Engineering Drawing and Computer Graphics
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Module – 04
Lecture – 35
Orthographic Projections II (Part – 5)

Hello all, welcome to our NPTEL Online Certifications Courses on Engineering Drawing and Computer Graphics. We are in module number 4 lecture number 35 on Orthographic Projections. Especially, we are covering line projections when it is inclined to both horizontal plane and vertical plane.

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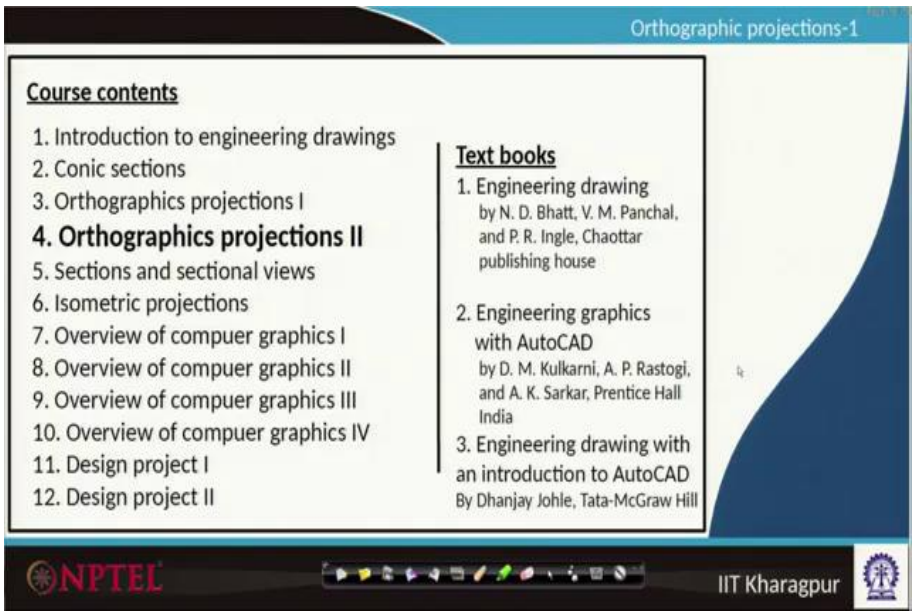

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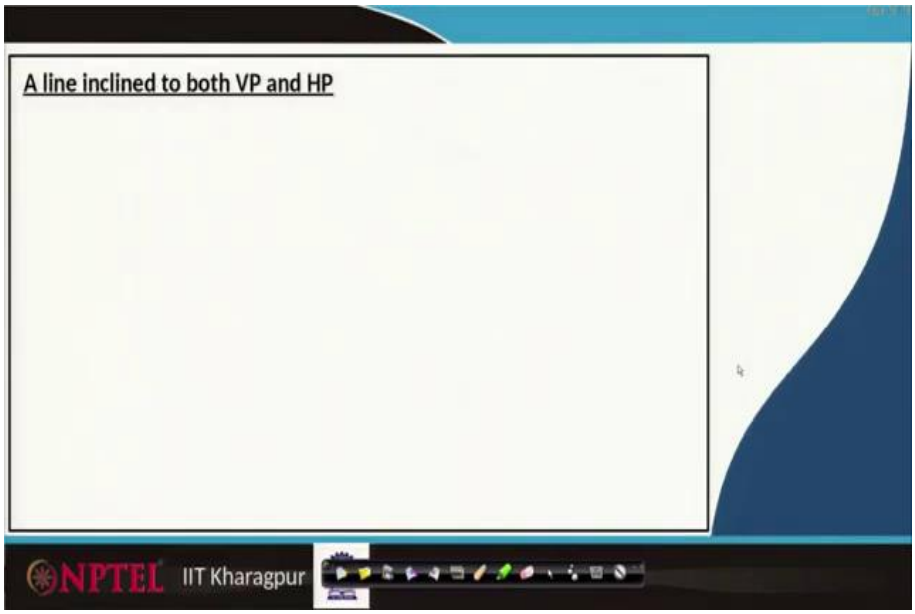

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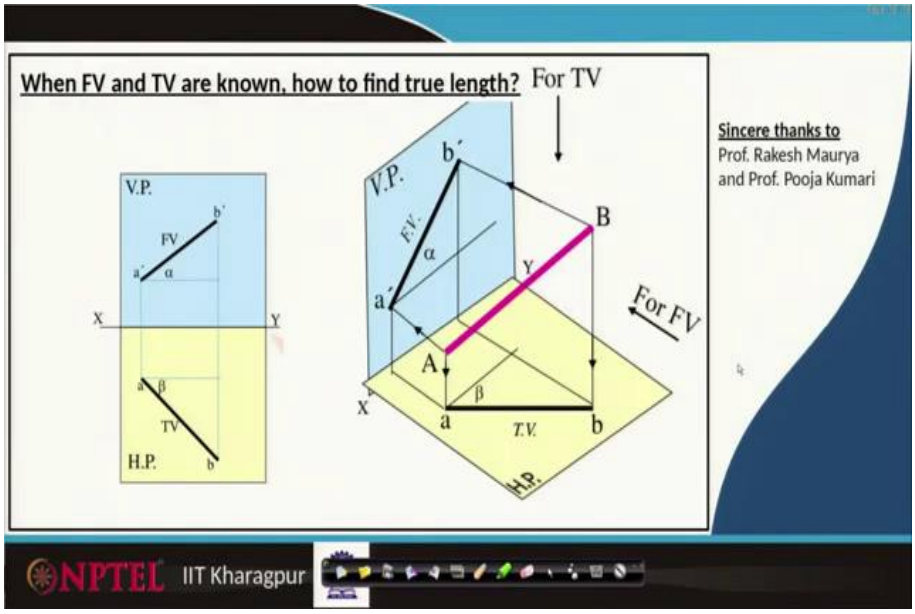

In the last classes we have learnt, if a line is inclined to both vertical plane, horizontal plane, the true length is neither available on the vertical plane nor on a front view or the top views. And, the angles are also apparent angles we will have it as projections.

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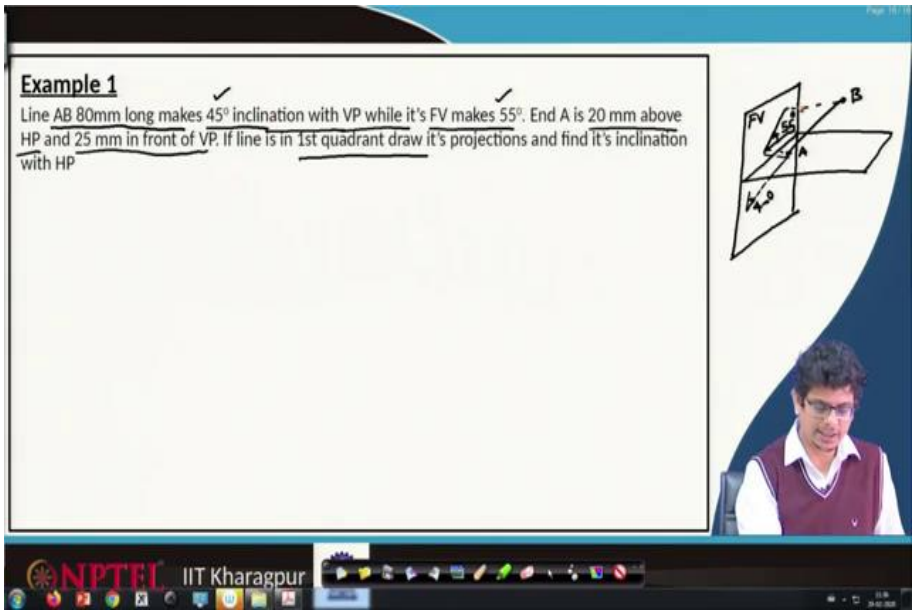

And, let us learn that through an example. Here, there is a line AB, which is 80 mm long and makes 45 degrees inclination with a vertical plane. So, the true length is 80 mm and it makes 45 degrees inclination with the vertical plane.

It is a projection on the front view makes 55 degrees. So, this is the apparent angle. And, this 45 degrees we will be going to see it for this complete projection thing on the top view. Now, end a is 20 mm above the horizontal plane and 25 mm in front of the vertical plane.

So, point A begins 20 mm above the horizontal plane and 25 mm in front of the vertical plane. And, this entire line is in the 1st quadrant. If, that is the case can we draw it is projections and it is inclination angle with the horizontal plane?

So, if we are pictorially showing that this is the vertical plane, this is the horizontal plane, perhaps our AB point inclined in such a way that, this is A, that is B. When we are having projections, this projection we can see 45 degrees inclination with the vertical plane.

So, 45 degrees inclination means, if we are going to extend that this angle is 45 degrees. And, this front view makes 55 degrees. So, when we have this projection, the front view is here. And, this one is 55 degrees. So, let us draw that step by step.

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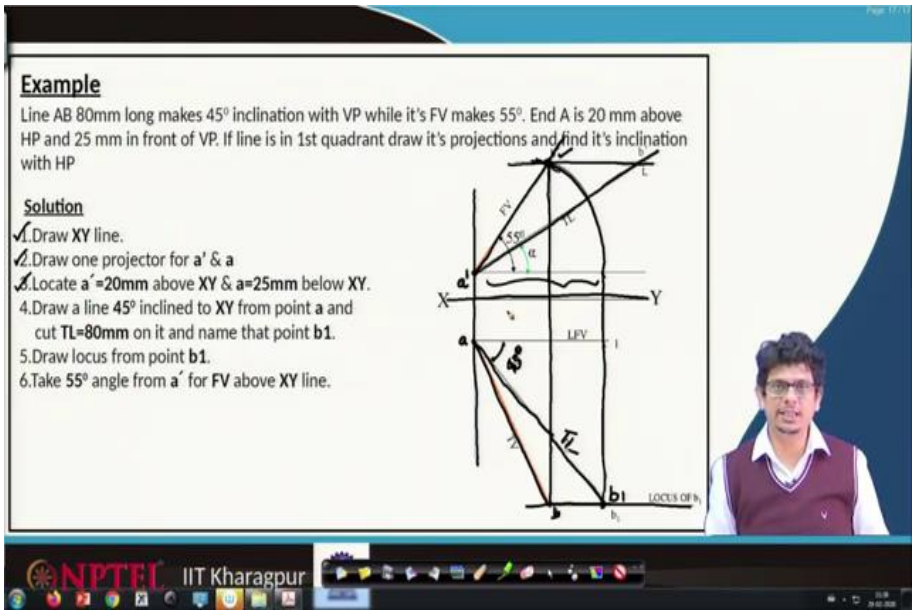

The first step what we have to follow is drawn an XY line. First, we have to draw this XY line after that we draw a projector. Then, we will locate a point a ' 25 20 mm above XY and a 25 mm below XY line. Once these three steps are done, we will draw a line 45 degrees incline to XY from a point a.

So, from point a draw a line of 45 degrees and let us call this line as the true line. And, we will be in a position to locate point b 1. Then take 55 degrees from a 1 a dash in the front view above XY line like, that we have to draw. After, that we draw locus for b 1, from b 1 project it all the way up, whatever this length we have it from there make an angle so that we will be in a position to locate this point.

Once, we have that point, we have that curve again we locate a true length on that axis, which makes a horizontal line. Once, we have that horizontal line the intersection point we project it to locate this b point. And, we join these top views, this is the way we construct it.

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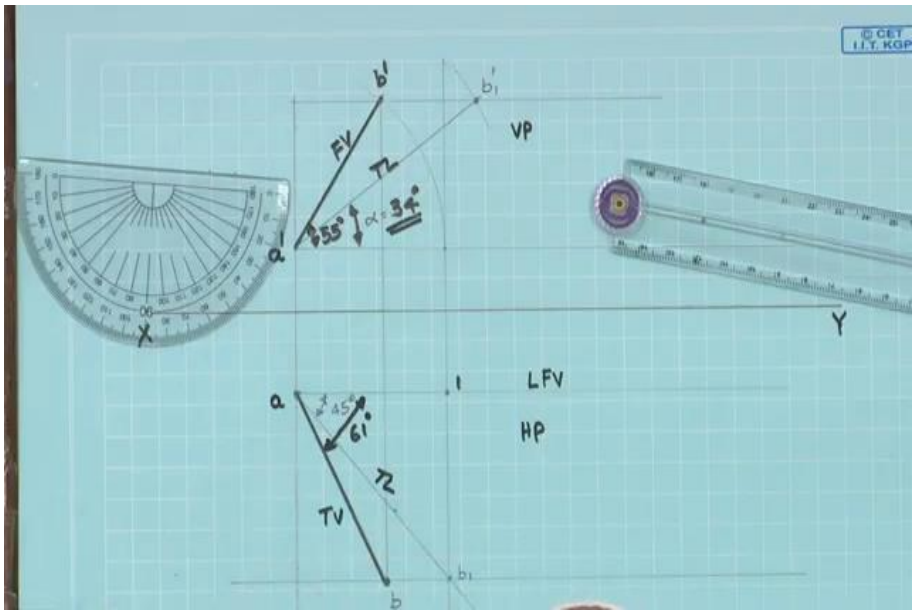

Let us see that step by step. The first three-step, four steps are on the drawing sheet; first, draw an XY line. X-axis and Y-axis, draw a projector for a and a ' that is a vertical line, on which we can locate a ' and a. Use your scale a ' is 20 mm above XY here. And, in below XY line, it is 25 mm here. Name them as a ' and a.

Once done draw locus for these points, which will be useful at a later stage using roller scale draw this. Now, 45 degrees inclination we have to find it on XY from point a. So, use your protractor 45 degrees line join this. Now, locate 80 mm true length, 80 mm true length on that picture.

Once, we have that call that point as b 1, draw a locus line, passing through b 1. Now, 55 degrees angle in the front view we would like to have, that is from point a ' 55 here, connect these points 55 degrees thing from a. Once it is drawn draw a vertical line from b 1. So, we have to pick from b 1 here up to locus of a.

So, this is the point and let us name this one as 1. Now, this is a horizontal component of true length. So, this is the true line, if we have rotated that whatever a to 1 that, we will call this one as the horizontal component of true line and usually we represent like locus of that front view. Now, we have to continue it to the locus of a ' up to all the way there and rotate that upward up to the front view and name it b '.

So, what we have to do is? Now transfer this entire length. So, let us transfer that all the way to this 55-degrees line. This is already we know 55 degrees and this one already we know 45 degrees. So,

let us call this projected 1 b '. Once, that is done from b ' draw again a locus. So, we know a ' b ' is the front view projection.

So, draw a locus which passes through b1 and we have to locate true length, which is a given one 80 mm, this length we have to locate it all the way on that locus so this one. Now, join these two lines a' and let us call this one b1'. So, this is the true length and this is the front view, true line and this angle is 55 and what we have to find is the angle true line making in that horizontal thing. So, it is 10, 20, 30 around 35, 34 degrees.

So, this angle alpha is 34 degrees. Now, we did not draw the top view. So, what we have to do is project this one-point b ' make a projection call this point b, join a and b. If we do that we will have this top view line, this is the front view line, this angle is 34, and this one the apparent angle is around 61 degrees. This is the way we draw projections in the front view and also in the top view, this is the vertical plane, this is the horizontal plane.

The top view front view we will be new portion to draw and it is inclination angle with hp also we will be in your position to find it. So, any inclination angle with hp we will be seeing that by projecting onto that vertical plane. So, this is the angle which is making with that horizontal plane. So, let us move on to our next problem.

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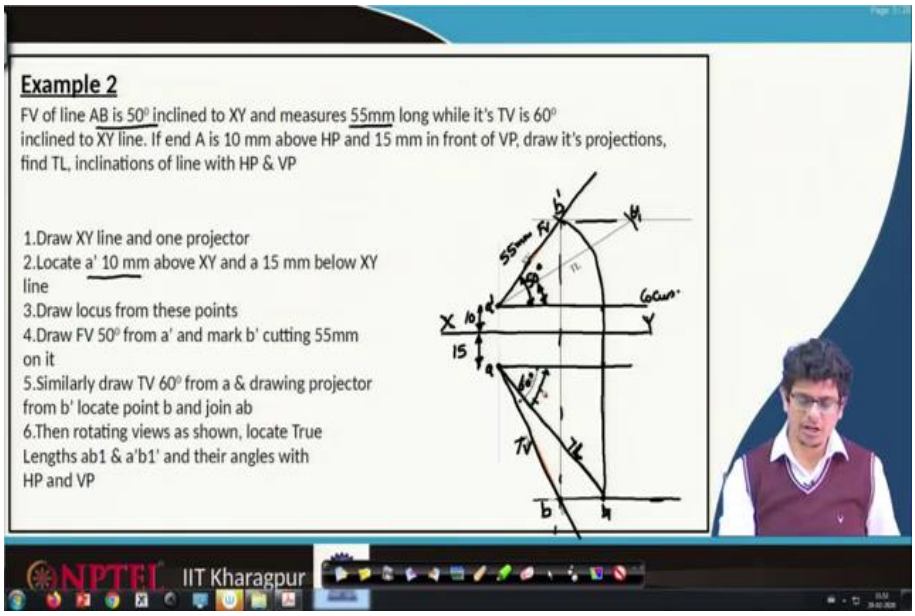

So, example 2, where front view so, on the slide, there is a front view of a line AB is 50 degrees inclined to XY. And, measures 55 mm long while it is top view is 60 degrees and it is inclined to XY line. If, end A is 10 mm above hp and 15 mm in front of VP, draw it is projections unknown is the

true length. And, it is an inclination with the horizontal plane and vertical plane; these are the unknowns in the problem.

So, what we know is a front view of a line is given? So, this is the apparent length. And, that is 55 degrees with a length of 55 mm. It is top view is again apparent angle 60 degrees inclined to XY line. So, let us begin that with the following steps. So, let us first look at the steps. After drawing this XY line locate a ' is equal to 10 mm this point this will be 10 mm and a 15 mm.

So, a is also located a and a ', draw locus lines from a and a '. After, that with 50 degrees in the front view that is also from a ' draw a line. And, it has to mark at 55 mm to get this b ', because this makes 50 degrees. So, this is 50 degrees line and it measures 55 mm long. So, b ' is known.

Similarly, let us draw in the top view 60 degrees line. This is the front view line and this is the top view line, we have drawn that from a then drawing draw a projector from b '.

So, already we know p' project that all the way down may which cuts this 60-degrees line at this point. Locate this point b and a to b join it. After, that draws a locus from this point. So, what we know is this top view we know front view we know. Then, what we can do is from this a ' to b ' make an arc which cuts this locus line and project that line all the way down to this locus line. Where it is going to intersect let us call b1.

And, join a to b to get the true length. Once, we know that true length measure it from a' make an arc to cut this locus. So, that b1' also we will be in a portion to locate it. Once the line is known we can measure what is this angle? Similarly, true length what is the angle it is making on this top view also? So, let us begin that on our drawing sheet.

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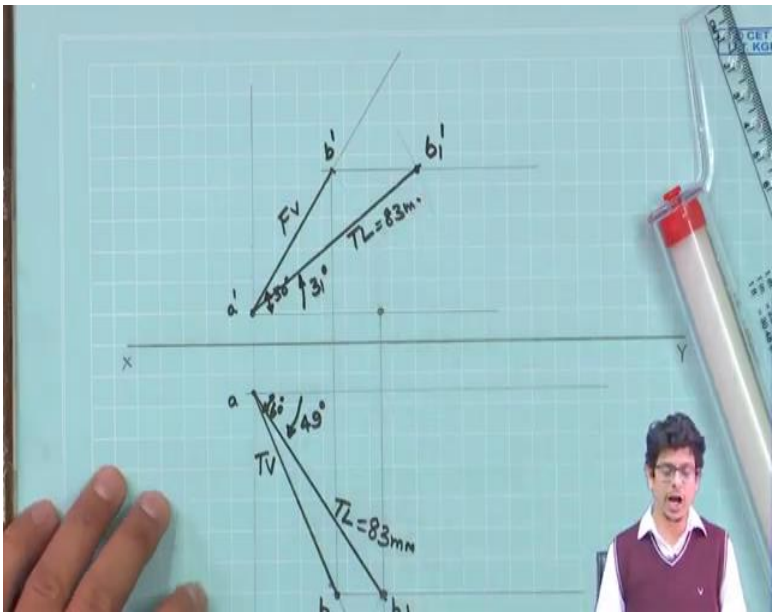

First thing, we have to draw an XY line, X line, Y line. Once done locate this projector lines. On this, we have to locate 10 mm above XY for a ' and 15 mm below XY line. This is a', this is a.

Now, draw a 50 degrees front view line from the horizontal plane, from here. Join these lines from a' all the way there. And, there make 55 mm length to mark our b'. So, 55 mm we have to locate 55 mm here.

So, once we mark let us call that as b'. And, then we require a projector line in this way. Similarly, let us locate this top view line 60 degrees, make 60 degrees line. Here join this line, this is 60 degrees.

So, let us mark that 60 degrees and this is 50 degrees. Views let us darken the views. As of now, we do not know what is that length? But this one is the front view and this one is the top view.

Now, what we have to do? On this axis, we have to mark whatever the true length where it is going to intersect it which we do not know. So, the step goes from b ' locate point b and join a b. So, we have to locate a b point on this top view line. And, for that, we have to locate a projector line, which is passing through b', because these are the projections they will match somewhere here.

Now, join that by true line by darker one and call this one b point. Then, draw a locus line somewhere here. Now, project this frontal view front view through an arc to locate this LFV line, this is the one. Project this entire line. It is intersecting this point; let us call that point as our b 1. Now, join a and b, this is the true length we will measure it.

Now, once that true length is known from here intersect this line so that we will get this b1'. Now, join a and b, this is the true length. The inclination angle we do not know so let us measure that, this is around 31 degrees.

Similarly, the true length angle, true length whatever it is inclination making let us measure that is 49 degrees and the true length is 83 mm. So, the unknown true length is 83 mm and the apparent the inclination angles made by this true line with the horizontal plane is 31 degrees and with the vertical plane is 49 degrees. In the next classes, we will look at more examples in terms of this line projections.

Thank you.