Engineering Drawing and Computer Graphics
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Lecture – 41
Orthographic Projections II (Part – 11)

Hello everyone, welcome to our NPTEL online certification courses on Engineering Drawing and Computer Graphics. We are at lecture number 41.

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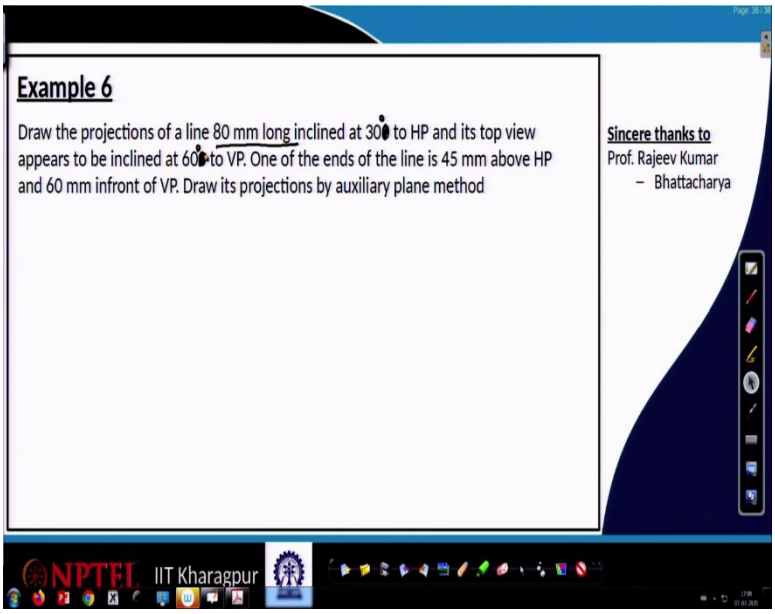

And at this lecture we will work out two example problems on this auxiliary planes. Let us pose the question.

Draw the projections of line 80 mm long inclined at 30 degrees to the horizontal plane and its top view appears to be inclined at 60 degrees to the vertical plane. One of the ends of the line is 45 mm above the horizontal plane.

So, in which direction we will see this 45 mm above HP? If we are projecting this point on to vertical plane we will see this 45 mm and 60 mm in front of the vertical plane. Draw its projections by the auxiliary plane method. Let us begin that using our graph sheets. First of all, we will draw the top and front views of one of the ends because it is a line there will be two ends like a point and b point and one of the ends we will draw it.

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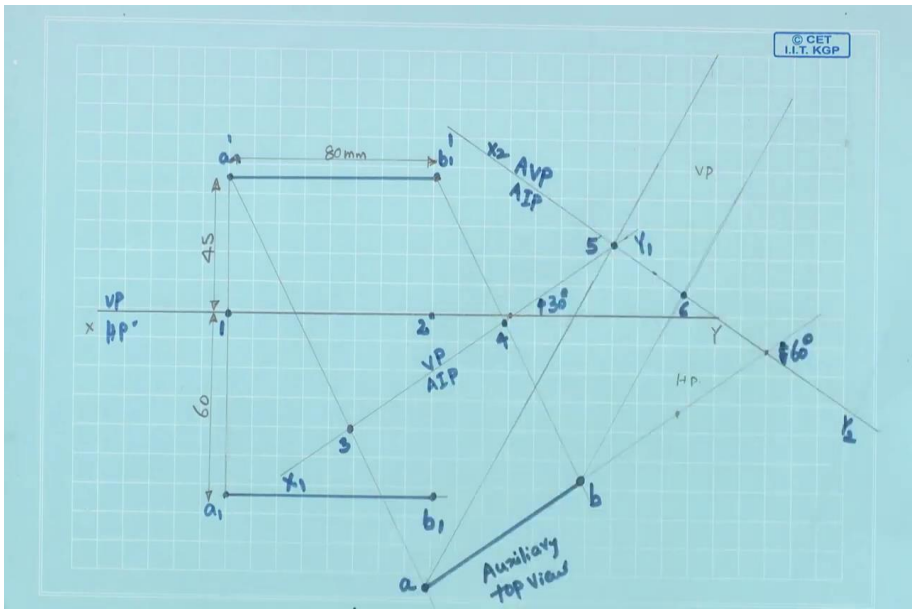

First of all, let us draw an X Y plane. This is the X-axis, Y-axis. Draw the top and front views of one of the ends. Say a 45 mm above HP. So, this is a vertical plane and this is a horizontal plane, 45 mm above HP let us locate it. From this point 45 mm, this is the point and 60 mm in front of the vertical plane.

So, 60 mm here, let us join that. Let us name these points as a 1' and this one a 1; vertical plane and horizontal plane. Assume that the line is parallel to both horizontal plane and vertical plane and draw it is top and front views. Since this line is to be inclined at 30 degrees to the horizontal plane, set up an inclined plane auxiliary inclined plane at 30 degrees to HP

So, first of all, we have to construct one auxiliary inclined plane. So, that supposed to be at 30 degrees angle is supposed to make. So, use our protractor anywhere making an angle of 30 degrees. Let us first fix the point. This is the auxiliary inclined plane which is making an angle of 30 degrees and anything above this auxiliary inclined plane is the vertical plane, anything below is the auxiliary top view we will get.

Now, name this auxiliary inclined plane as X 1 Y 1. Now, to project an auxiliary top view on this auxiliary inclined plane draw projections from a 1' and our b 1'. So, a 1 b 1 also let us locate it because the true length is 80 mm is given. So, from here one of the points we have made it. So, let us locate it 80 mm on these planes, this is the one.

Similarly, parallel to that here this is our b 1' line and this is point by point we will project it b 1. Let us darken these lines assuming this might be giving us true length. After constructing a 1 b 1 a 1' b 1' let us call this one distance 80 mm and this one 45 mm and this one 60 mm, ok.

Now, to project auxiliary top view on to AIP, auxiliary incline plane draw projections from a 1' and b 1' perpendicular to X Y lines. So, perpendicular to that we have to move our things. So, let us use our set square. Move that this a 1' b 1' projects onto this X X 1 Y 1 line and on them use to locate a point one a 1 is equal to 3a kind of points

So, let us intersect this point at 3 and this one is intersecting at 4. Now, we have to locate in such a way that 1 2 a 1. Let us name this one also 1 so that it is easy for us to locate these points. The projection point this one is two from this front view.

Let us pick 1 to a 1 is equal to 3 to a. So, this intersecting point 1 a 1 is equal to 3a in such a way that we locate this point a. Similarly, from 2 to b 1 that is equal to from 4 transfer that this is the point. Let us call this point b and join a and b. Now, a b this is our auxiliary top view which with respect to this auxiliary inclined plane we are getting.

Now, this top view of the line appears to incline to vertical plane at 60 degrees; for that what we have to do is because this one appears to be 60 degrees. So, we are going to construct one more inclined plane that inclined vertical plane at 60 degrees we are going to draw. So, with respect to this view, we have to construct a 60 degrees line. Let us extend all the way there. Anywhere it can be here, here, we have to locate another auxiliary view.

Let us mark the angle between that view and this plane supposed to be let us make it here 60 degrees line mark it somewhere there. So, let us join this point. So, for the second one name, it as X 2 line and this one Y 2 line and this is our auxiliary vertical plane and this is our auxiliary inclined plane and this angle what we have constructed 60 degrees.

So, once we construct this auxiliary plane, draw the projections from a and b; a and b, perpendicular to X 2 Y 2 plane. So, along with that, we have to draw a vertical line which is passing perpendicular to this plane, similarly perpendicular to that b. So, let us use a plane. Through b we have to draw a perpendicular line. It passes through that point.

Similarly, through a also we should draw. Now, join these lines. Now, it is going to intersect these new points somewhere there. Let us name them 5 and point 6. Extend these points line so that we are going to locate that true shape of that object. Now, we have to find from 5 a' whatever the distance we are going to get that is is equal to 3 to whatever the distance of a1'.

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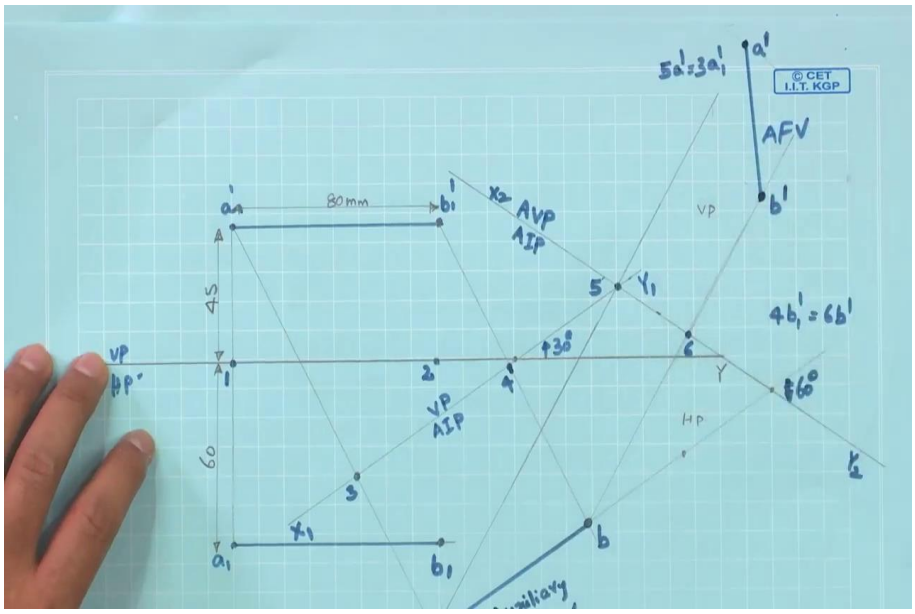

So, 3 a1' this one, we are going to locate it from 5 to somewhere there. Let us show it somewhere there. So, if we are joining this line it intersects this point here, where we are using a relation 5 a' coming from 3a 1'. Similarly, whatever 4 b 1' this distance that has to pass from b information.

So, this distance from 6 points whatever the location we are going to identify that from 4 b 1'. So, 4 b 1' is equal to 6 b' in such a way that this one 4 b 1' from the plane 6 we are going to identify. Now, join these two points. Now, name these points as a' and this point b'. So, using true projections we will be in a position to get this a'b'.

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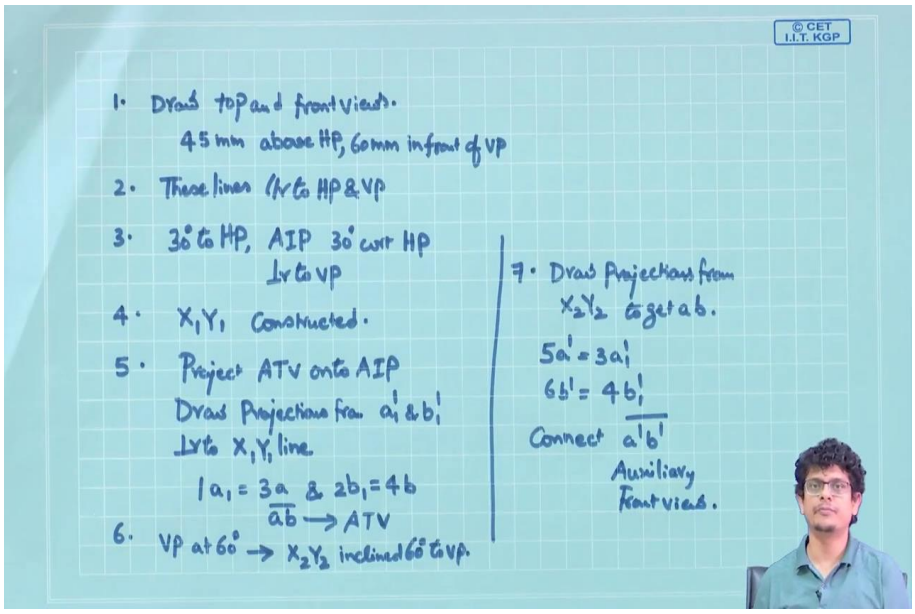

Let us summarize this entire thing. The first step for this problem, draw the top and front views 45 mm above HP and 60 mm in front of VP. These lines let us assume that both are parallel to HP and VP. Now, construct a line inclined at 30 degrees to HP that gives us auxiliary inclined plane which is making 30 degrees angle with respect to our horizontal plane and this is perpendicular to vertical plane also.

4th point: X 1 Y 1 auxiliary plane this has been constructed from this auxiliary thing at a suitable distance. Then project auxiliary top view onto an auxiliary inclined plane. Then draw projections from a 1' and b 1'. These are perpendicular to X 1 Y 1 line. We construct in such a way that 1 a 1 is equal to 3a and 2 b 1 is equal to 4b. On these lines, we construct in such a way that a and b points will be located.

Now, once we have that join a b. So, we have a line a b line and this is the auxiliary top view. Now, this top view of this line appears inclined to VP at 60 degrees. So, that means, draw X 2 Y 2 line inclined at 60 degrees to VP. Now, draw projections to get a b. These projections from X 2 Y 2 line to get a b. For that, we use 5 to a' is equal to 3a 1'.

Similarly, 6 b' we will get from 4 b 1'. Once we have connected a' b' and this will be the auxiliary front view. So, if we do that procedure, front view top view then constructing auxiliary inclined plane, project them all the way, locate 3 4 points; from projections, we know what is this distance, relocate a and b lines.

Once a b lines are there join them. With respect to that, a b line constructs another projection line. This X 2 Y 2 auxiliary inclined plane we will construct. Project point a point b. Locate a1 to 5th point the distance coming from this our 3a 1' 3 to a 1'; this distance we locate it. Similarly, this distance 4 b 1' from b to 6 to b 1' we will locate. Once we know that that a' b' represents our auxiliary front view.

Thank you very much.