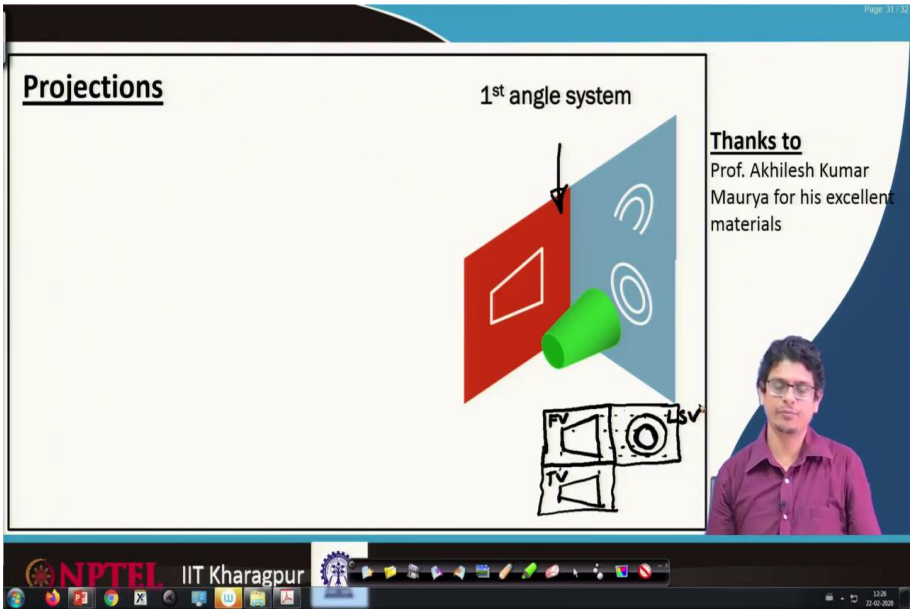

So, if we are drawing this one for this entire object, the front view will be that and then, the left side towards the right direction, we are trying to look at. So, the view followed by these lines, in between that we get a bigger circle which will be visible. Similarly, we are looking in this direction, so based on these lines, we will get one more circle, concentric with that. Both are visible. Now, top view, if we are looking from that direction; so, it projects onto this bottom plane and we are folding it to open it, then this line and the bottom one coincides. So, there similarly this line the bottom one coincides and we are looking in that direction, again we see a trapezium of the same size. So, this is a front view, top view, left to the right-left side view. This is the way, we construct a picture.

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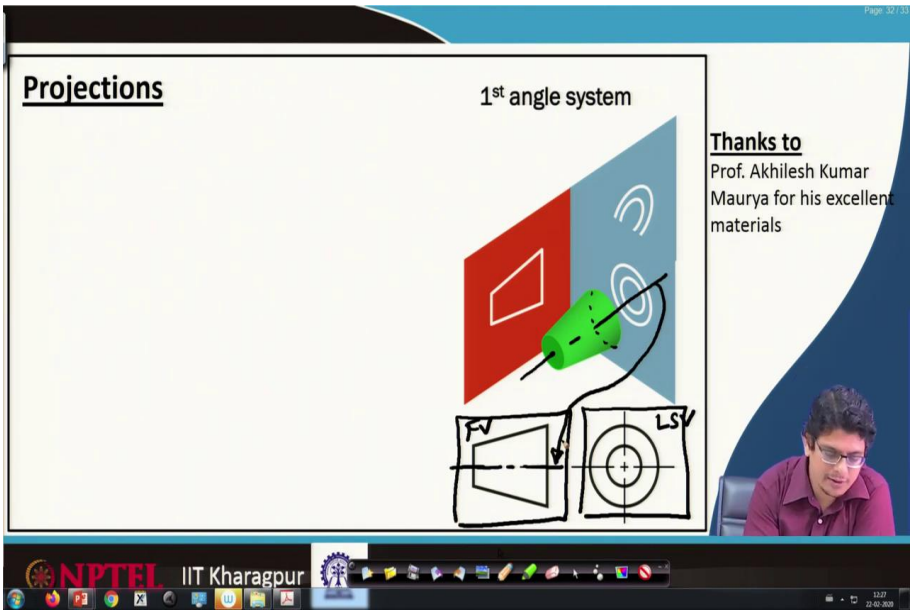

So, doing that, the front view object, this is the front view object, trapezium; this is the left side view of that object and our drawing terminology goes in this way because this is a cylindrical object. We usually show this centre of the axis that is passing from that point comes from that point. If this is the complete circle, this line pass through that.

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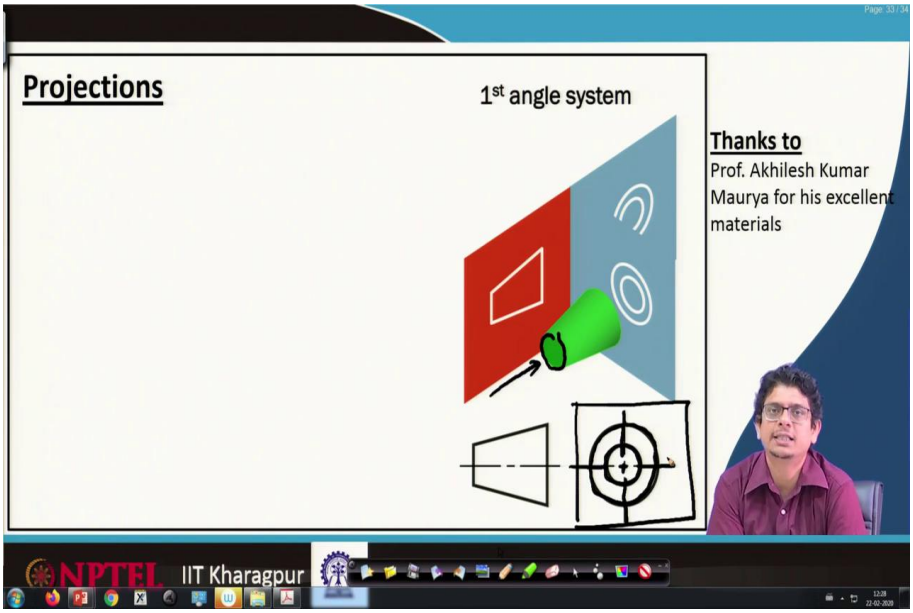

So, the same line, we are showing it here. Second, because this is a circle on the left side view, a circle and another circle because this is a cylindrical object having circles. So, again dash-dot lines, we show to represents that it is a cylindrical object.

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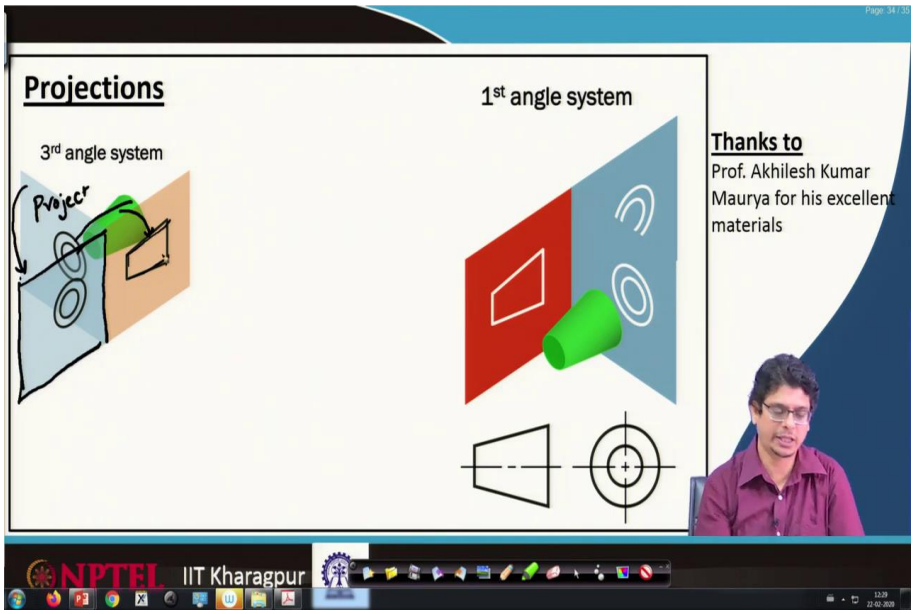

If we are looking at that in the 3rd angle projection systems, the same cylindrical object in the 3rd quadrant we are placing. So, the planes on which it is projected is this. The planes on which this will be projected is this one projected there, that one projected there.

So, if we are flipping that entire plane, it comes to this plane. By folding it after projecting on to project onto this plane, then fold it in this direction, rotate it so that the view what we will get is a circle. Similarly, we have looked in the 3rd angle projection. So, the projected one will be this one. This is the way, we get the views required views.

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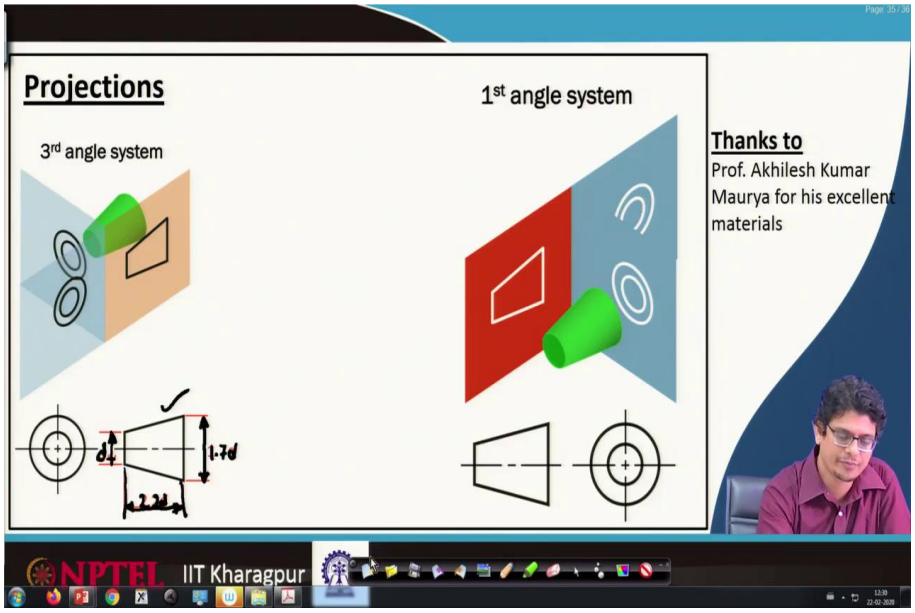

In the 3rd angle projection system, it is quite common to show these dimensions. Next to the object by these symbols because it is a projected one. So, some diameter, another diameter perhaps length of the object 2.2 d and usually, we show that for the front view. The maximum dimensions, we are supposed to show it on the front view and the remaining leftover dimensions will be d1stributed on the top view, then after side view.

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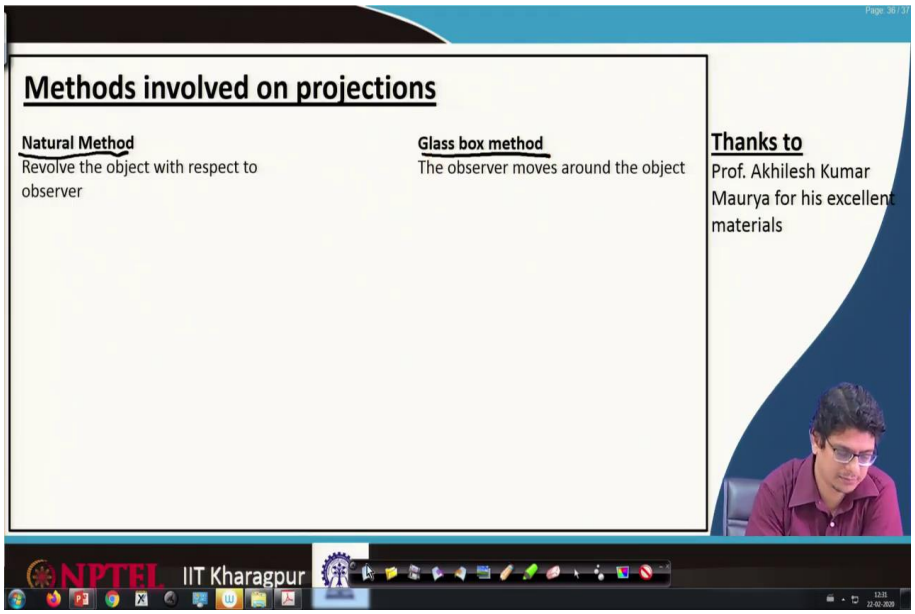

Now, we will look at the methods involved in these projections. Any projection, we divide into two methods; one is by natural method, another one is glass box method. In the case of Natural method, what we do is we keep the object as an observer, we walk around that object, by looking at that object how it looks like. The other way is more like you keep the object, slowly rotate it by 90 degrees either clockwise, anti-clockwise kind of directions or perhaps from top to bottom 90 degrees or bottom to top 90 degrees. This is the way also we can rotate the object and look at the views. If we are doing that, first keep an object, fix the observer, rotate the object, the views whatever we are going to get, that is what we call natural method.

In the Glass box method, we construct an imaginary box around this object; some of them are transparent ah planes, some of them are opaque planes. Walk around that transparent planes so that the views whatever we get that what we call glass box method.

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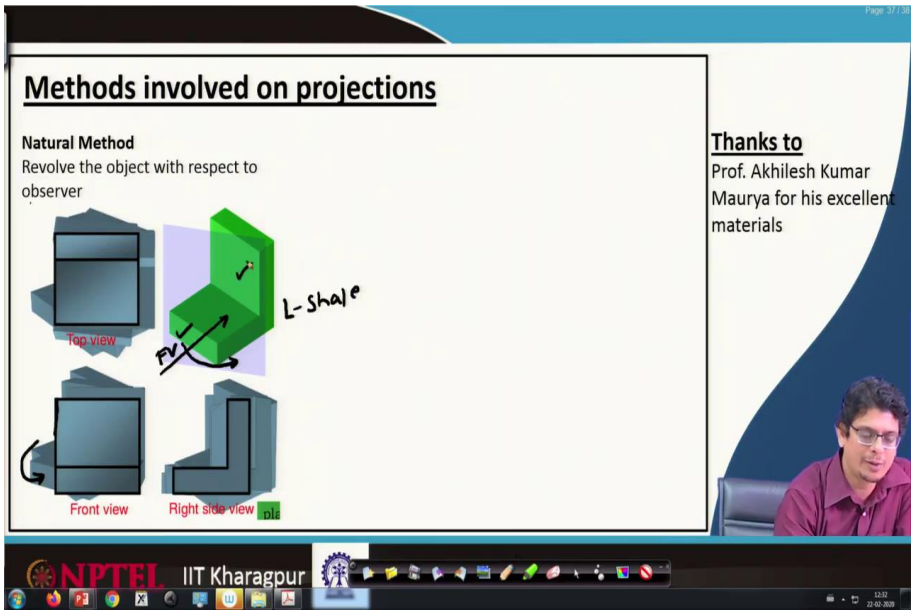

So, let us look at an object. Here the object is something like in L shape. A block in L shape and we would like to say this one as the front view. So, you are the person, who is looking at the monitor and the object is slightly inclined with you. The easy thing is to rotate this object by a certain angle in that direction so that it will be perpendicular to your view direction, in that direction into that plane direction. So, here if we are rotating that object by that certain angle; this one, we will be in a position to view; that one, we will be in a position to view.

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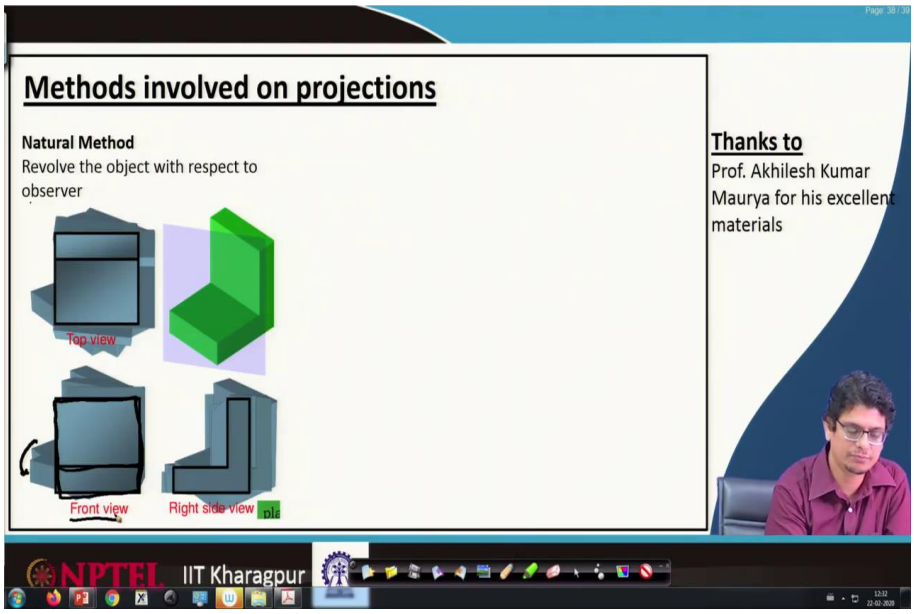

So, rotate that object so that it comes out to be in that shape, in the natural method. This is what we call the front view of that object. Similarly, for top view object, what we have to do is this is the object what we are trying to say and what we want to make is this one front view.

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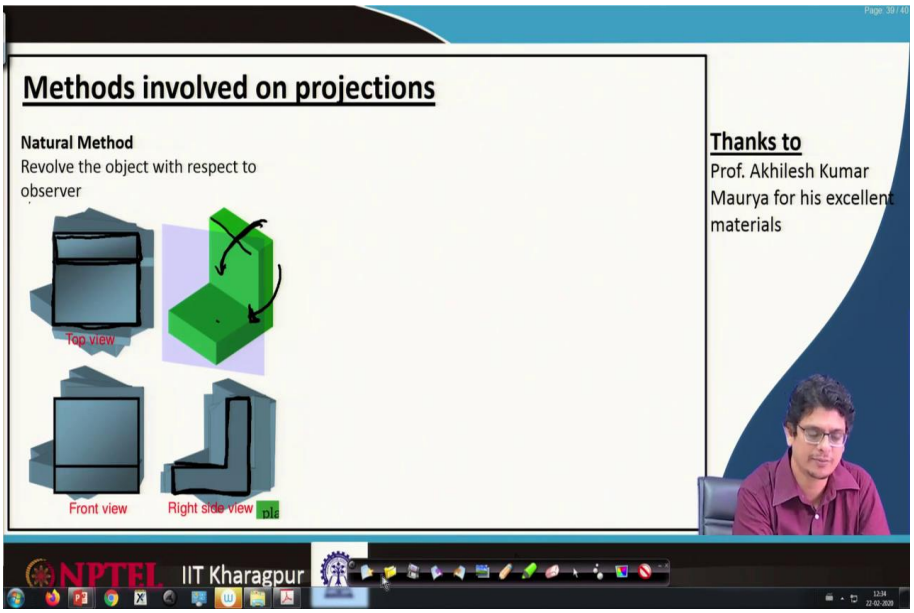

So, rotate that in that direction. So, by doing that, we will again get that normal to or perhaps into the plane of that paper. Then, whatever the thing we are going to observe that we call top view. For example, if we are rotating this object in that way, we are going to get this one as the dimension here for the top view. This one because we are making normal this entire object comes at that level towards our direction.

Similarly, by rotating that in that direction normal to the plane, we will get the right side view. This is what we call the natural method. The observer is always be fixed, the object will be rotated in such a way that it will be in the view of the observer and whatever the view we get, that we call this natural method.

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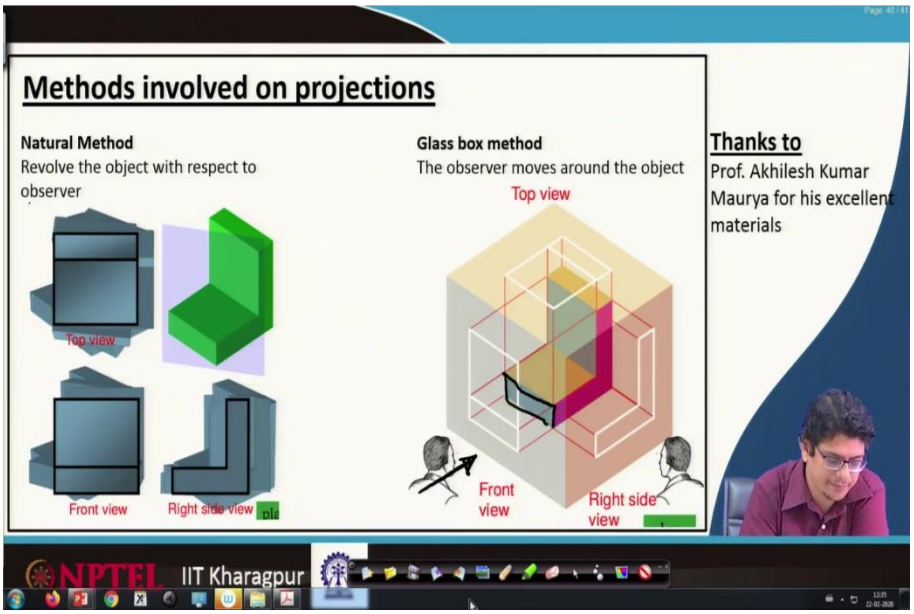

The other method is called the glass box method. This glass box method is to deal with our transparent planes, opaque planes and their projections. So, all the time, we are trying to construct this glass box method, where there are transparent planes. So, in front view, the observer is in this direction. As of now, he is looking in that direction, whatever the shape he is observing that let us call front view, this one is the front view projection.

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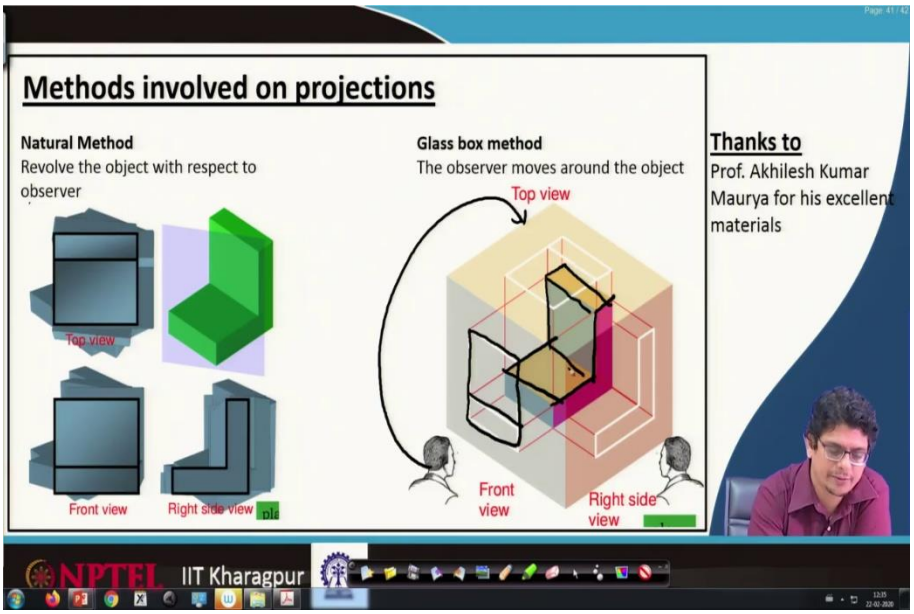

So, if you are going to have it, the complete one, projection what he is going to see that will be of this shape. This is what we call front view. Then, to look at the top view, he has to go observe the from top side whatever this projection he is going to get onto that plane.

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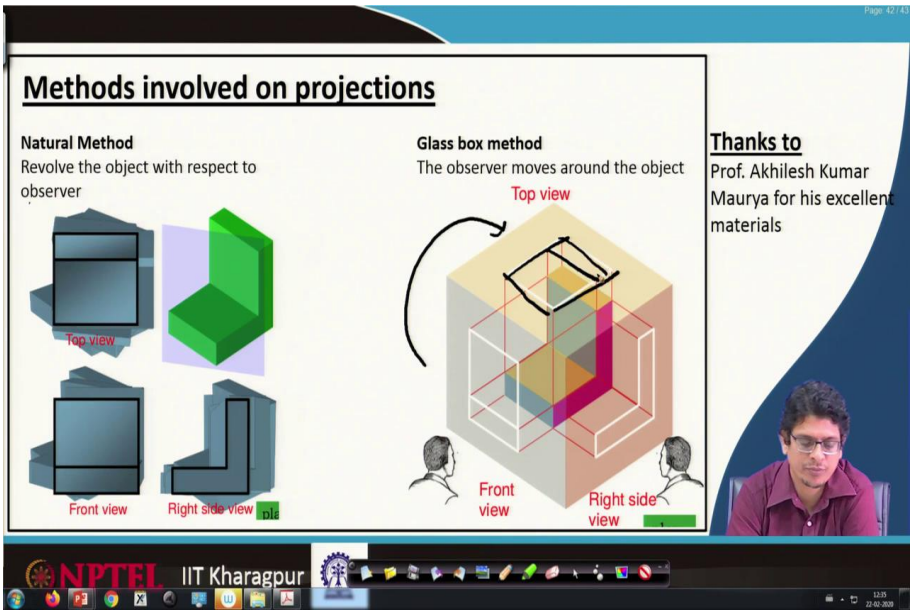

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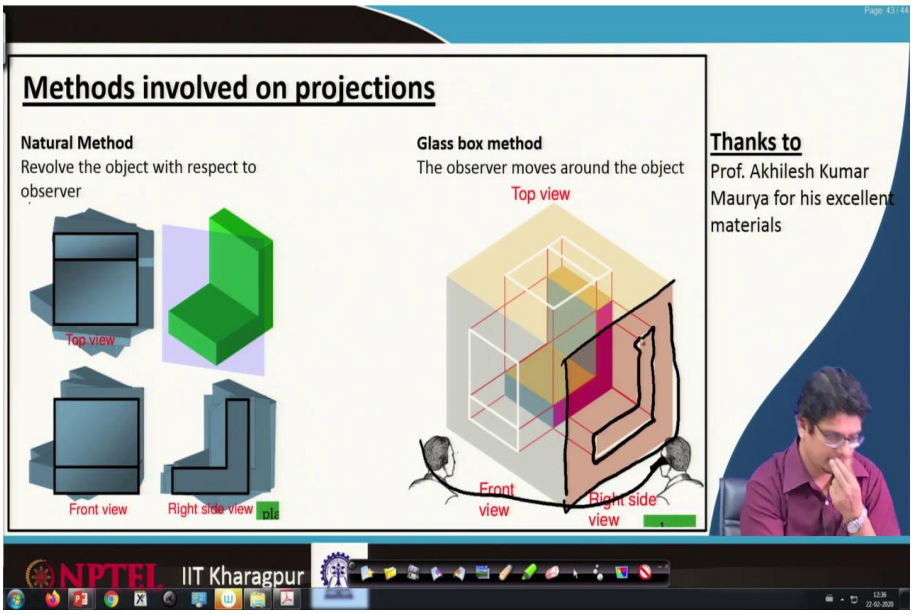

Like this, we call as top view and again, for the right side view, he has to come to that direction, look on that plane whatever it is projected, he is going to get that is what we call right side view.

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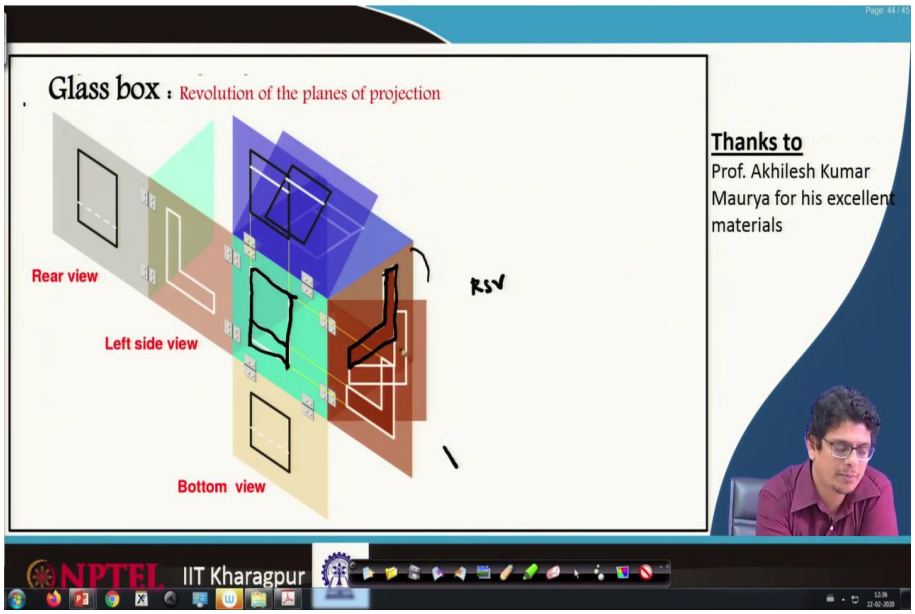

So, in the glass box method, we construct these views, project it onto the planes, then fold them or perhaps rotate them so that different views, we will get. For example, let us look at this one, for the same object the front view, after projection, we might be getting this one. This remains a fixed plane. Now, the observer looks from there. So, first of all, he will get this one as the object for the right-side view.

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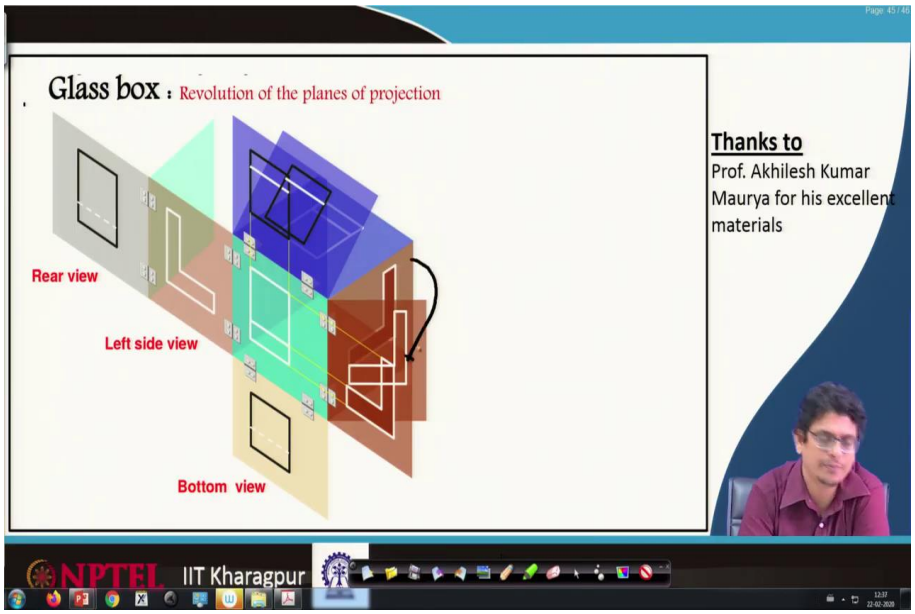

Now, rotate this entire plane by 90 degrees. So, if we are rotating that, we get this view. Similarly, for the object onto that plane, we may be getting this one as the top view.

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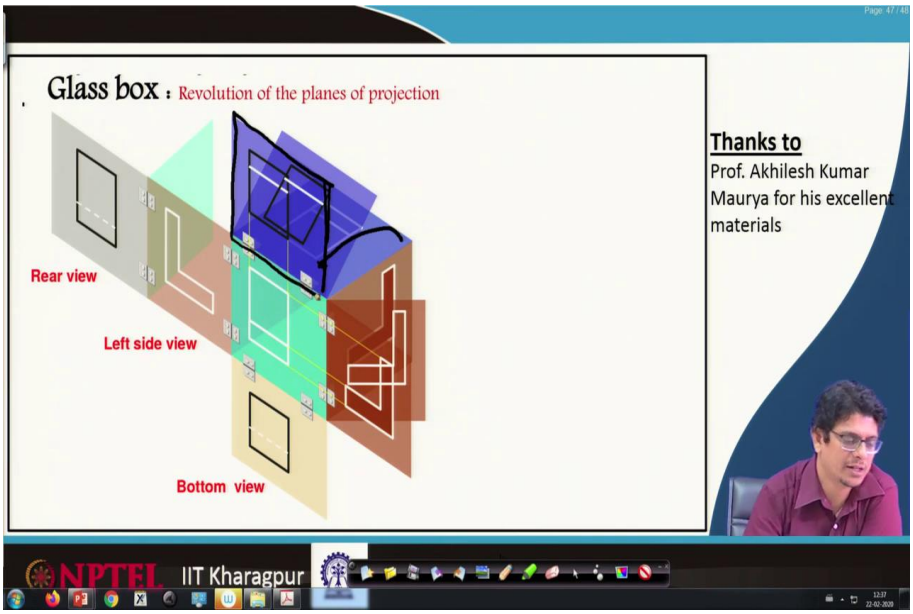

This plane, rotate it 90 degrees. So, once we unfold that, so this is the object on that plane, what we get; this one; that one what we call this top view.

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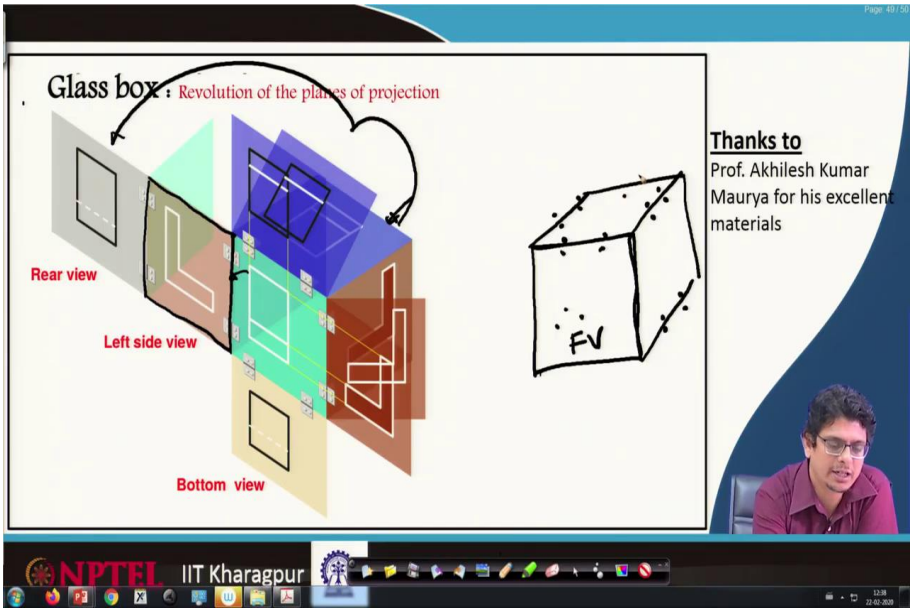

Similarly, if we are projecting on to that plane backside opaque plane and rotate that we will get again another view. The backside also we have that, that also we can unfold it so that it comes to that level. So, you can think of a box cons1sts of many latch kind of events. So, this plane is always fixed which we call front view.

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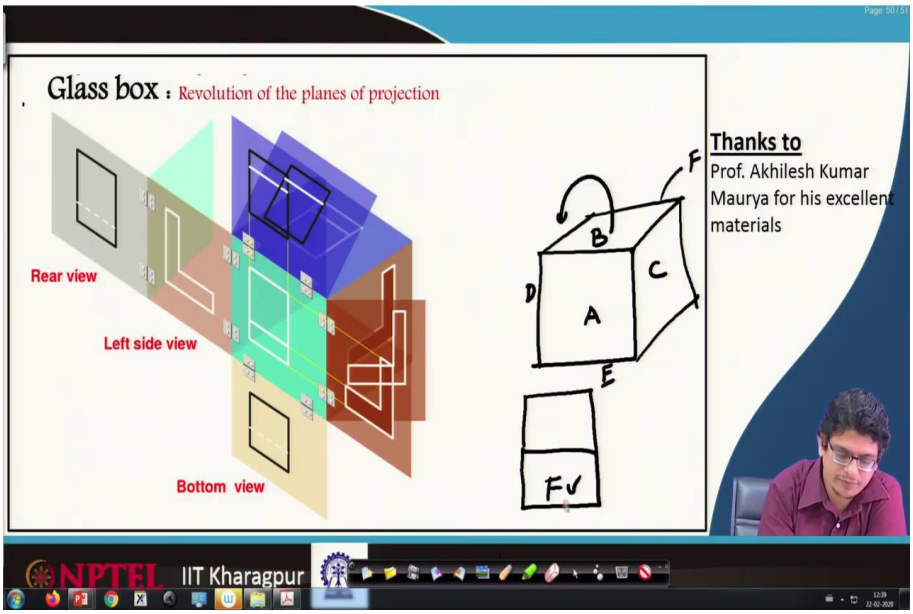

Now, once it is done on that box, we open it in such a way that this part comes to the top so that the front view will be there, let us name it like A plane, B plane, C plane, the backside of is D plane, the bottom one is E plane, the backside of that is F plane.

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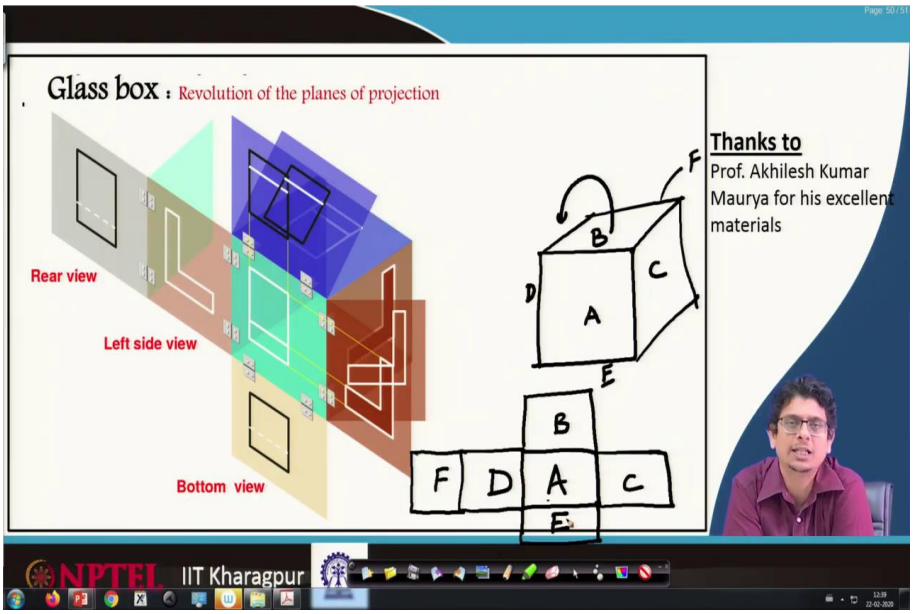

Now, when we are unfolding it; the A plane will be there, the B plane comes on top, the C plane comes at this level, the D plane opens like a box in that one, F plane on the backside, twice we are going to unfold it so that it comes in this direction F and the leftover E plane comes at that level. This is the way we unfold this box and their projections.

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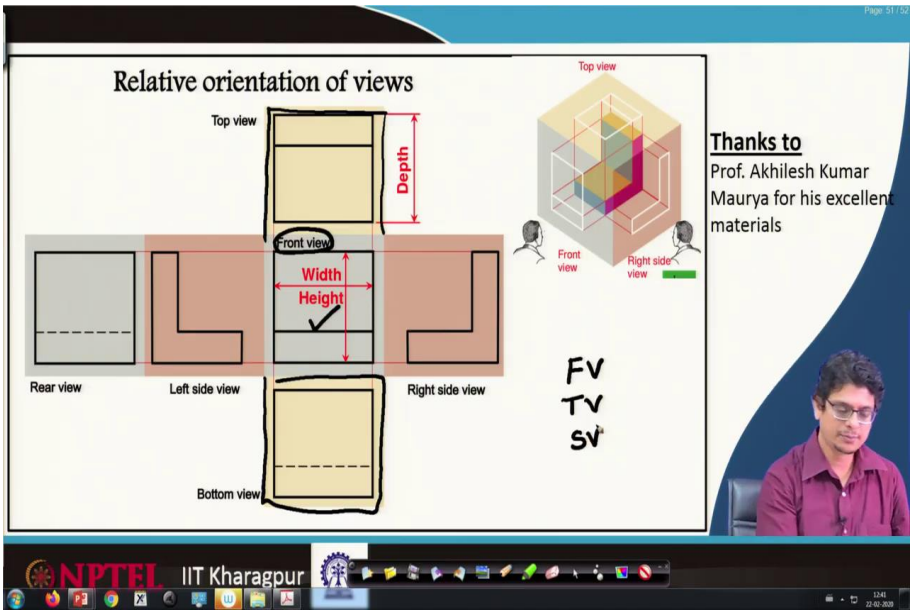

After unfolding all these things, if we are naming it, the front view will be at middle and supported by that, we will have a bottom view, a top view this is for the third angle projection system.

Because front view top view on top, right view on the right side and the bottom view is on the bottom side, left view will be on the left side and rearview on the rear side. So, based on the 3rd quadrant system, if we are trying to make it and using glass door kind of box method, un opening that unfolding these things, this is the way we get. And maximum dimensions supposed to be visible on the front view and remaining dimensions will be pushed on to other directions like side views, bottom views, top views and so on. So, the first preference always is the front view, then the rest of the dimensions supposed to be conveyed by the top view and the remaining views supposed to be taken care of by side views.

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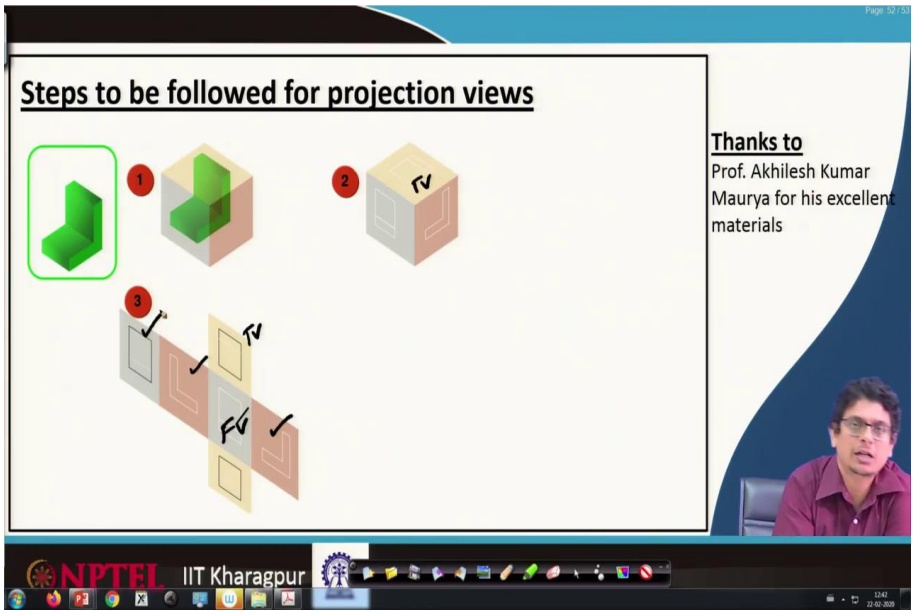

So, let us look at for an object by taking an example. This is the object, what we would like to construct the views. Let us go step by step. The first one is maybe it is easy to construct a glass door kind of thing, then if we are trying to project on to this glass doors box method, this entire thing projects onto these views.

Then, unfold this box, so the front view comes at this level; the top view comes there; the right-side view comes at this level; the left side view comes at that level and the backside view comes at this level.

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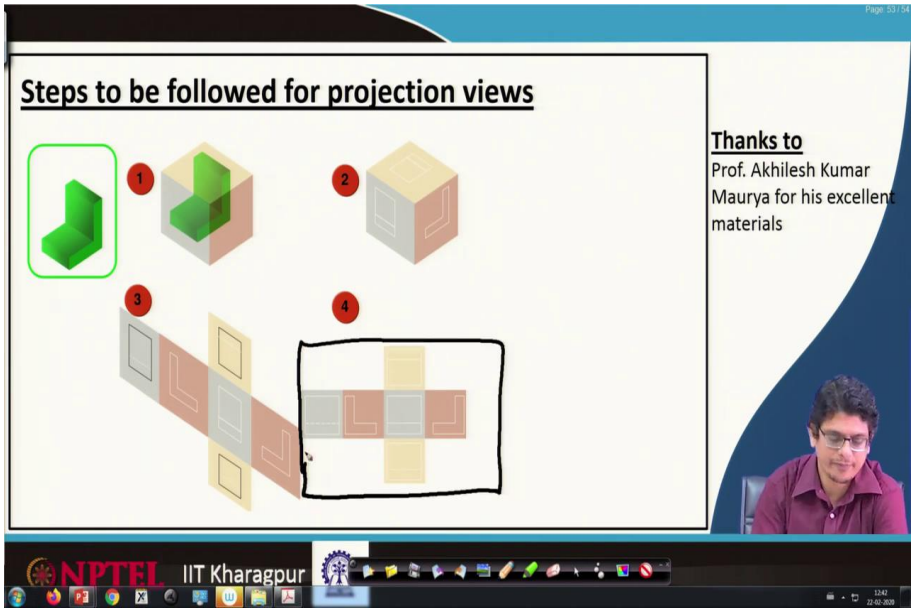

So, if we are rearranging all this thing on the drawing sheet using a glass box method, projections turn out to be in this way on the drawing sheet. In the next class, we will learn more about other projection methods.

Thank you very much.