Engineering Graphics and Design
Professor Naresh V Datla
Department of Mechanical Engineering
Indian Institute of Technology, Delhi
Lecture 6
Example Projection of a Solid

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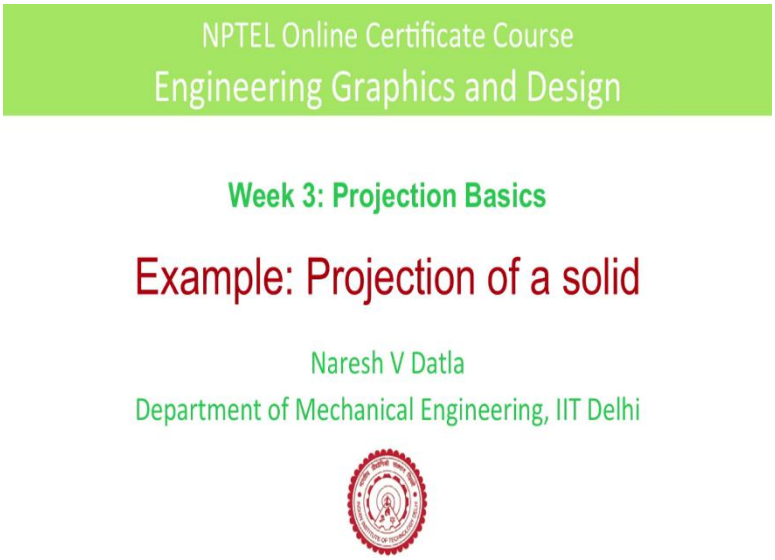

Good morning everyone. Myself Amit Chanda, a teaching assistant in this course, Engineering Graphics and Design. We are on week 3 and we are doing the orthographic projection of objects, different objects. So, whatever has been covered in week 3 lectures by professor Datla in the class, so today we will be doing those things with pencil and paper.

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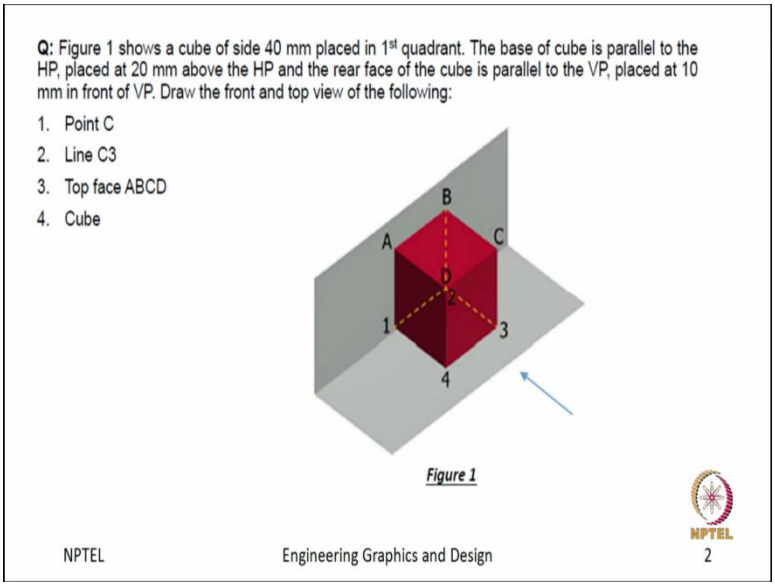

We will see there are two problems in this class. The first problem is a simple cube placed in first quadrant. While the base of cube is parallel to horizontal plane. So, what we have to do here? We have to just capture the point, line, face and the whole cube in front and top view.

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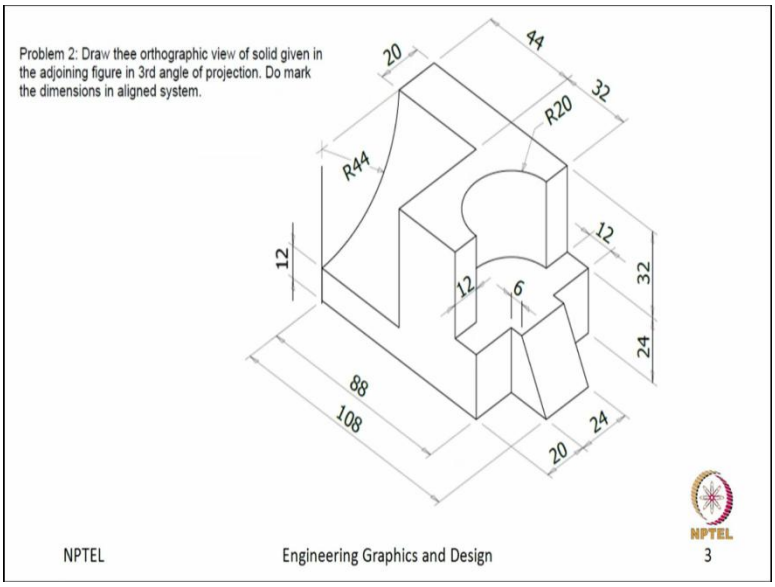

The second question we are having here is another simple object and we have to draw all the orthographic projections of this simple object. Both of the things has already been covered in the class. Today we will do the practical and we will see how to do it.

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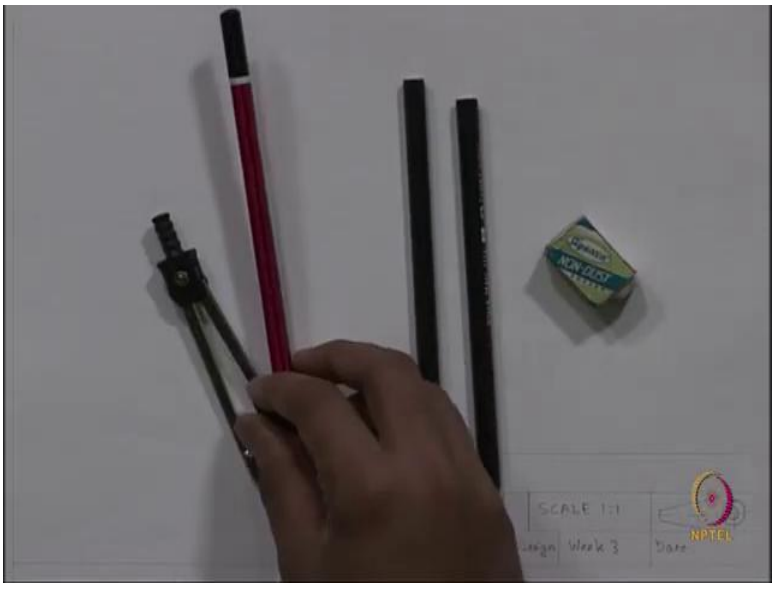

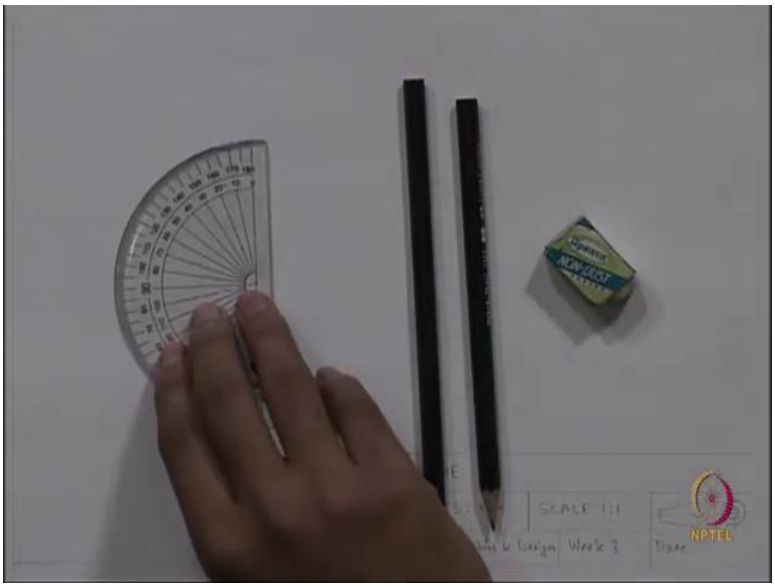

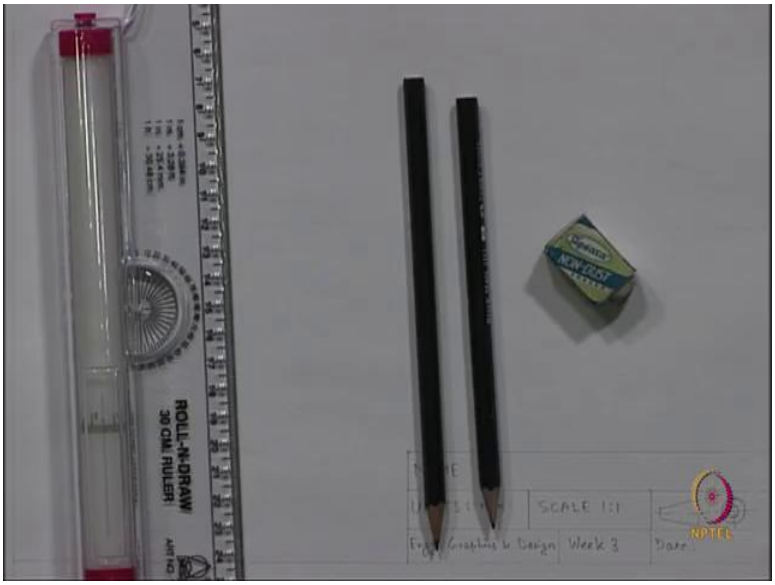

And one more important thing, before starting any engineering drawing, we should always be prepared with some of the important items. The first important item is the pencil. Definitely for drawing you will be using pencils and there are two types of pencil we will be using for this drawing. The first one is H category of pencil. H, the H category of pencil we will be using for drawing projection line, construction line, etcetera. It will give you a light impression.

For the original drawing of the object, we will be using 2H pencils. 2H pencils used to give a bold impression compared to H. So, these two type of pencil we will be using and other important thing is definitely eraser, the compass, the D for angle measurement and the most important thing is the slide ruler.

Definitely you may not have a slide ruler always in your home and or wherever you are now but you can use a proper normal ruler also. But the advantage with the slide ruler is you can draw parallel lines easily using this. So, these are the items which we need for this drawing and definitely now we will not to waste time and we will directly start doing those examples.

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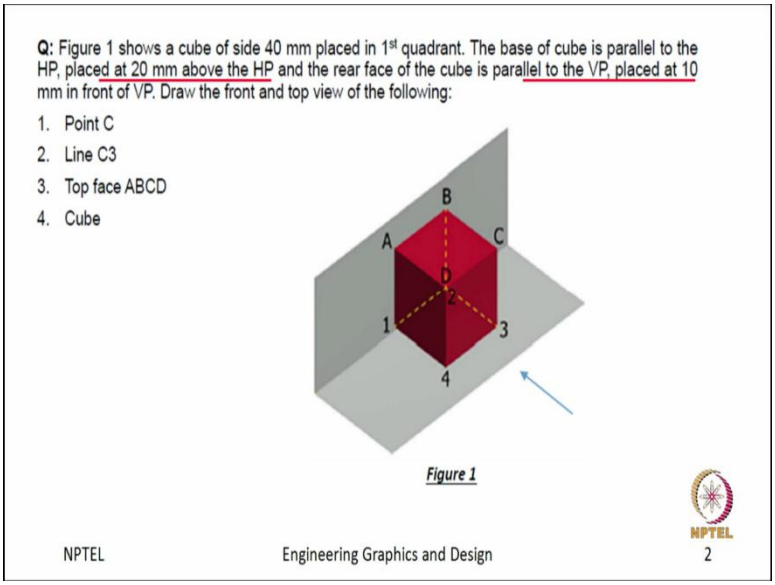

For the question number one. So here first let us read the question. Figure one shows a cube of side 40 mm placed in first quadrant. The base of cube is parallel to the horizontal plane placed at 20 mm above the HP. This is important, and the rear face of cube is parallel to vertical plane placed as 10 millimetre in front of the VP.

So, first we have to draw the front and top view of point C, then the line, then a face and then the whole cube. And another important thing is, in your class definitely you have been taught about first angle and third angle projection. If you read this question what it says? Just by reading this question can you tell like which view, like which kind of projection we have to draw, first or third angle?

Definitely first angle projection here. It is not mentioned in the question but just from like if you look at the question, let us say, this is the cube this is our object. So, the object is placed in between. The viewer is me in this case and the plane is here. So, definitely the object is in between the viewer and the plane and it is placed on the first quadrant.

So, we have to draw the first angle projection not the third angle. It is not mentioned in this question but just from reading the question you have to understand. So, we will draw the first angle view of the question number one, point C, line three, face and the cube.

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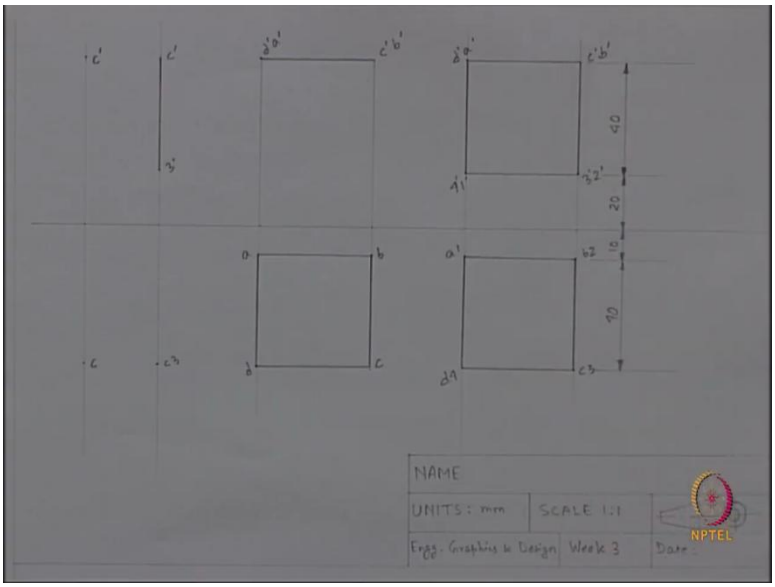

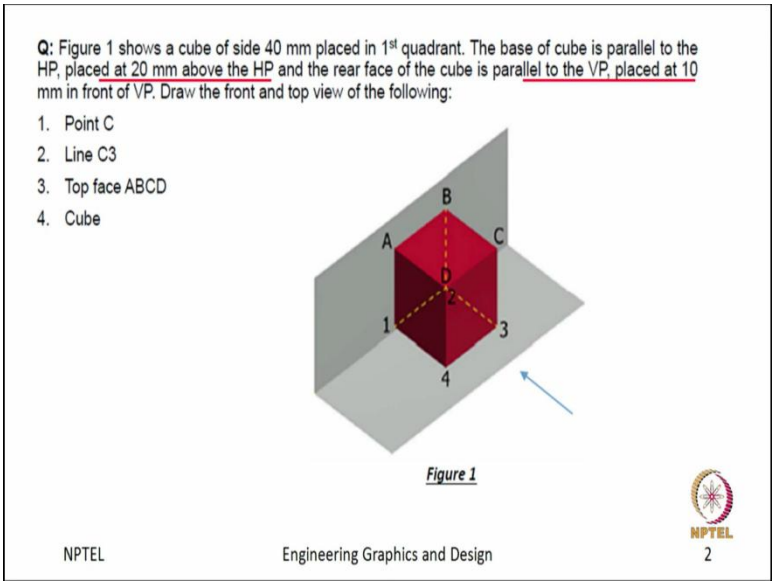

Let us come to the drawing sheet again. While you prepare a drawing sheet, the most important thing is to put the title block here. The title block will consist the name, the units, units are millimetre here. Scale 1:1, we are not changing the scale whatever has been given in the question paper we are just taking this the course name and the sign of the projection.

We are using the first angle projection here, so definitely this is the first angle projection side. If you do the third angle, we have to change the projection (())(5:55). Just by

looking at your sheet drawing sheet someone should be able to tell like which view or which projection is this.

So let us start. Here, we have to first draw the reference line. For drawing the reference line, we will draw only the horizontal reference line because only the front and top view is asked, so that will be in between horizontal plane and vertical plane and the intersection line between horizontal and vertical plane is the reference line.

And that is horizontal in our case and this reference plane drawing and this kind of things I will be doing using H pencil, the light construction pencil. So, our reference line is done. So, part one of question one, point c, we have to draw the front and top view of point c. So, first let us understand the position of point c. Point c is situated at a distance of 60 mm from the horizontal plane and 50 mm from the vertical plane.

Why 50 and 60? Because the side has a length of 40. So definitely we will add the side length also. So, while we will draw the front view, we will take the distance from horizontal plane because you are looking from here, the front view impression of the c, the projection of the c will be here. So, we have to consider the distance from horizontal plane which is 60. So, from reference line we have to draw the point above 60 millimetres.

Let us mark the point first. For drawing I will be using 2H pencil. This is 60 millimetres and for the top view, if we watch from the top, we have to take the distance from the vertical plane which is 50.

So, the top view will be at a distance of 50 from reference line. From reference line we will take distance of 50. So, this is the front view of the point c. This is the top view of the point c and definitely both of these will be at the same line. So, just for representation I am drawing a construction line here.

So, those should be on the same line. Front view should be on the top and top view should be below the front view in case of first angle projection. Now, let us go to the part two of question number one that is we have to draw the front and top view of line C3. Let us understand the position of C3 first. C3 is a line, the line has been situated at a distance of 50 mm from the vertical plane. For the front view, we have to take the distance from horizontal plane. The point 3 is situated at a distance of 20 and point C is situated at a distance of 60 from the horizontal plane. So, let us draw this.

First, let us draw a construction line first; then mark the point. Point 3 is 20 mm above the horizontal plane and point C is 20 plus 40, 60, 60 mm above the horizontal plane or the reference line here. And we will join these two points and by joining these two points we will get the front view of the line C3.

The top view will be exactly below the front view but there is one catch here, you are looking from the top. And the line C3 is perpendicular to the horizontal plane. So, what you will do? You will see a point rather than a line because both the point C and the 3 will be coincided in a single point rather than having a whole line.

So, we will draw a point corresponding to both point C and 3 and that will be at a distance of definitely 50 millimetre, 10 plus 40. So, our first two problems are done. Another important thing we have to take care is the notation. We have already drawn but we have to mark those points. This is the front view of point capital C.

So, while we will be marking, we have to follow some notation. The notation here we will be following is if it is the front view, we will use small letter prime. This is the front view of point capital C. So, while we will name it, we will use small c′. For the top view, we will use only the small letter.

So, for capital C while we make the top view, we will mark it only C. Similarly, here this is for line C3. This is the front view, so we will mark it small c′3′. The top view, we have to mark the top view should be C or something else. If you are watching from the top the first point in the projection line will be C, if you are watching first you will watch C.

The projection of point C you will watch first then the projection of point 3 you will watch. So, at the time of naming, we will use the nomenclature like c3. First c then 3 so, this is the basic nomenclature we will be using for this drawing. So, there are different nomenclature they can use but in for this case we will be using this particular type of nomenclature.

Let us come to part three. Top face ABCD, we have to draw the front and top view. This is the top face ABCD. While you look from the front, what you will see? So, if you look from this what you will look at? You will not see a plane or you will not see a square rather you will see just a line.

So, that is what we have to draw in the front view. So, for ABCD plane ABCD, the front view will be a line and the line will be situated at a distance of 60 from reference line.

This is one point we will mark and the length of the line is 40. So, we have marked two points, now if we join this, we will get the front view of, so this is the front view of plane ABCD but definitely, while taking the top view if you look from the top this is a square plane. If you look from the top, you will see a simple square projection.

So, the top view will be a square and that will be situated exactly below the front view. So, we will draw the construction lines here using H pencil. Our top view should be within this boundary. And the distance, the line AB will be at a distance of 10 mm from the reference line and the line CD will be at a distance of 50 mm from the reference line.

So, let us measure the points first, I mean the position of point 10 and another is 50. Same here 10 and another is 50. So, now we will just join these points to get the square. Again, I am reminding you at the time of drawing, I am using 2H pencil, the bold pencil and at the time of making construction line, reference line I am using H pencil. So, we are done with the front view and top view of face ABCD. Now, we have to put the notation. How we will put? We have seen a line, the left point of the line is DA.

How I will decide it will be DA or AD? Because I am watching from the front, I am viewing from the front. In the projection line first I will see the projection of D, projection of point D will come first then the projection of point A will come. So, I will mark the front view left point as d dash a dash, similarly this will be c dash b dash because c comes first while I am viewing. In the other case, like in the top view it will be directly a, b, c, d just the small letters.

So, let us go for the last part of the question, the front and top view of cube. So, this time we have to take care of the whole cube. So, and it is very simple while you look at a cube what you will look at from any side from front, from top, from left side or from right side you will look a square from every side because it is a cube.

All the edges are equal, so if you look from any side, you will just see a square and what will be the position of the square? Situated at a distance of 20 mm from the horizontal plane so definitely front view will be 20 mm upper from the reference line and top view will be 10 mm ahead of the reference line.

Let us draw this. So, both the front and top view should be within these two construction lines, the projection should be within this part. Front view, as I said it will be at a distance of 20 mm from the reference line. So, I will mark the two points and I will just

join the point. So, we got the front view. Front view is a square, the top view will also be a square but it will be at a distance of 10 mm from reference line. Let us draw that too, first mark the points, if you join those points, so we are done.

We have drawn the front view and top view both for the whole cube but we have to name it, we have to put the names. How? For front view, what you will look at? Front view, for this point, point D and point A they will coincide while the projection will be there. Point C and point B will be coincided at a single point. Point 3 and 2 as well as point 4 and 1 will be coincided at a single point while looking from the front.

So, we will mark it like this point will be d′a′ because d comes first while looking in the front view, this will be c′ b′, this will be 3′2′ or prime, 3′2′ and this will be 4′1′. This is for the front view. For the top view, similarly, if we look from the top first A will come for this point and then 1, for this B will come first then 2 for this C then 3 and continuously like D and then 4.

Mark this point like a1, this b2, this c3 and this d4. So, we are done with the drawing but another important thing is left and that is dimensioning. We have to put the dimensions, we have not put the dimensions for any of the case but you will see like if I put the dimension in one case, so I can represent all the four questions at a time.

So, while naming the dimension I will be again using that H pencil. It will be a light line, so before giving the dimension I have to draw the extension lines from the drawing, this is one extension line. This is one and then I will draw simply draw the dimension lines. And you have to make the arrowheads in such a way so that it will have a ratio of 1:3. 1 is the width, 3 is the length and we will be using here the aligned dimensioning system. What is the aligned dimensioning system here?

While I will write those dimension marks that will be aligned in the direction of the arrow and that I will write on top of that dimension line. This is the side, so this will be 40. This is the distance from the reference line for front view, this will be 20. This is again the distance from the reference line but this distance is 10 and this distance is 40. So, our dimensioning is complete. All the four drawings are complete so please look at it. This is the solution for question number one, figure one. Now, we will go to question number 2.