Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
Engineering Graphics

Lecture – 04
Orthographic Projections Part1
by
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Now start these course first one is your Orthographic Projections.

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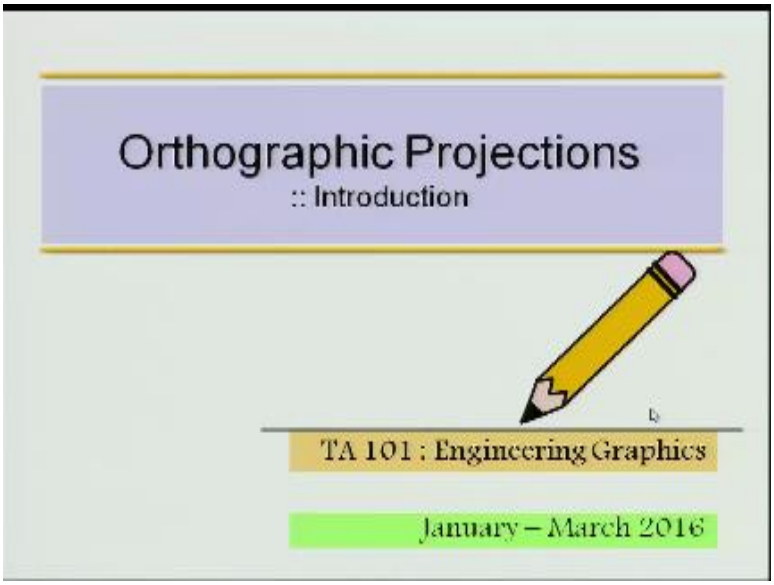

So we are finished till now course objective, what are the contents, lettering and why we need for your orthograph, why we need this graphics engineering graphics, then basic lines and curves then we are going to start first one is your Orthographic Projections

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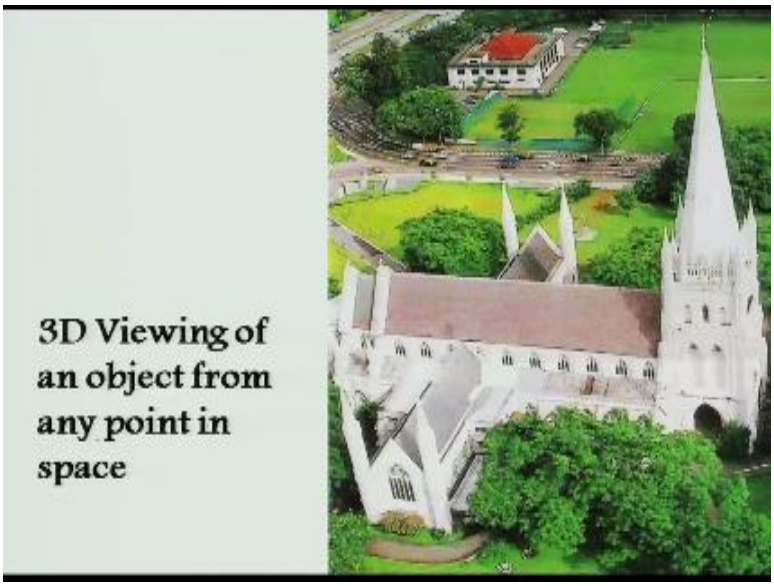

3D view look at this view, 3D viewing of an object from any point in the space, any object in the space how do you view it, you can visualize 3D view then it has to be mapped in 2D, you have to draw in 2D.

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So consider for example as I said in the beginning of the class take a glass half full water then if this is my glass with half full water how your top view looks, I am looking at the top how it looks it looks like this, then how is your front view, I am looking form the front, how is your view looks, then how is your side view looks, these are all called views or projection looking at from top, side, as well as front.

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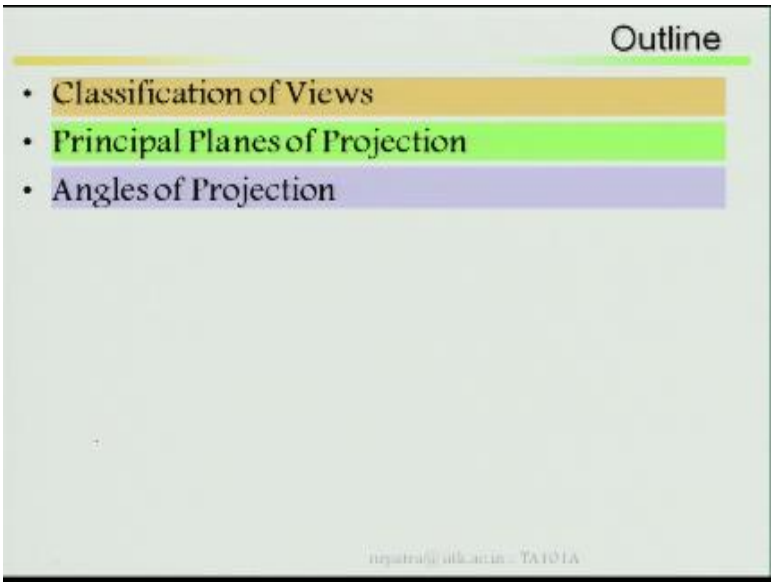

Classification of views and principal planes of projections, angle of projections, this is the outline about this chapter.

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Classification of views.

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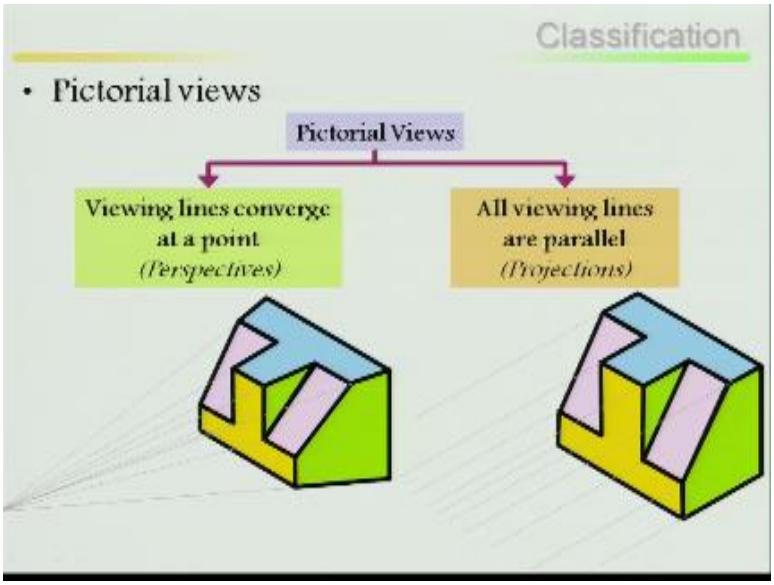

Pictorial views, pictorial views I can classify basically in 2 parts, one is viewing lines converge at a point, all viewing lines converge at a point look at this example all viewing lines are converging at one point, this is called perspectives views. Then other part is all viewing lines are parallel this is called project sense, so pictorial view has 2 that means remember one is your viewing lines converge at a point perspectives views, then viewing lines are parallel this is called project sense this called your pictorial views.

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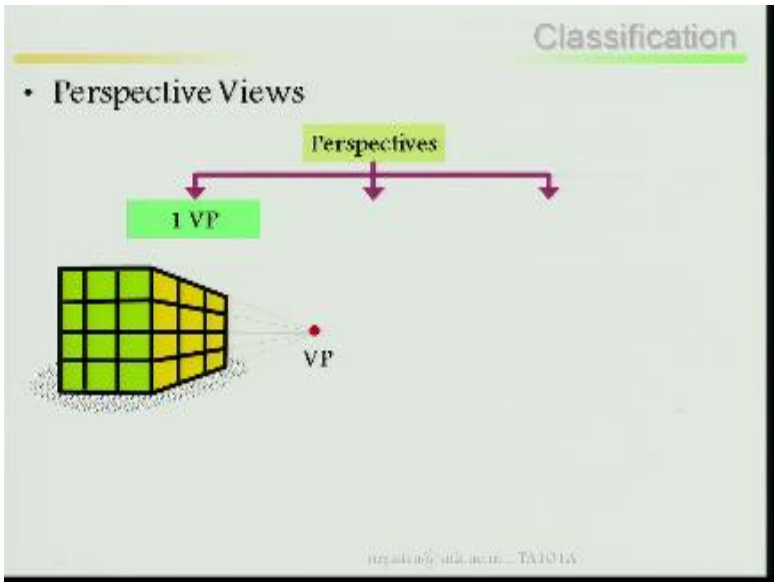

Then perspective views again classified into 3 parts, first 1 is your one vanishing point, at one point all rays are vanishing that is called one vanishing point.

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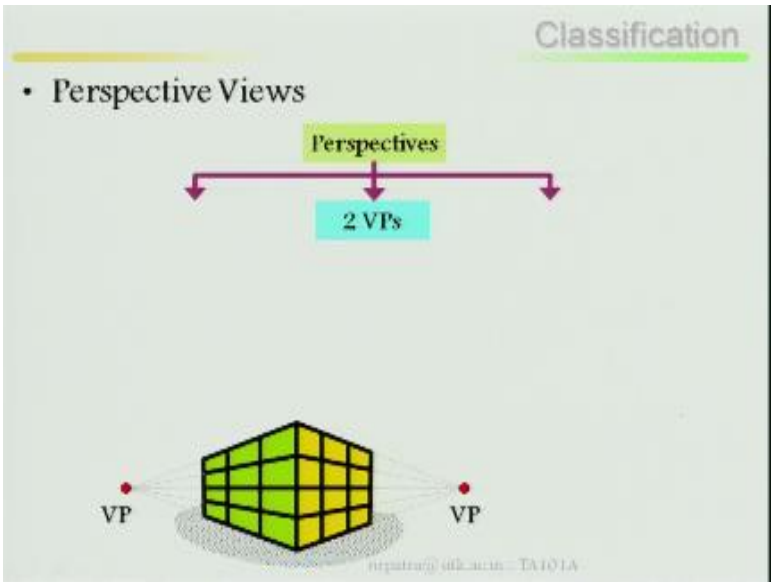

Second part is your 2 vanishing point, that means 2 parts vanishing, 2 vanishing point.

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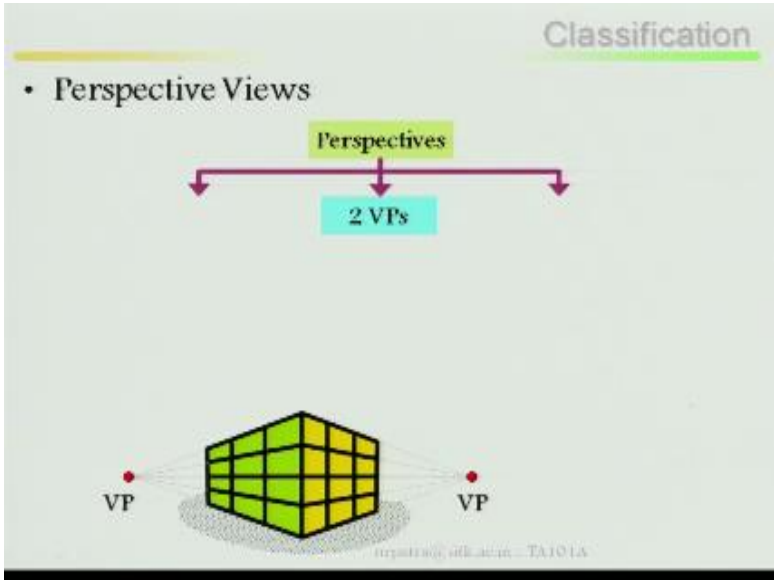

Third one is called 3 vanishing points that means in perspective views all lines are merge at one point this is called your vanishing point, that means it maybe one vanishing point, it may be 2 vanishing point, it maybe 3 vanishing point.

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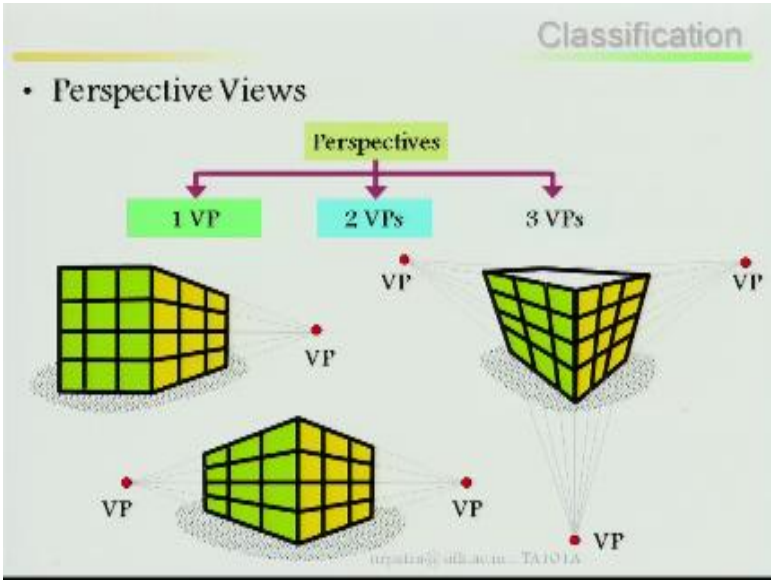

Depending upon your perspective view 1 vanishing point, 2 vanishing point, and 3 vanishing points.

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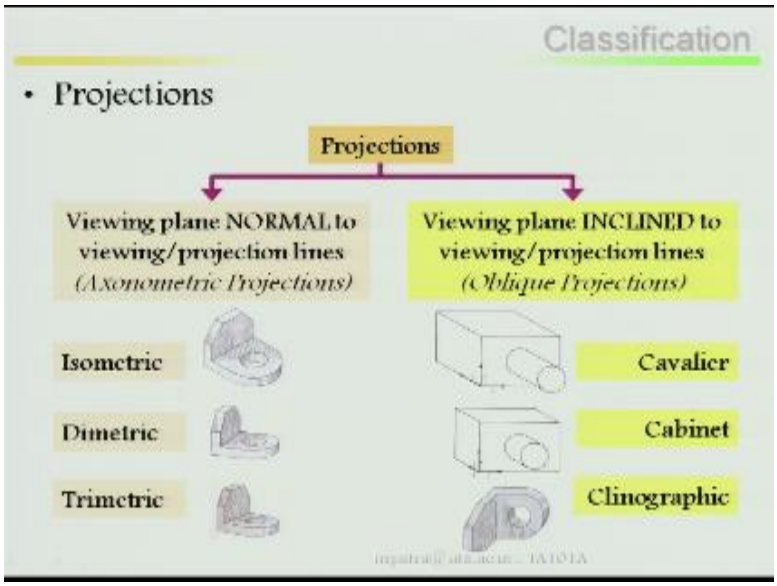

Are there, then projections. Projections again classified into 2, viewing planes normal to projection lines and viewing planes in client to projection lines. Viewing planes normal to projection lines again classified into 3, all will be discussed later on, Isometric, Dimetric, Trimetric, then viewing planes INCLINED to projection lines again classified into 3 Cavalier, Cabinet, and Clinographic.

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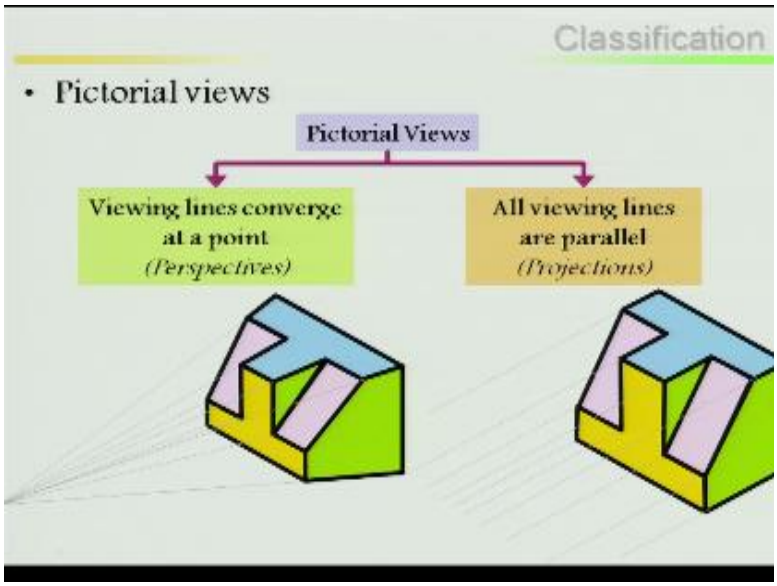

If I repeat it again pictorial view classified at 2, 1 is your viewing lines converging at a point that is called vanishing point and that point is called vanishing point, that pictorial view is called prospective views, other part is your all viewing lines are parallel that is called your projections

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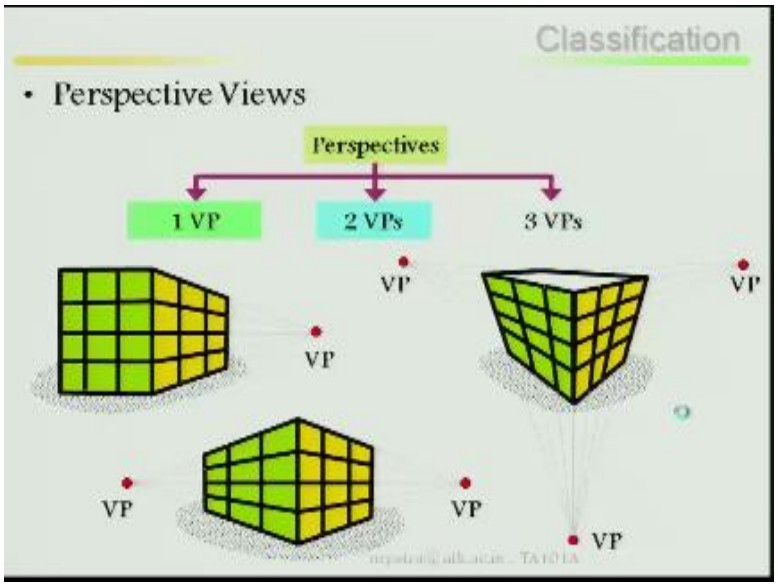

Then perspective views again classified 1 vanishing point, 2 vanishing point, and 3 vanishing points.

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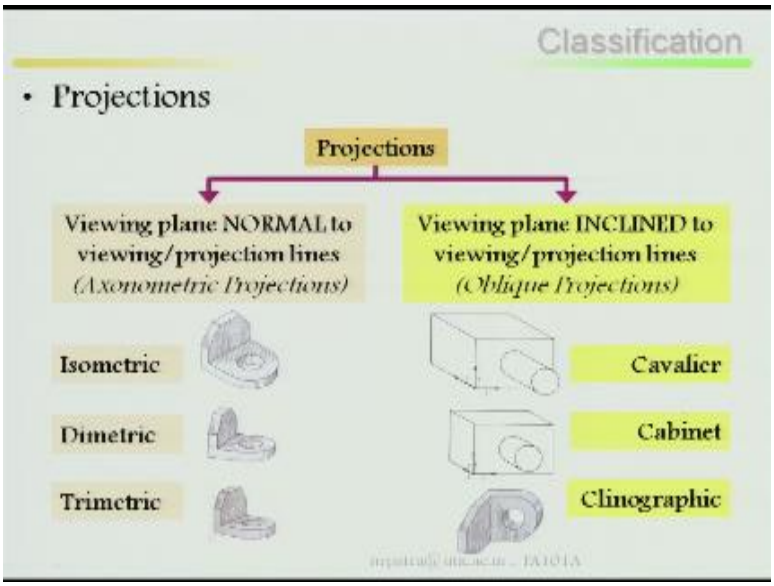

Then projections again classified, viewing plane, normal to projection lines, again this classified under these 3, one is your Isometric, second one is your Dimetric, third one is your Trimetric, then viewing plane inclined to projection lines, that is your Cavalier, Cabinet, and Clinographic, see this is all your classifications about project sense and perspective views.

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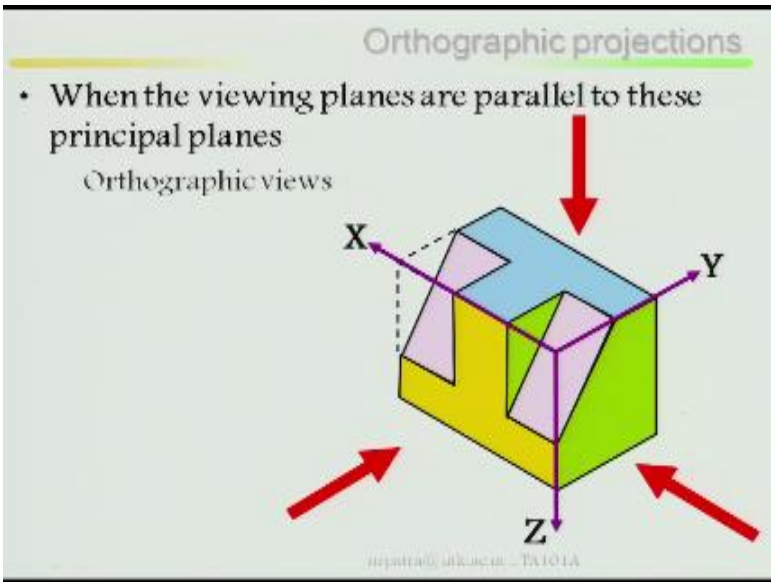

Now come to Orthographic projections, each object can be seen to have principle planes, each object can be seen to have principle planes, if I draw it X plane, and Z plane. Then looking at this views when viewing planes are parallel to these principal planes, when viewing planes are parallel to the principal planes these are called Orthographic views.

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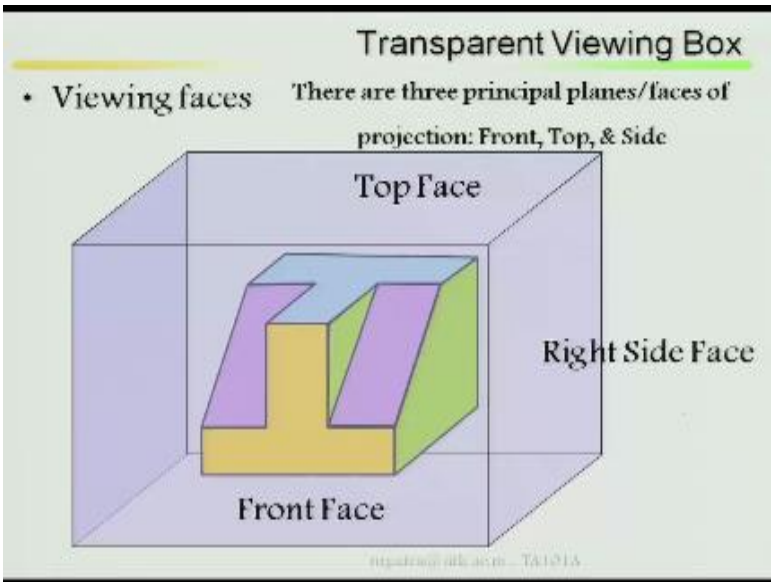

Viewing faces, now viewing faces if I take a glass box, if I take a glass box inside this glass box I put an object, then this is my object inside the glass box cube, then if I am looking this object from here from this side this I call front view, if I am looking form the top or top face this is called top view, then depending upon left and right it depends upon the how you are viewing then it is called left hand side or right hand side view. There are 3 principal planes or faces of projections, if I divided into then it will be front, top, and side. Front, top and side, this is your side.

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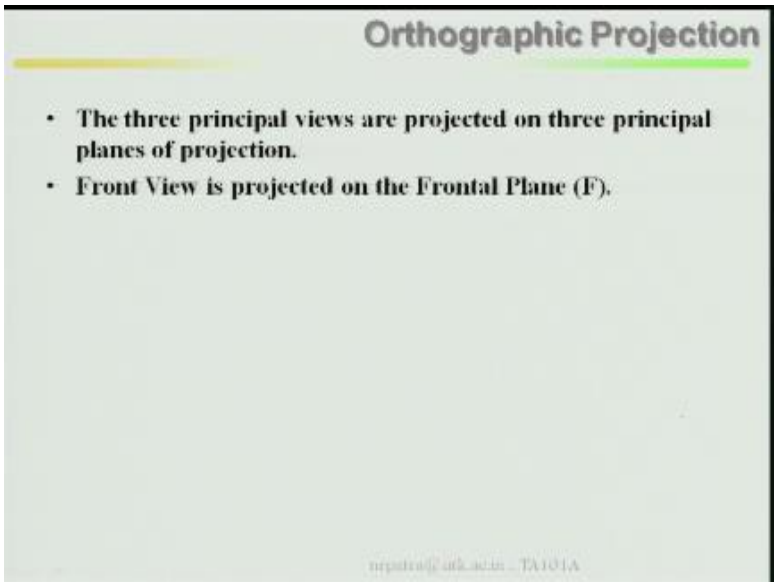

So the 3 principal views are projected on 3 principal planes of projection, front view is projected on the frontal plane, front view is projected remember on the frontal plane.

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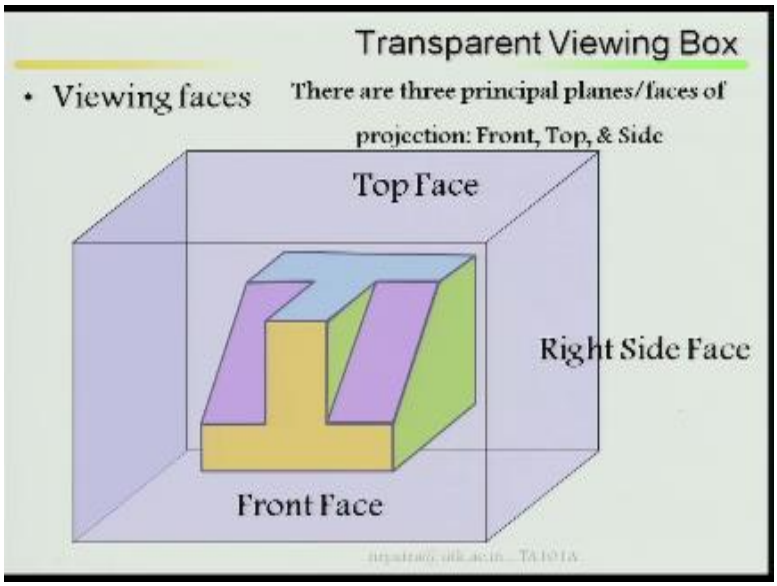

If you come here this is your frontal plane, front view will be projected in the frontal plane, similarly top view will be projected on your

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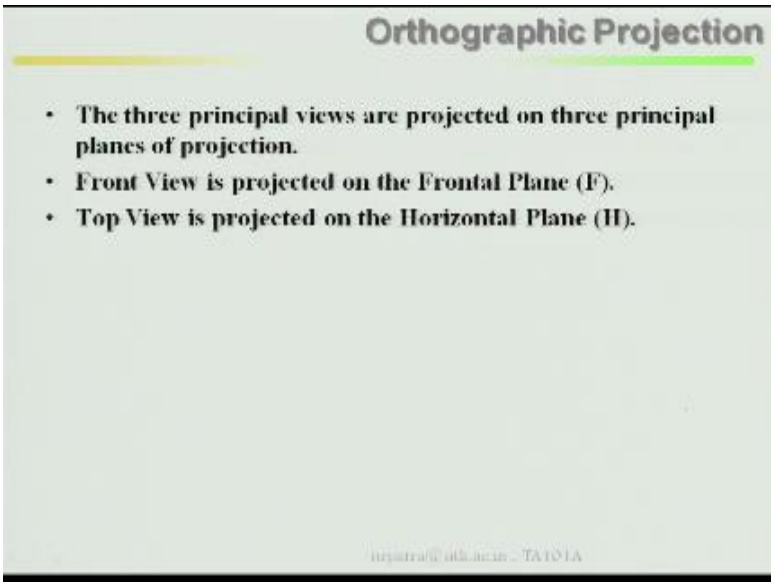

Top or horizontal plane, top view is projected on the horizontal plane.

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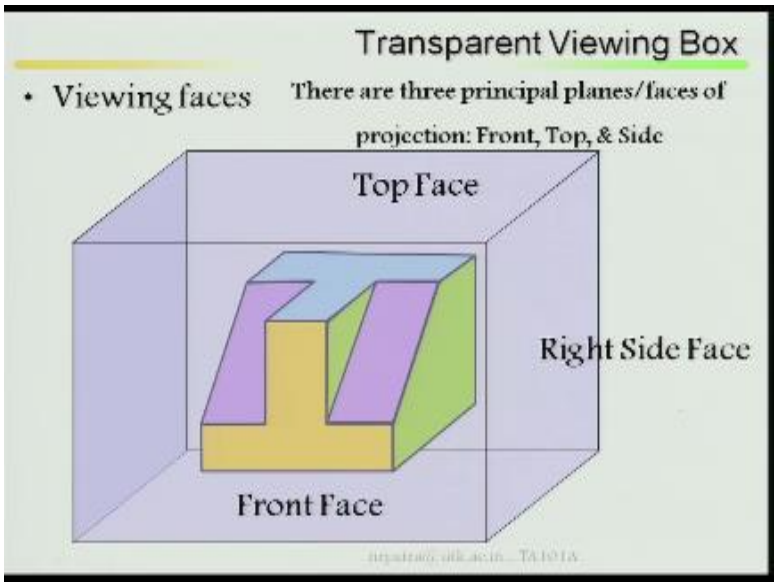

If I take it this is my frontal plane, this is your horizontal plane.

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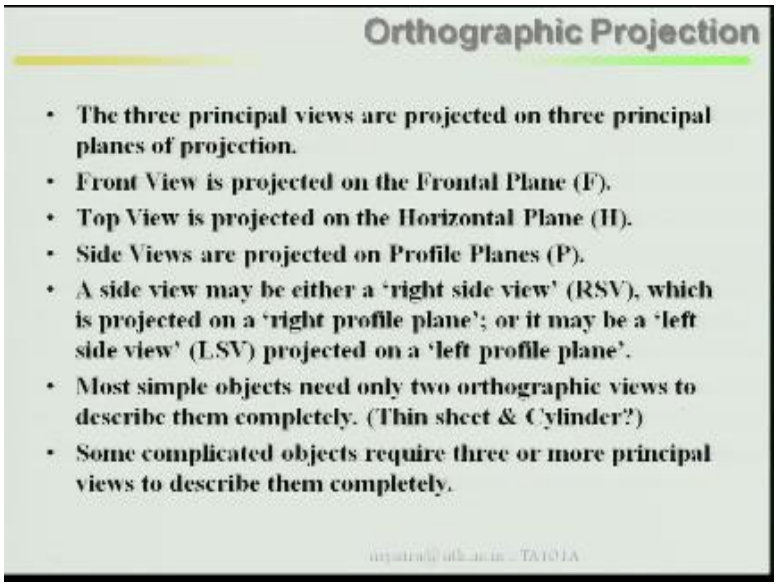

Similarly side views are projected on profile planes both the sides called profile planes, a side view maybe either a right side view it is called RSV, right side view RSV which is projected on a right profile plane or it may be left side view LSV projected on a left profile plane. Most simple objects need only 2 Orthographic views , either top front, or top side, or front side, describe them completely, some complicated objects require 3 or more principal views to describe them completely.

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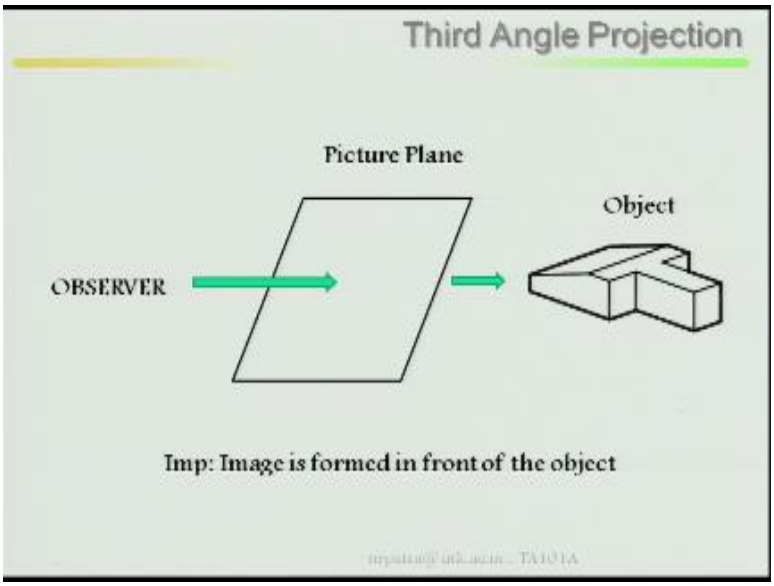

Now come to you are third angle projections, come to third angle projections, look at here, if I say this is the observer, this is the picture plane, this is object, image is formed, image is formed in front of object, if this is the object observer is fixed, image is formed in front of object.

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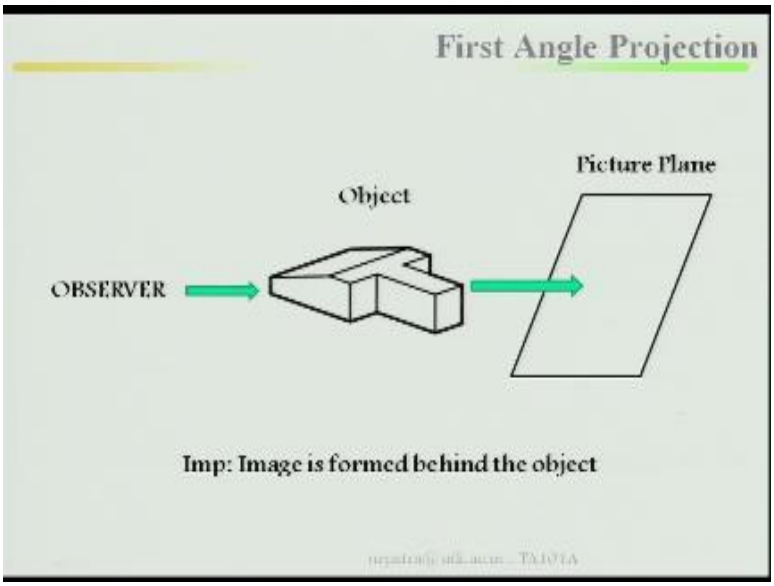

Now come to first angle projection, in first angle projection image is formed behind the object, if this is the object image is formed behind the object, look at the difference.

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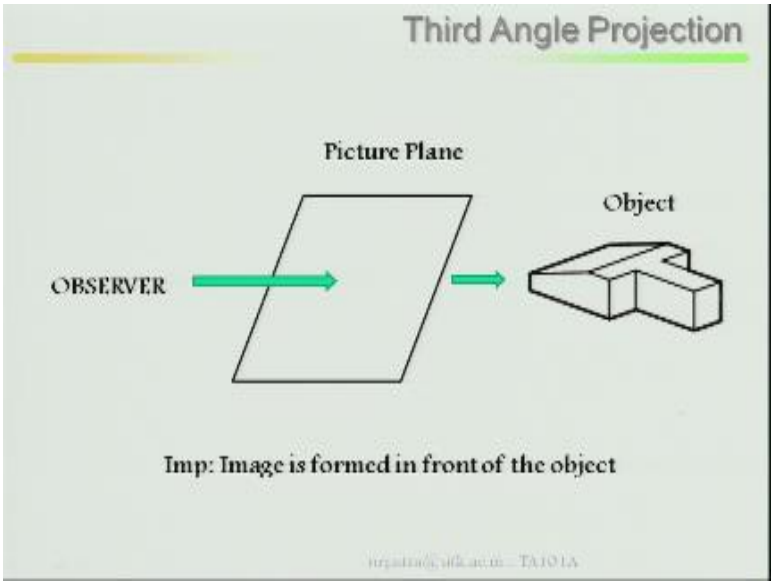

In third angle projection image is formed in front of the object.

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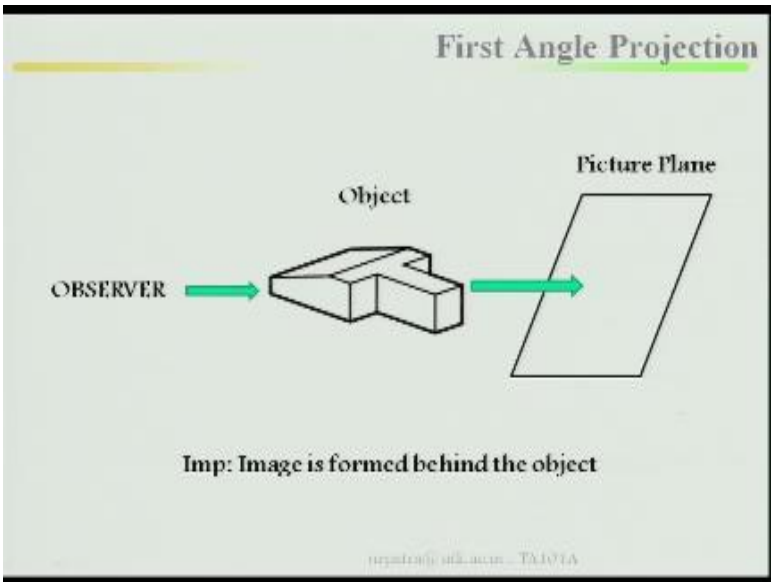

In first angle projection image is formed behind the object.

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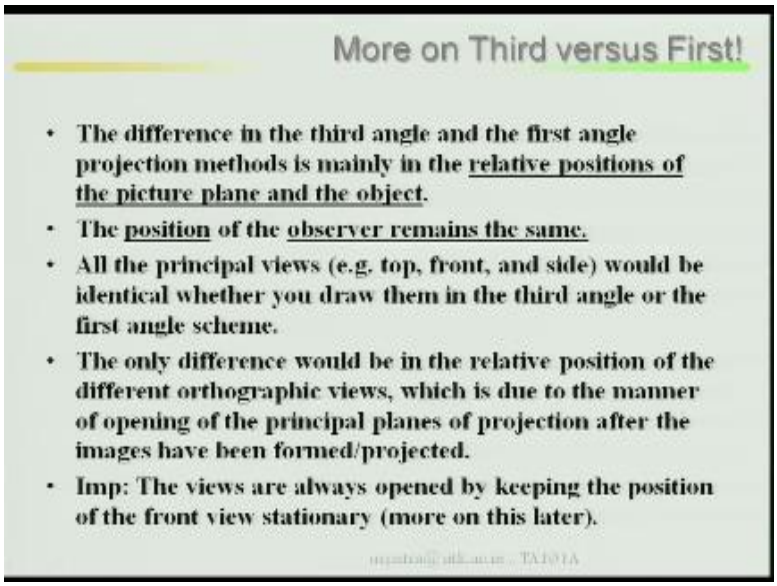

The difference in the third angle and first angle projection methods is mainly in the relative position of the picture plane and the object. The position of object however remains the same, the position of the observer if I am observing it remains same. All the principal views that means top, front, and side would be identical, whether you draw them in third angle or first angle scheme, the only difference would be in the relative position of the different orthographic views which is due to the manner of opening of the principal planes of projection after the image have been formed or projected.

The views are always open by keeping the position of the front view stationary remember, we will discuss it, the views are with respect to you, your front views, front view is your stationary, how you are opening the glass box as I said earlier.

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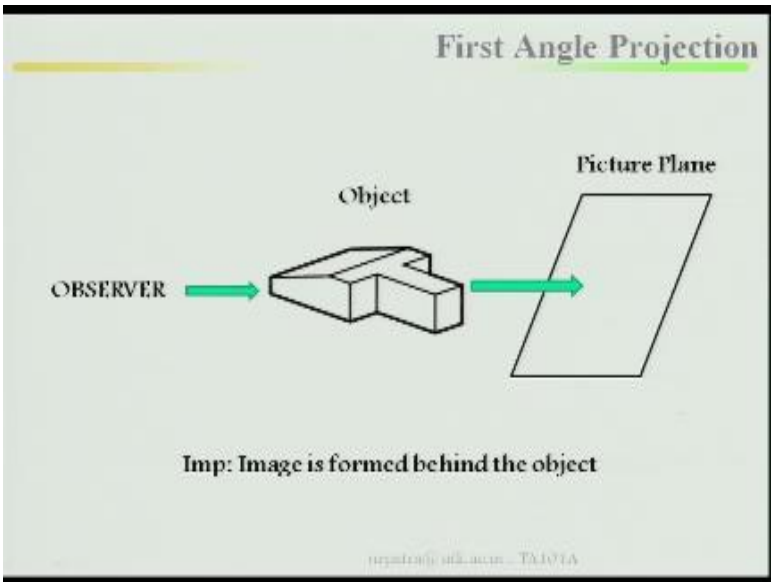

A object.

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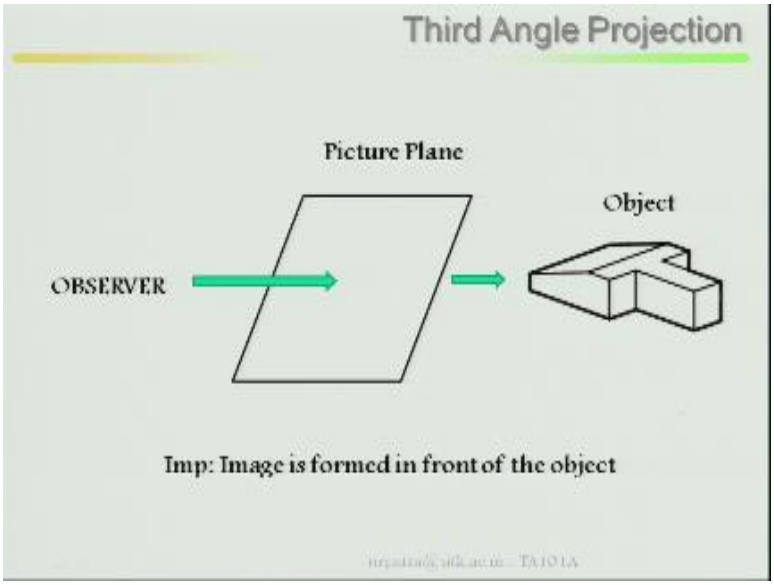

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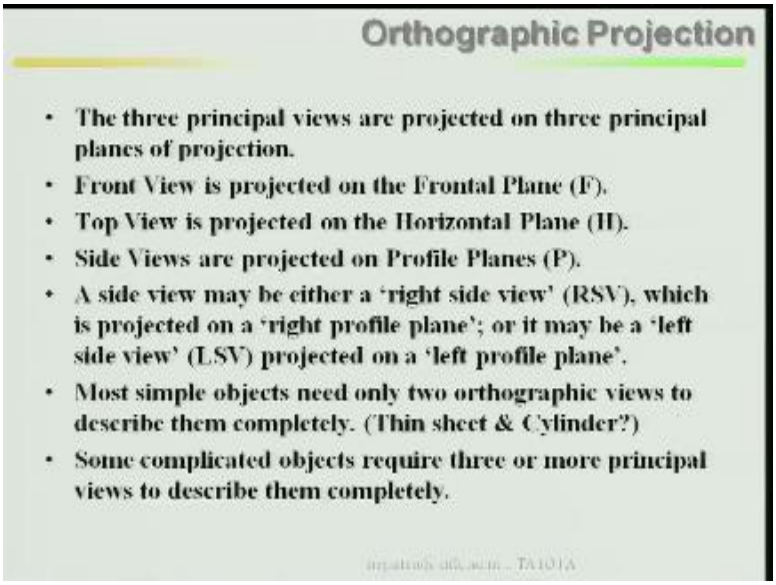

One object is inside a glass box

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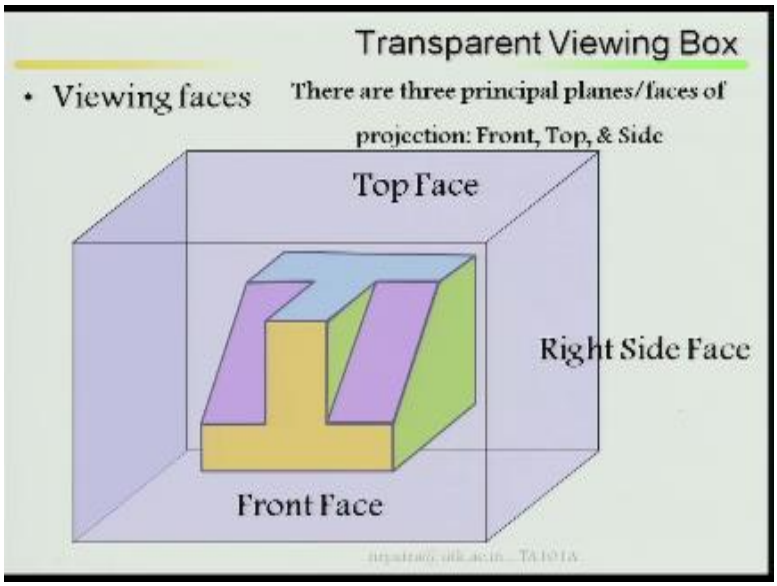

With respect to your front how you are opening that depends upon your first angle and third angle.

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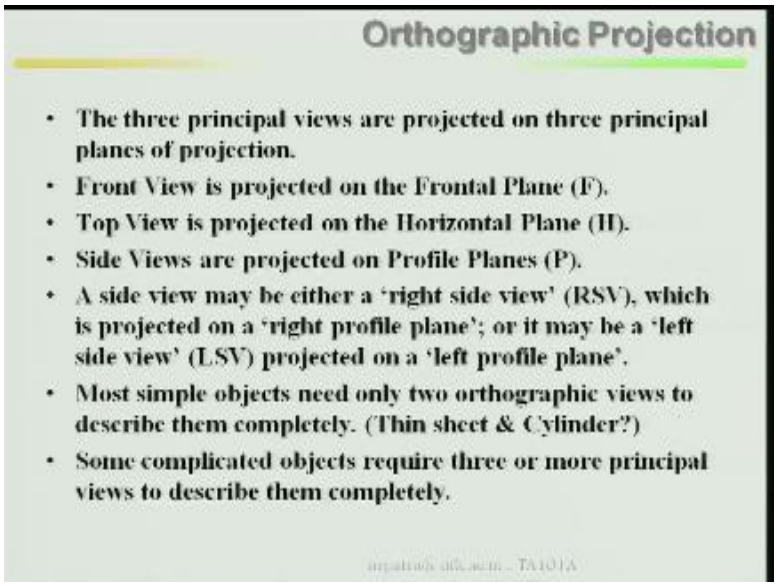

And it is only relative movement, but here.

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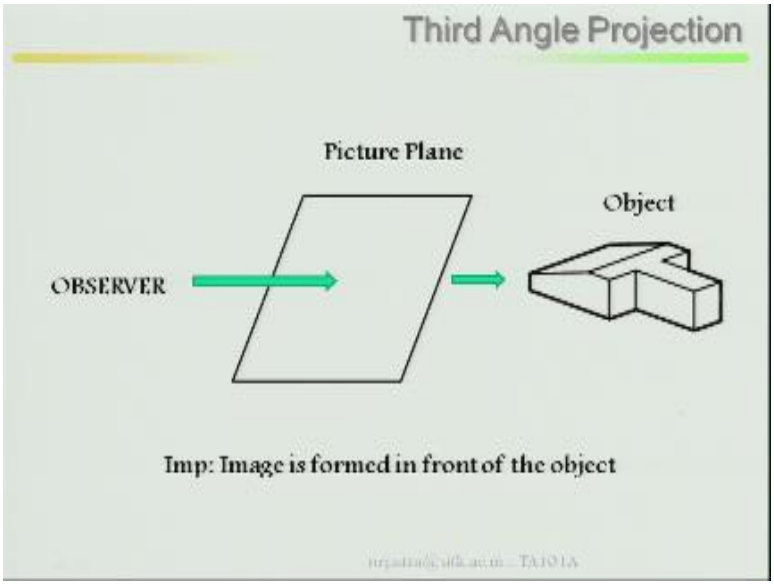

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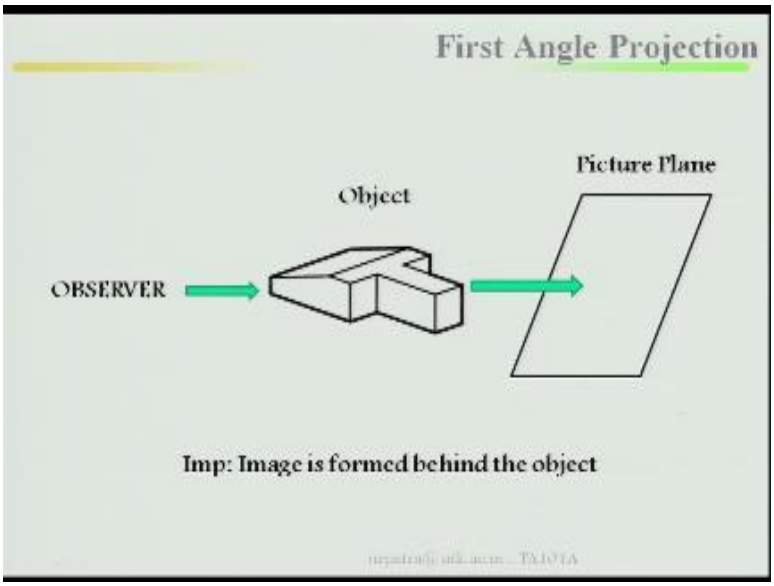

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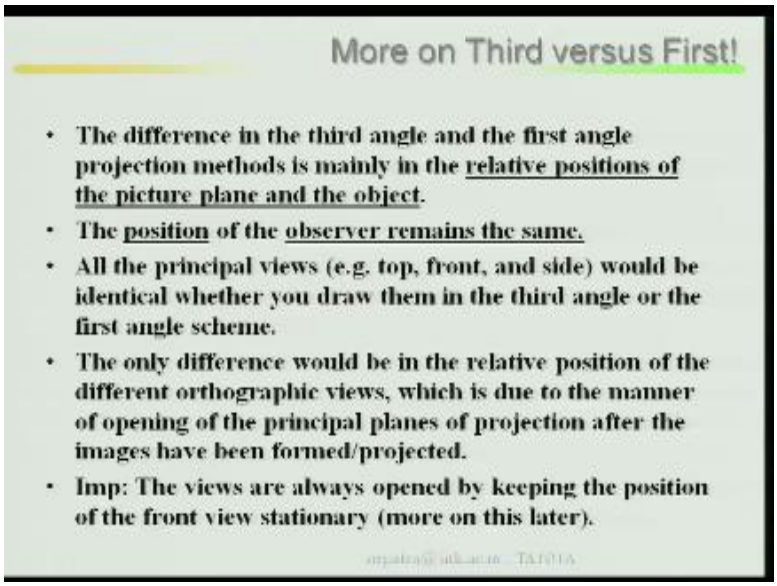

Front view is always stationary.

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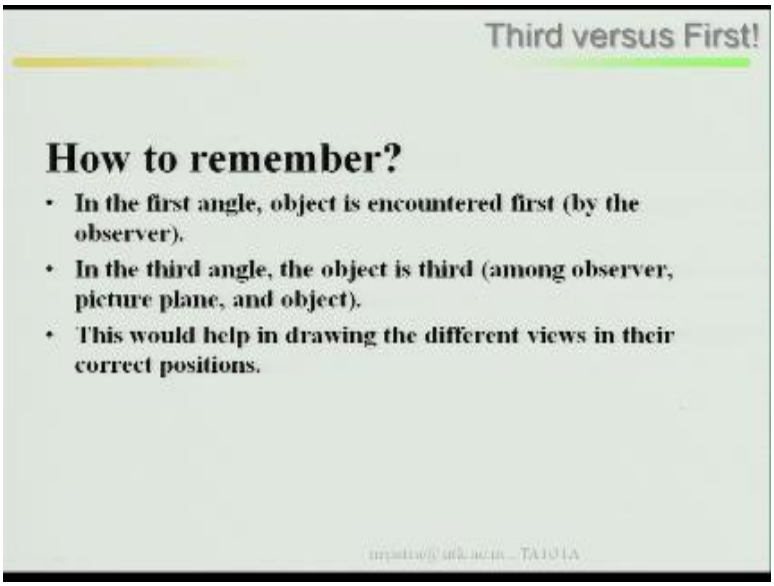

How to remember difference between third angle projection and first angle projections. In first angle object is encountered first, if observer in stationary that means object is encountered first, that means in the observer in front of this observer there is object in first angle, in third angle the object is third that means picture plane will come into picture, behind your picture plane your object will come into picture, this would help in drawing the different views in their correct positions.

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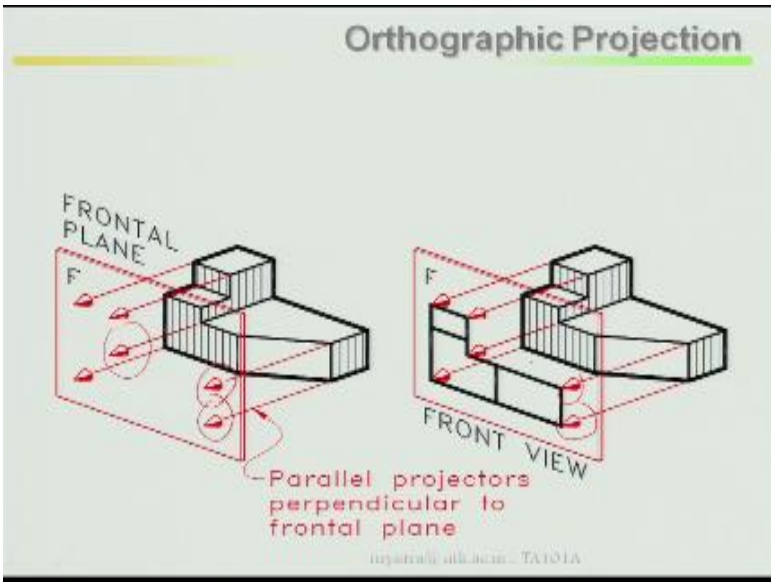

Look at here frontal plane, if I draw a frontal plane like this parallel projector perpendicular to the frontal planes, the projectors are parallel and it is perpendicular to frontal plane, here it is also perpendicular to your frontal plane.

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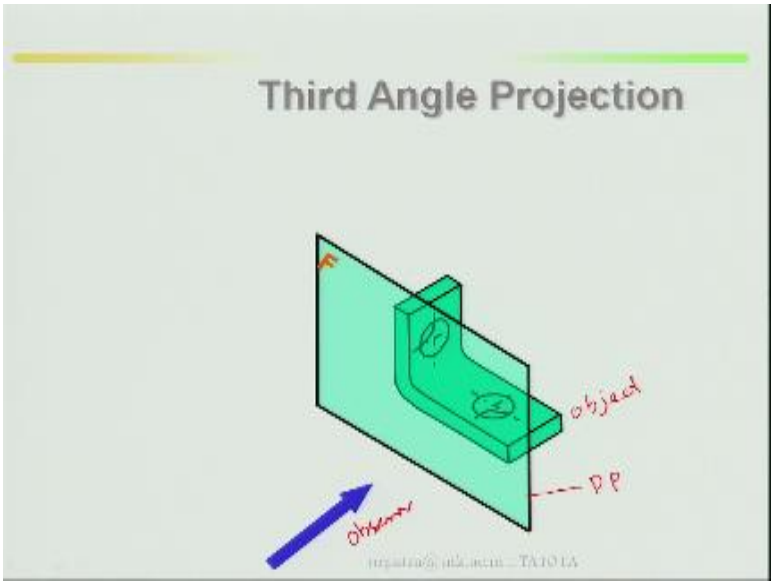

Third angle projections example this is your object, I am looking from this side, once you are looking from this side what is the basic example of your third angle projections, how do you distinguish? Observer is here then object is your third, observer, picture plane, this is your observer, picture plane PP, picture plane, then this is your object as I said.

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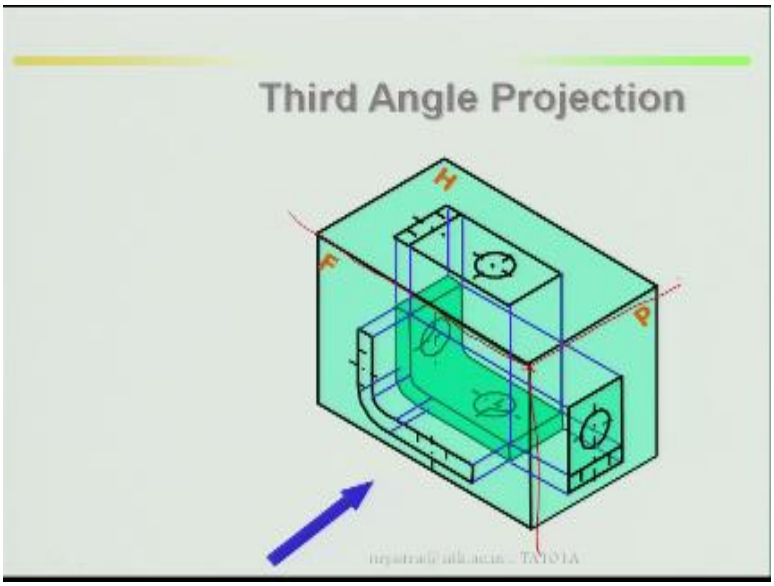

Then this will be a frontal plane, then respect to your frontal plane this is your horizontal plane, then side view as I said this you can say this is your profile plane this side and other side, then look at how in the frontal plane object has been projected from here, here to here it has been projected so this is your perpendicular to your frontal plane, here it has been projected, then here it has been projected how it looks in frontal plane.

Similarly in horizontal plane in profile plane draw it projected back, similarly in horizontal plane draw it, these are called hinge lines this, and this, and this. As I said earlier frontal plane or front view is stationary that means with respect to front view you have to rotate, that means this part is your stationary.

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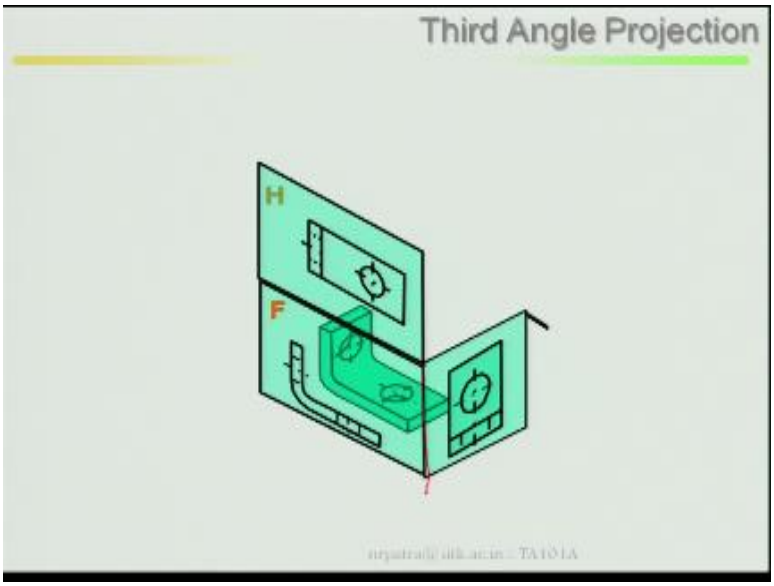

Then next part I rotate it with respect to frontal with respect to this hinge line, this has been rotated, it has been rotated, so now front view and is your horizontal plane here rotated, this is your top view, then again each respect to frontal plane or front view again with respect to this hinge line it has been rotated, you see it has been rotated.

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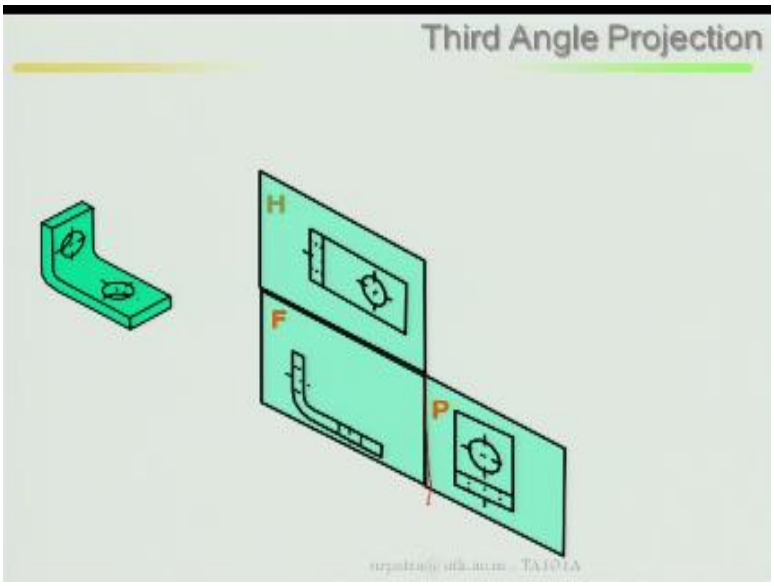

Now this is your profile plane.

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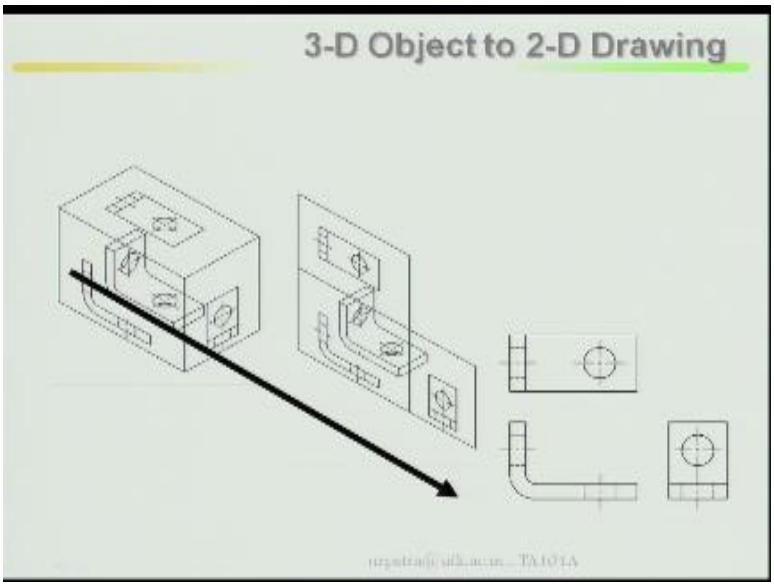

Look at here, object is here, frontal plane, horizontal plane, profile plane, then if it is a frontal plane then this is your front view and if it is your horizontal plane this is your top view, if this is your profile plane this is your side view depending upon right side view, all left side view, in this in case of third angle projections because it is the right side it has been rotated right side so it will be right side view RSV.

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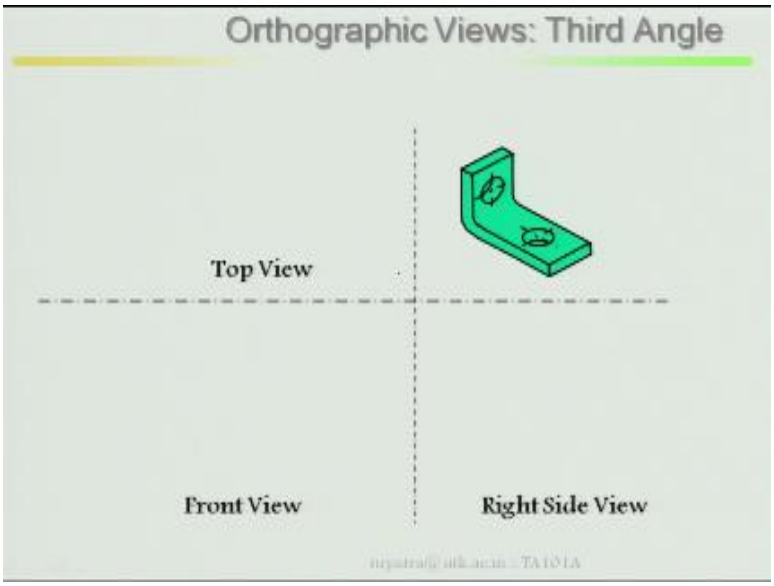

Third angle projection, here is your object so as I said here.

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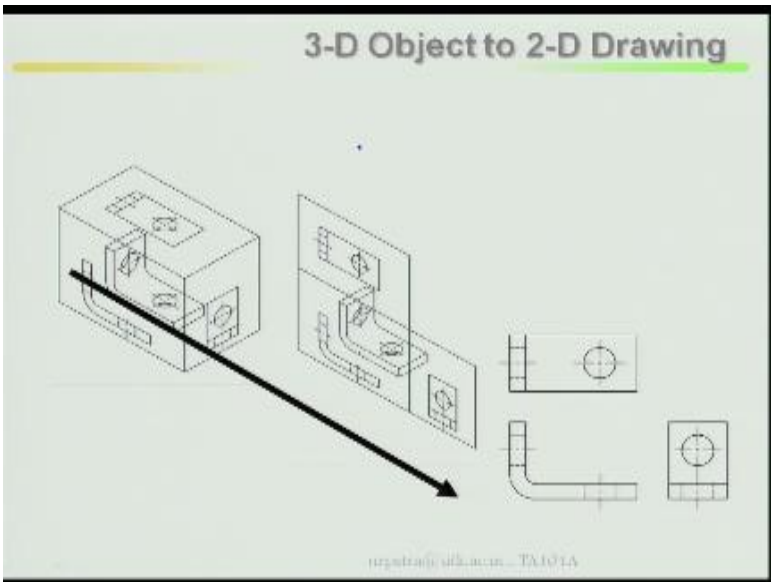

If you look at here, front, top, right side view

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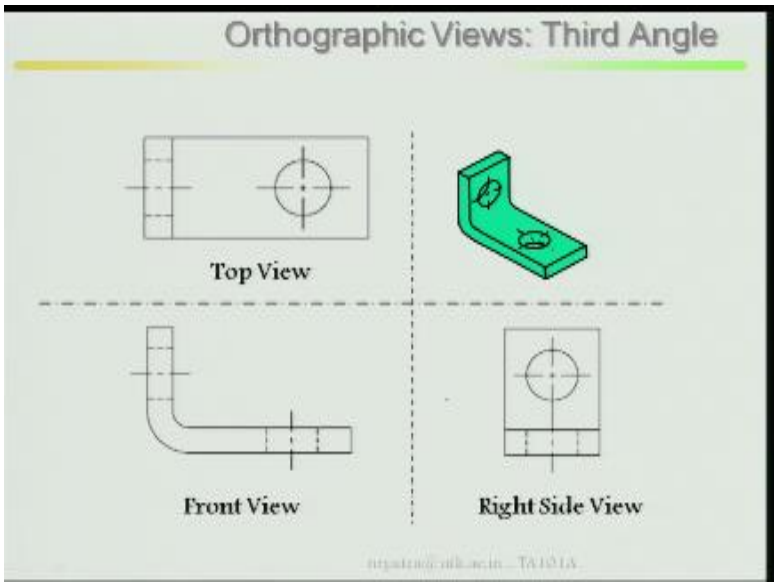

Top, front, right side view, front, top, right side view.

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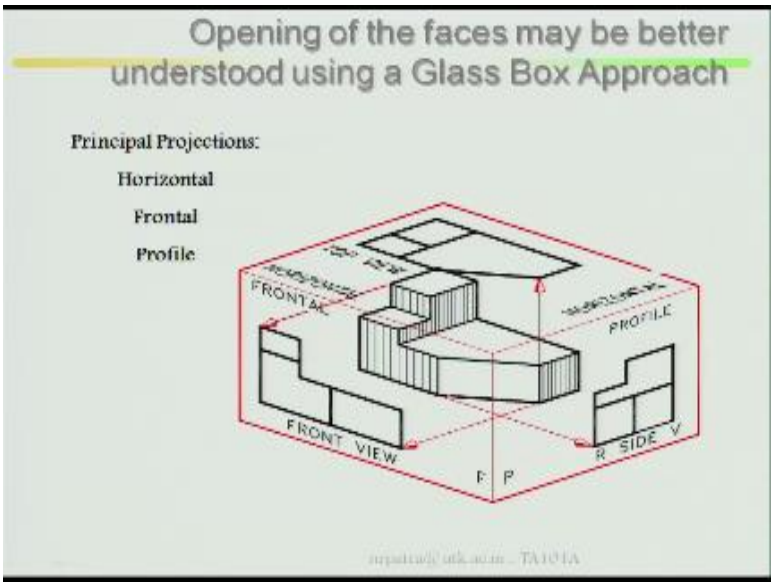

So principal projections, horizontal, frontal, and profile

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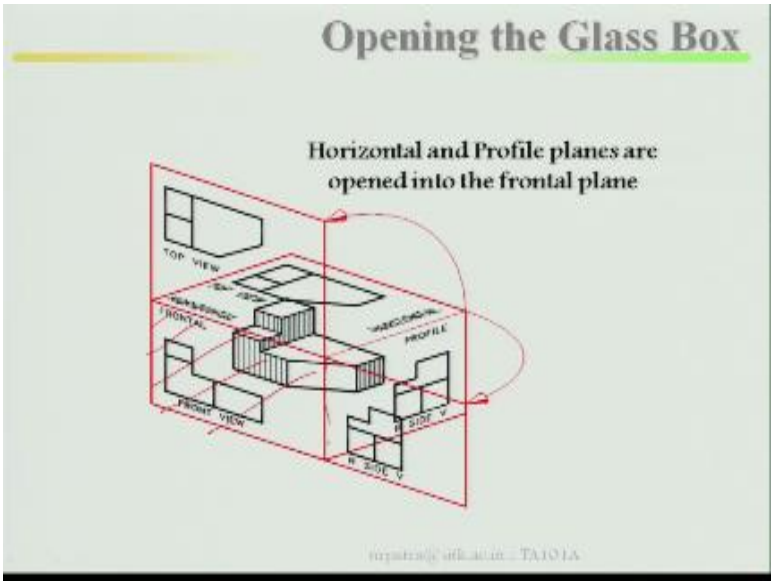

Opening a glass box, as I said opening a glass box with respect to your frontal plane, here if it is in case of third angle if you look at here this is your frontal plane, with respect to frontal plane this horizontal plane has been rotated so it is coming back here, similarly profile it has been rotated with respect to this it is coming back here. I have finished up to third angle projections, let me stop here, next class I will start with this first angle projections, then followed by few examples how you have to draw in third angle as well as in first angle projections, thank you.

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