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

Lecture – 06
Orthographic Projections-Part III

by
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Last class we have.

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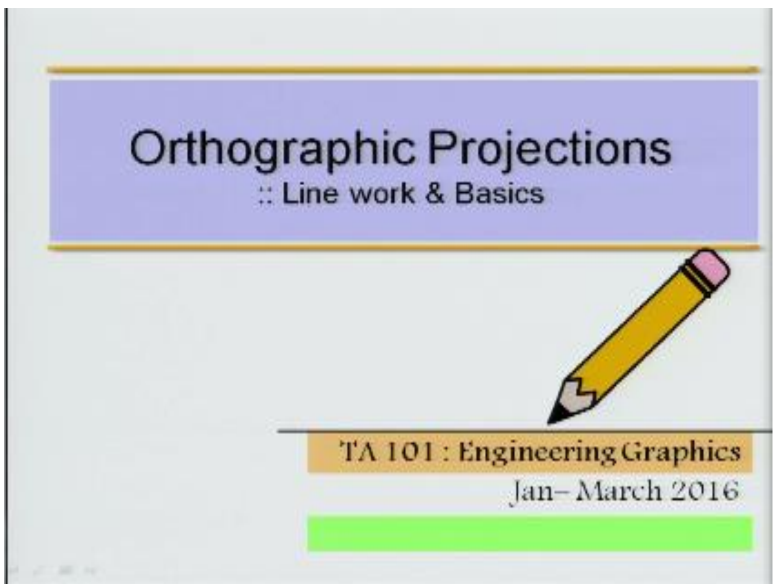

Finished basics about first angle projection as well as third angle projections, now this orthographic projection will continue, this lecture today's lecture line work and basics.

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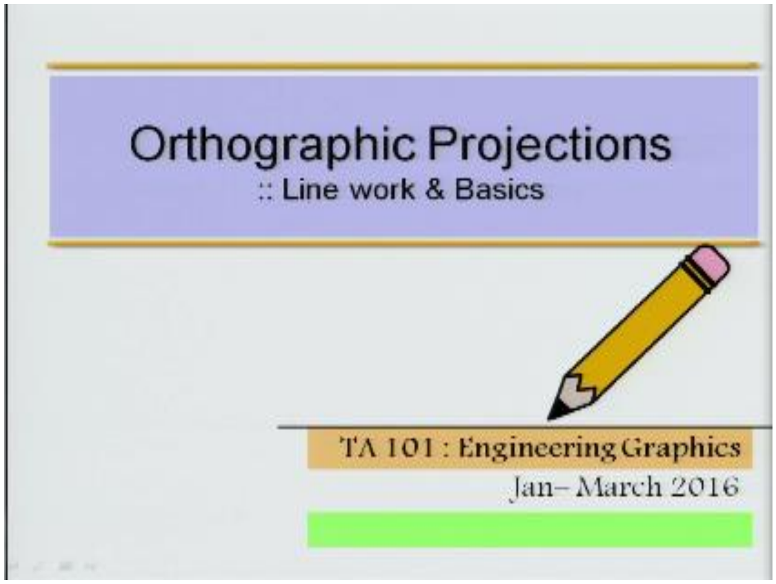

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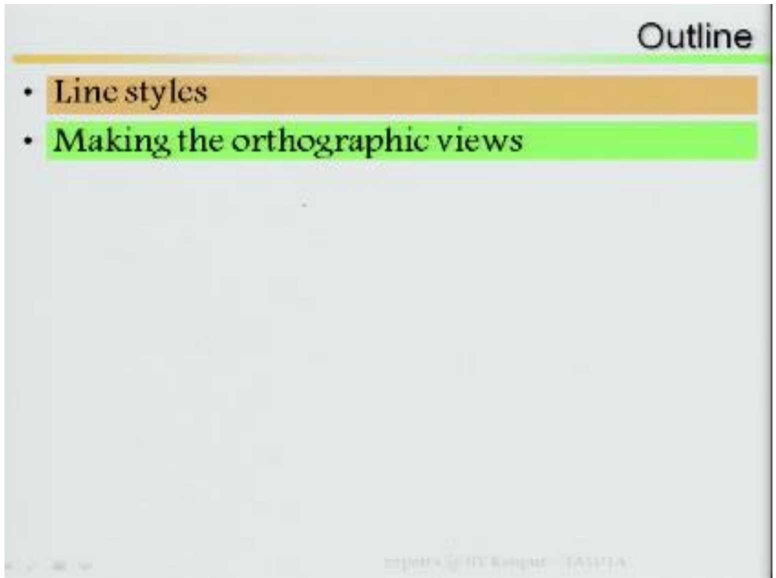

Line style making the orthographic views.

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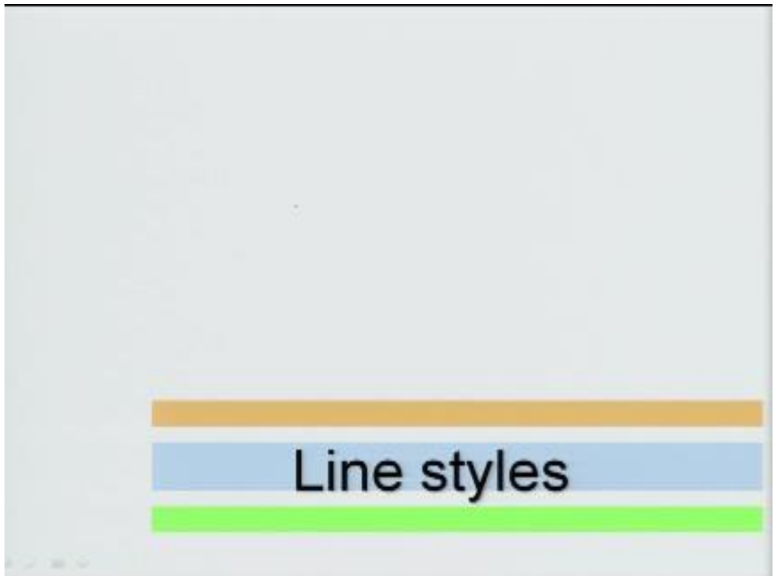

Now let me start with this line styles.

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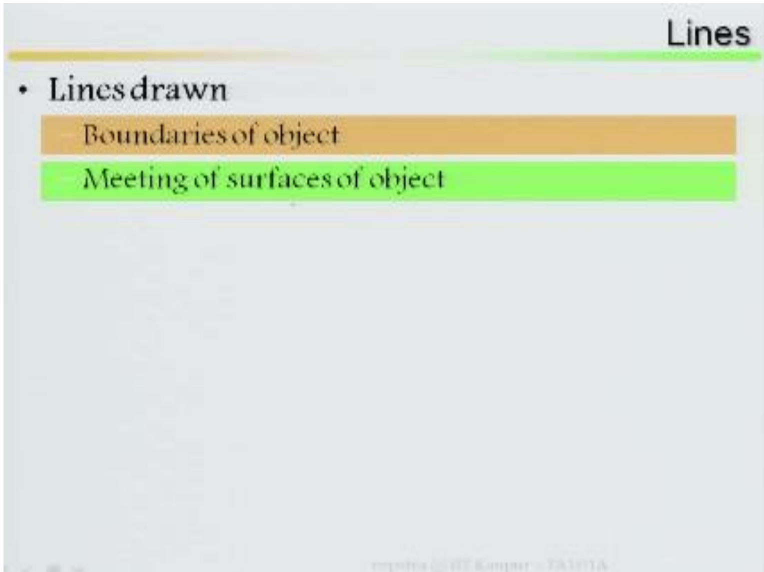

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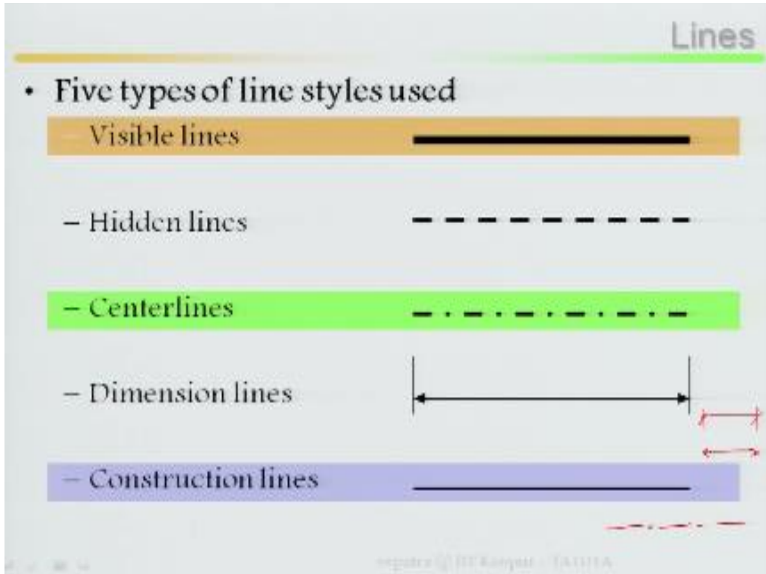

So five types of line styles used, one is visible line, complete visible it is a thick line generally HB pencil has been used. Hidden lines, dotted lines, center lines, if you look at the centerlines, center lines preferably we do like this then here one, then like this, then continue, then like this, this is your centerline. Dimension lines, dimension lines will be as it is given here dimension lines put it here, sometimes people will do like this, sometimes dimension lines with this two arrows, construction lines, simple construction lines.

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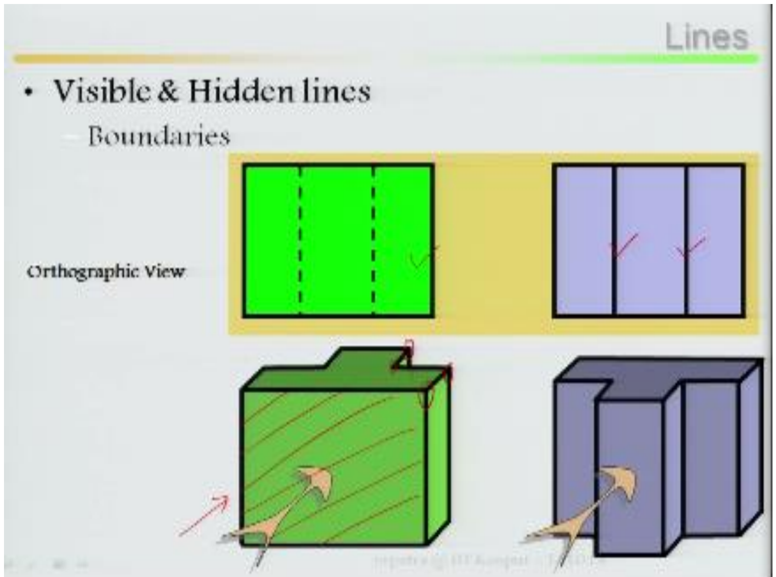

Visible and hidden lines boundaries if you look at the orthographic view of the object here, if I am looking from this side, this is your object if I am looking my front view is from this side, that means I can see this surface is clear visible, this is a surface which is clear visible, that means if I draw it this color is that means this is clear visible. However besides this, this section, this section it cannot be visible then what will happen, once I visualize from this direction for this your front view then what happen, this point and this point it is going to be merged.

It is going to be merged because I am visualizing from this side. Similarly this, this is going to be merged it is at the back side, and this is the continuous. If you look at here it is throughout it is moving, so these two lines will be invisible lines or hidden lines you can say, so these hidden lines will be marked as a dotted lines. So here it is a front view, in this front view this is your complete surface with a color blue color and this dotted lines is your hidden lines.

If I reverse it this way, this is this way if I reverse it other way, that means if I change my positions, where this your front view will be there, if this is my front view that means I can see the surface, I can see the surface here these two lines are not hidden lines, rather this is your visible lines, this is your example one line.

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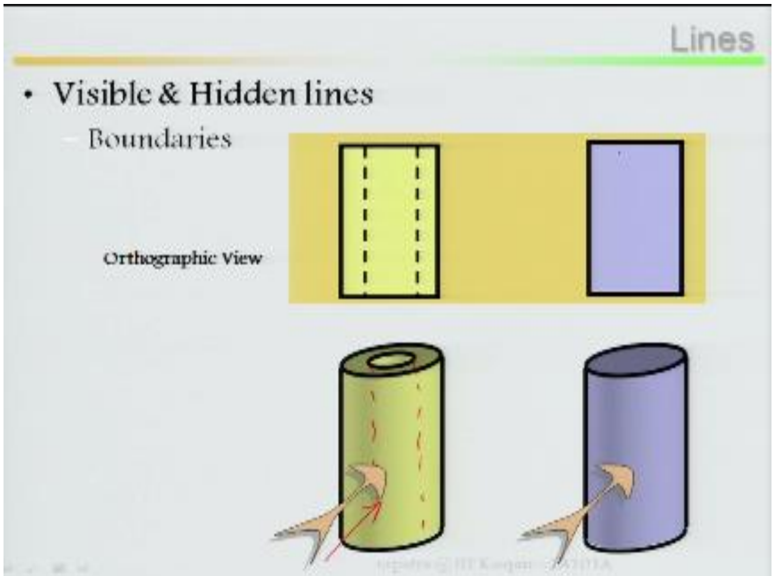

Then similarly, if you come to a cylinder here, in this case your internal diameter, outside diameter, so if I look at here this is my front view, if you look at from here, so definitely this surface will be visible and this is your hidden lines, inside diameter this is your hidden lines. But here there is no hidden lines that means only the surface it can be visible, this is your visible.

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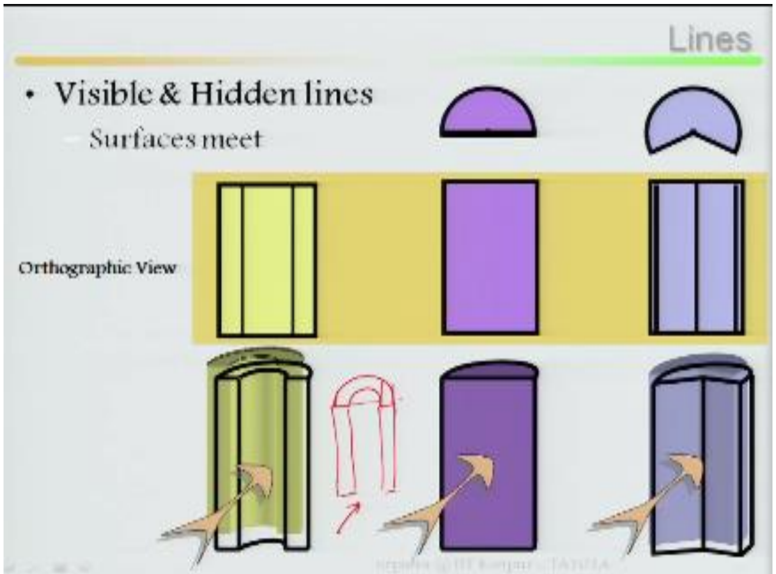

Come back to surface meet where you are one surface to other surface it meets if you look at your orthographic views look at the surface here, here it is a case, here it is a case of the half, half of the cylinder, if you look at here half of the cylinder it has been shown here, then if this is your front view from this side, this is your front view what will happen, this will merge, this will merge, this will merge, so this will come as a one line, this is the one line and this part will be visible because I am seeing from this side this will be visible.

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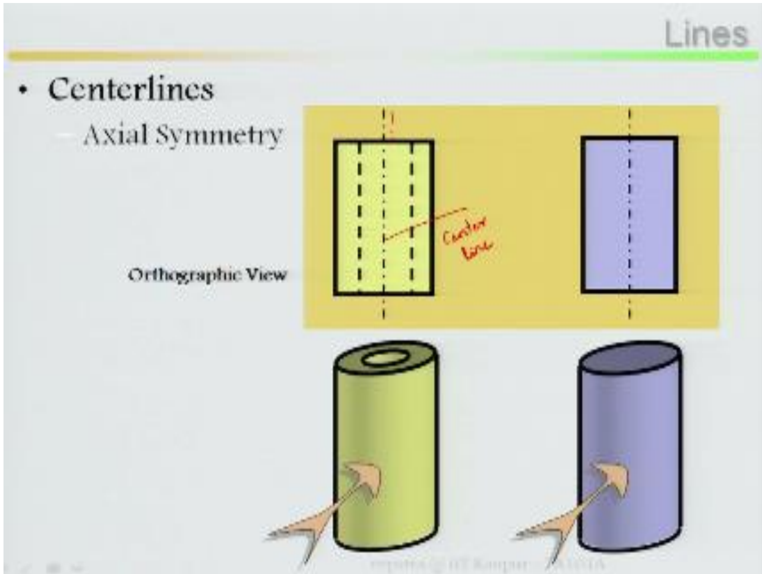

Access symmetry or axial symmetry center lines generally what happen if it is a cylinder, if it is a circular here it is a cylinder, in this cylinder of course this will be your visible, and this is your hidden lines because inside diameter is there, this is your hidden line, but you have to give your centerline, centerline represent your circle that is your centerline, here it is a centerline it has been represented by means of as I said earlier this and this, so this point once you mark this way this is the meaning of your nothing but this is your center line. Similarly here this is your center line.

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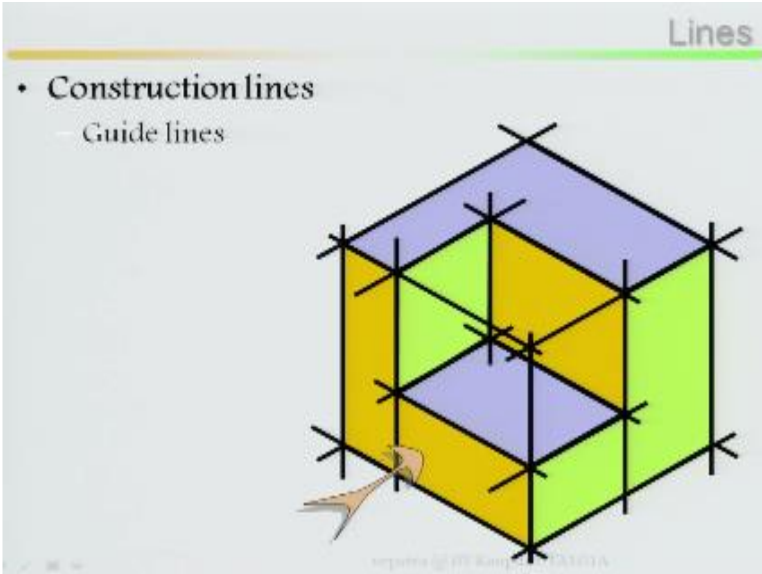

Now construction lines or guidelines, before you start it look at this object and we are visualizing from here, see what is your construction lines, look at the deep lines marked here these are all your construction lines.

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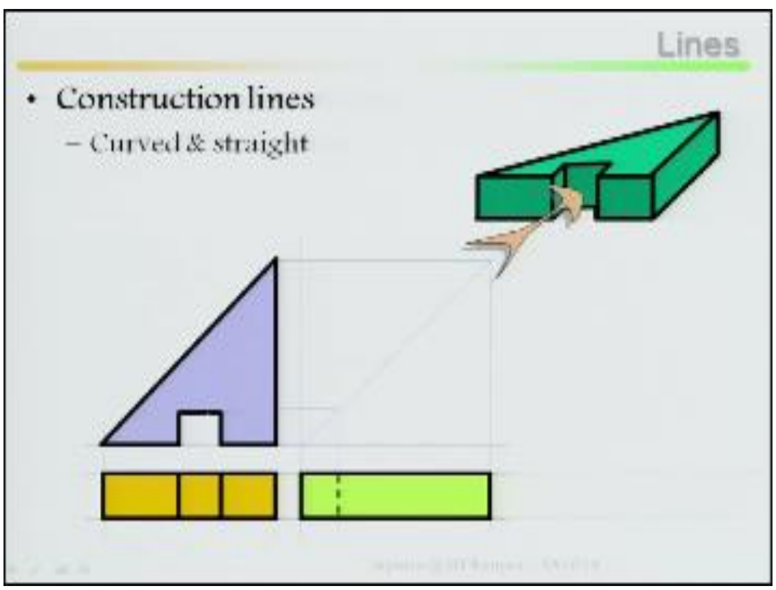

Similarly curved and straight lines, if you look at your curved and straight lines this is your, what is your curved and straight lines, again this construction lines look at here in this object I am visualizing from this side, so this is your construction lines.

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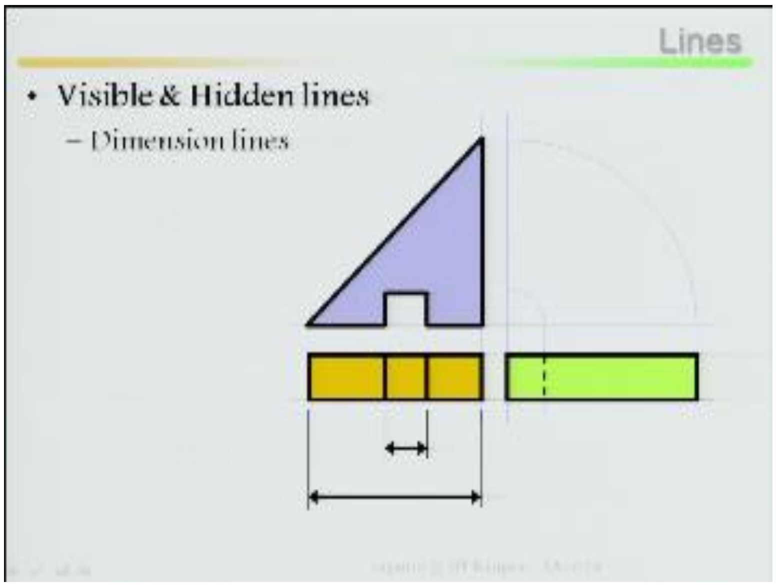

Second case hidden lines and dimension lines if you look at here in this case.

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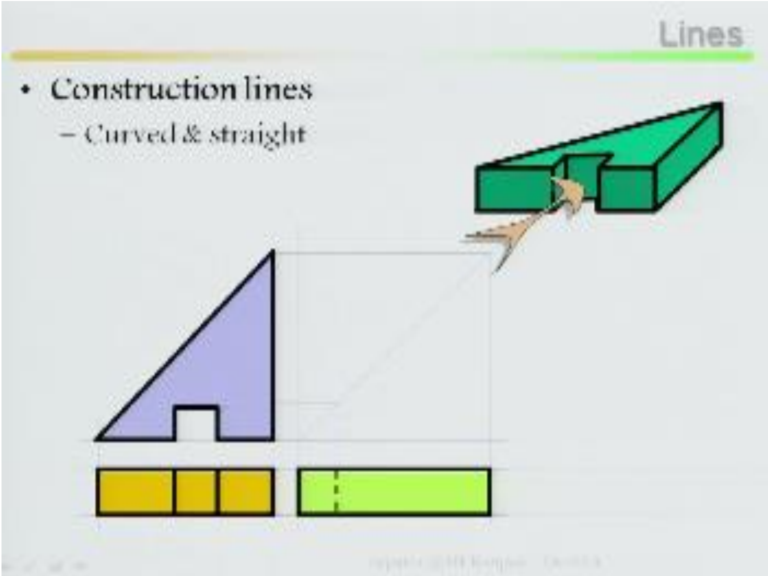

In this case this object has been visualized from here, so this is your third angle projections as I said earlier, unless otherwise it is not specified. Every object has to be considered as a, the drawing has to be drawn considering as a third angle projection unless otherwise it is not specified. So all the cases here it has been drawn by third angle projections.

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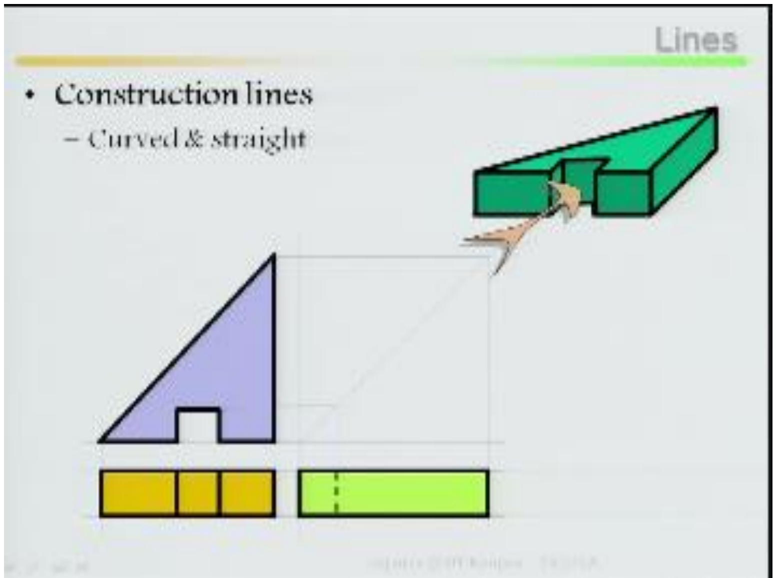

So obviously this will be your top view, this will be your front view, and this will be your side view.

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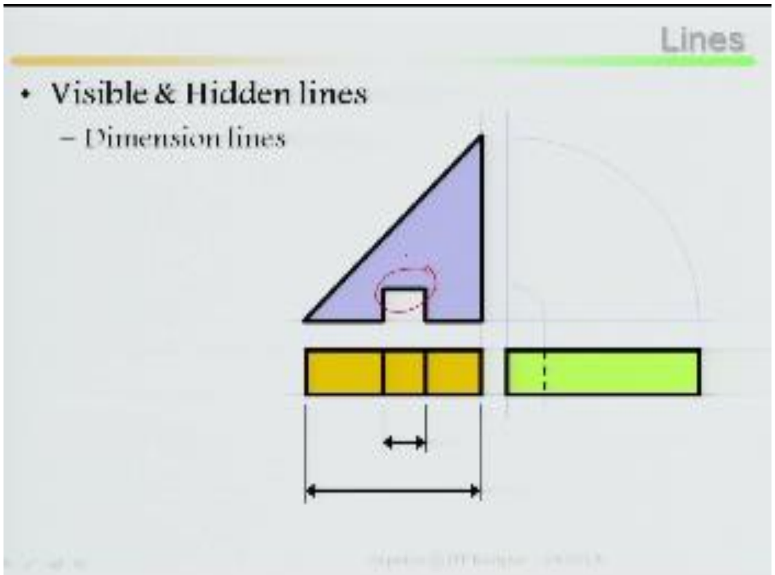

So if you look at here, in the side view this part is not going to be seen, that means this will be drawn as a hidden line.

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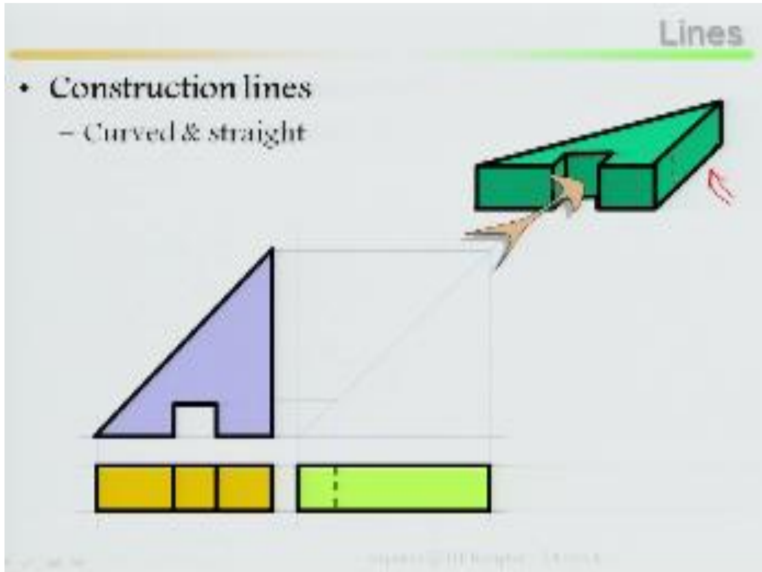

If you look at your side view if I am looking from this side, looking from this side that means this part is not I am going to see it if I am looking from this side, so obviously this will be hidden line and it will be marked as a hidden line.

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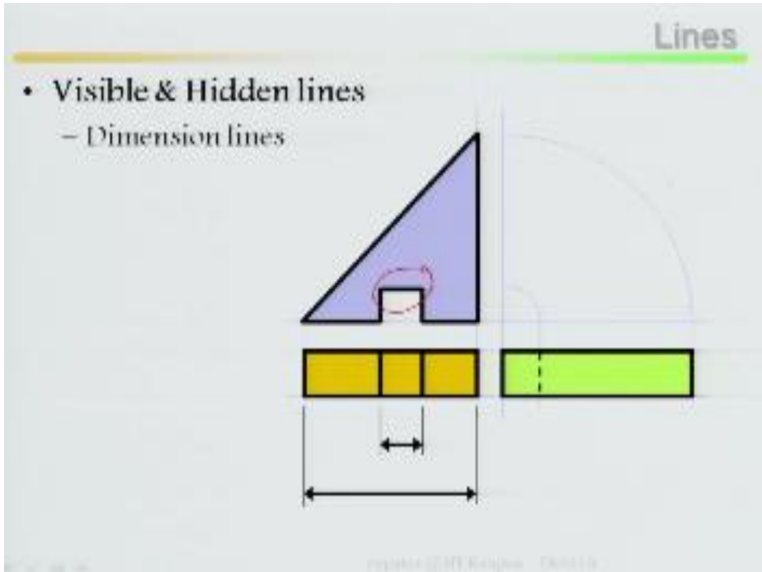

Here it has been marked as a hidden line.

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Then making the orthographic views.

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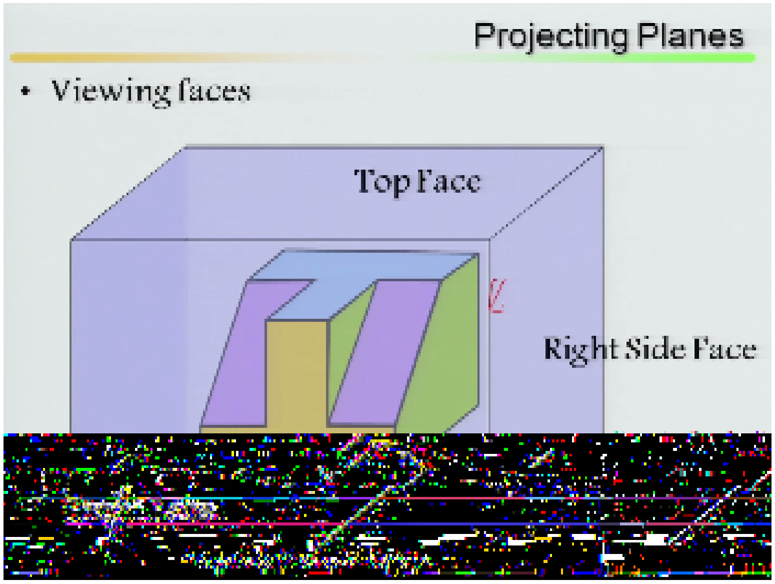

Viewing the faces, this is most important as I said how you are going to be the faces? Last class I say I can visualize this object from this side, this here I can say this is my front view or I can visualize from this side, this I can I can say this is my front view or I can see from the rear side also, that also I can say that it would be my front view. Now viewing the faces if you look at here take the glass, take the glass then in third angle projections very simple this is your object I am visualizing this object, this is my because the observer is myself I am seeing from this side, so obviously this will be the front face and this will be your top face, and this side will be your right side face.

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Now relative positioning as I said considering this object I have shown last class rotating a inside a box with respect to front view it has been rotated, front view is stationary, whether it is a first angle projection or it is a third angle projection, in case of third angle projection this is your right side view, top view at the top front view, bottom view, left hand side view and rear view, these are all related positioning I have already discussed.

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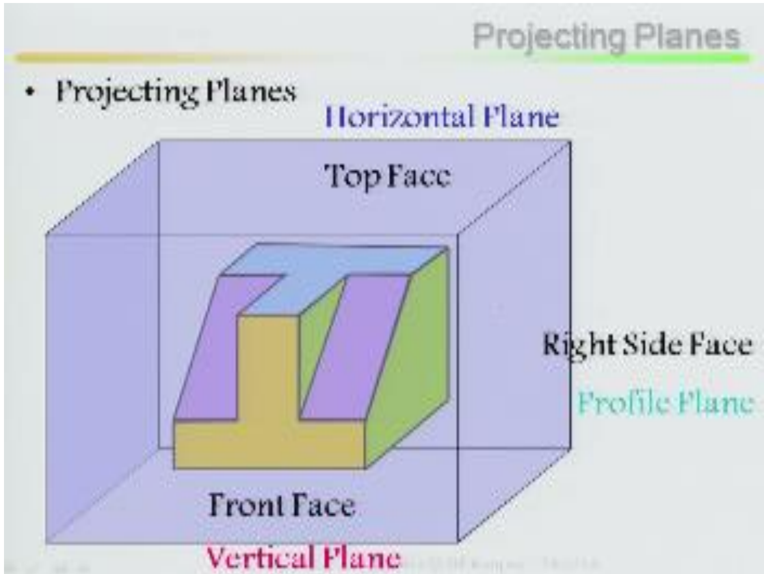

In the last class then projection planes, this is projection planes; this is your horizontal plane, basically this plane which is parallel to horizontal that is called your horizontal plane. Similarly profile plane, plane parallel to your side view that is called your profile plane, then vertical plane, plane parallel to your vertical face that is your, that is my front, front view that is called your vertical plane.

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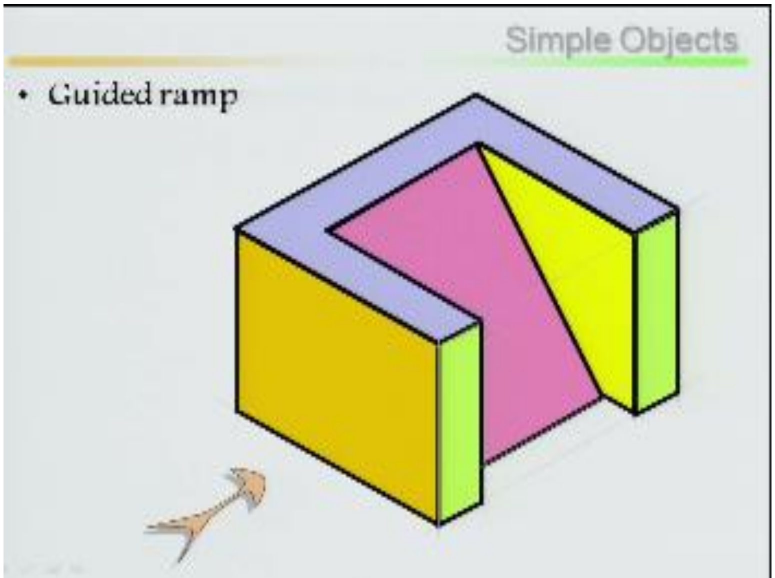

Then look at one example, guided ramp, one example is your guided ramp it has been visualized the direction and arrow has been given.

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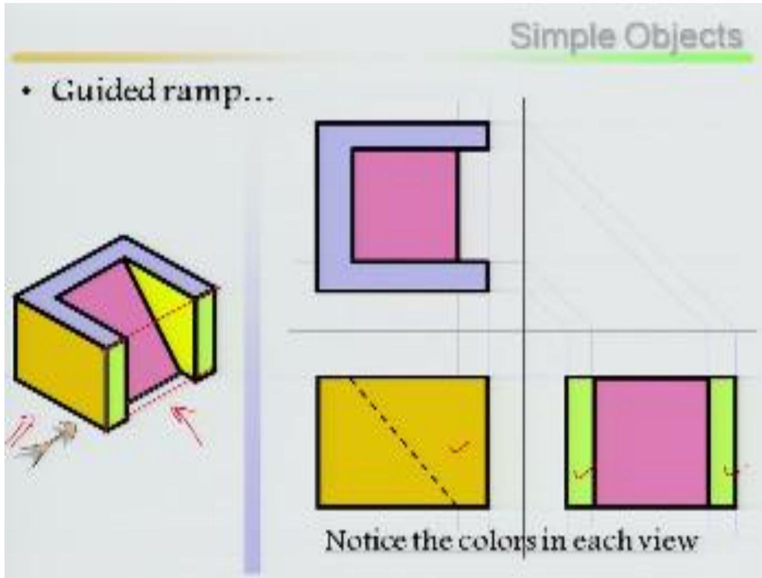

Now if I visualize from these directions look at the colors, if I visualize from these directions this will be, this is my construction lines and this surface will be completely I can see. However this slanted, this slanted face it is not going to be visualized that means, then what will happen once this and this going to merge because I am looking at from this side, this end and this going to be merged. I look at only one surface with this construction lines. However this line it is not to be visualized then hence it is constructed as a hidden line.

So this is your hidden line and similarly from top view, top view this surface is clear and this slanted surface also I can visualize. Similarly for side view, side view I am looking from this side right hand side, this is your right hand side view, so this two surface look at here this is visualized and this part also visualized. Notice the color in each view, I have explained with taking this colors, so you can visualize this color where is your construction lines, where is your hidden line and which surface you are seeing in that particular view.

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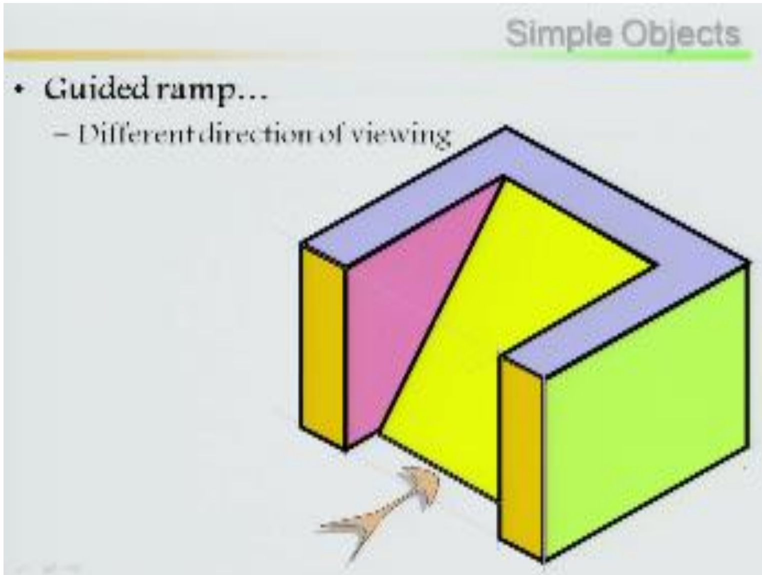

Different direction of view.

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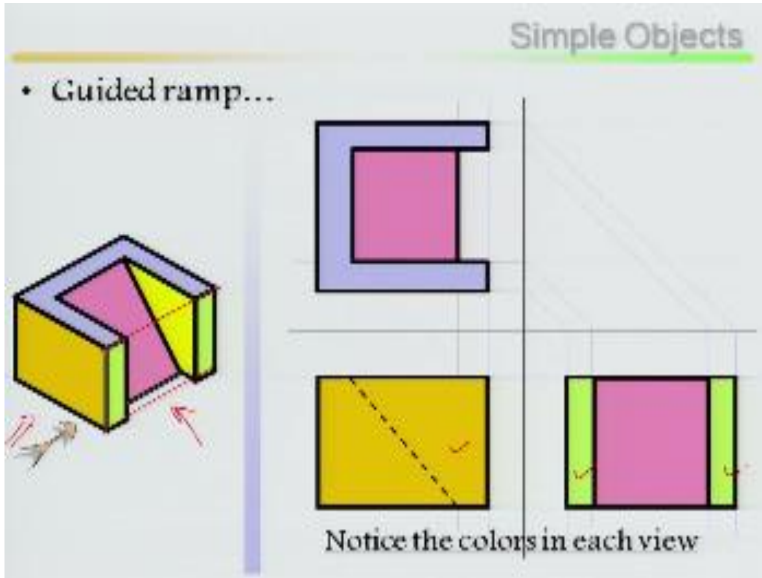

Look at here I am doing this guided ramp in this directions.

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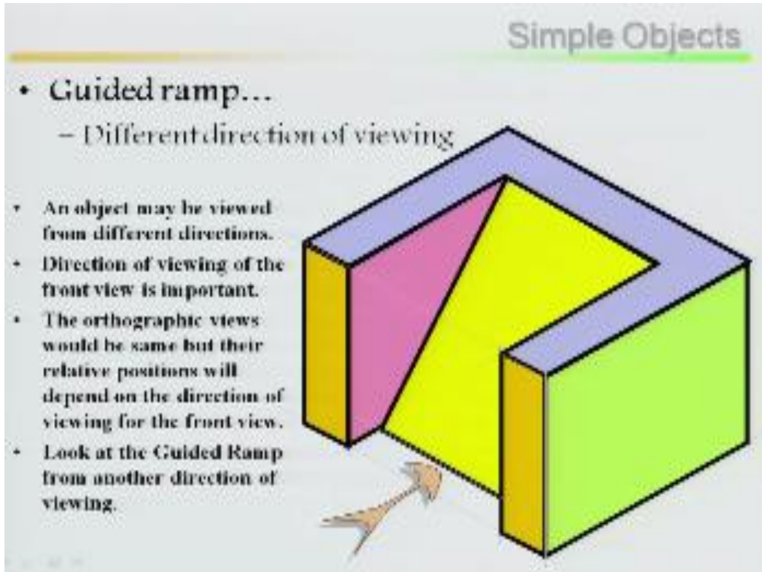

So here guided ramp I am viewing in this directions, so what is the difference? Any object may be viewed from different directions, it may be viewed any directions, it maybe because there are six, here front here you can view, rear side you can view, side also you can view it, direction of viewing of the front view is important, why? The orthographic views would be same but their relative position will depend on the direction of viewing for the front view, then look at the guided ramp from another direction of the viewing, this is the guided ramp, I am looking at the another directions.

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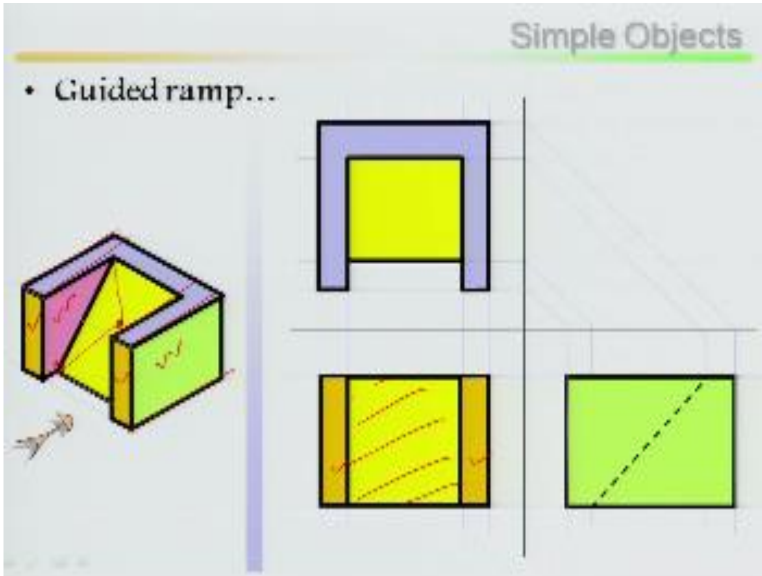

Look at here, earlier part I have viewed it from this direction, now this part I have viewed it from this directions. Now the moment I view it in this directions look at the front view, this is my front view, so front view which part which surface I am going to see, once in the front view that means this and this will be going to be merged, that means this surface I am going to see it, this surface I am going to see it in the front view. So this is the surface I am going to see, this is the surface I am going to see.

Then this slanted surface because once it is merged then this surface it will vanish, this surface will completely vanish. But this surface I can see it, this surface I can see it that means relative position of this though it looks like slanted, so what happen it will move up to these positions, that means it looks like a vertical, if you look at here this surface I have seen this is your slanted surface in front view, and look at the difference, here it is your front view.

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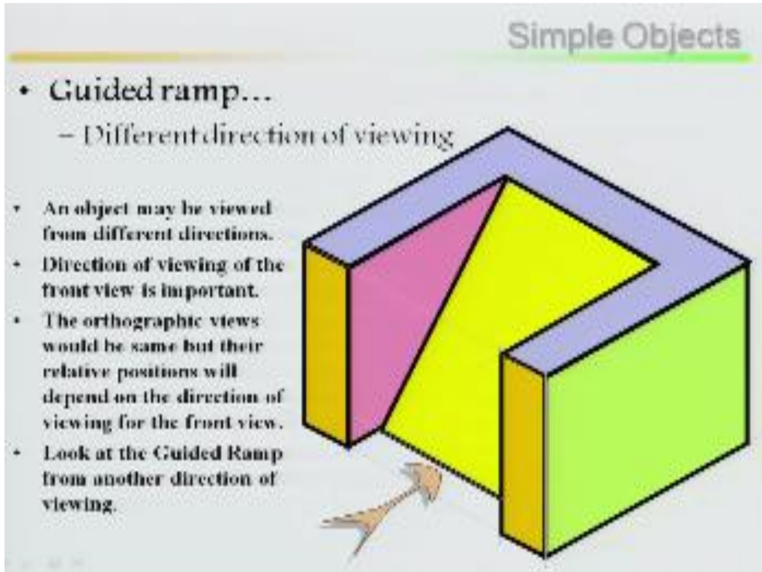

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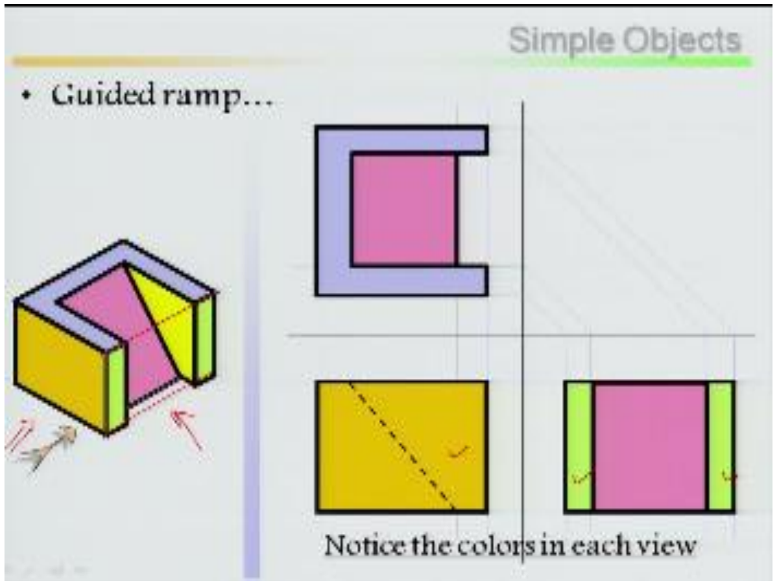

Come to your front view viewing in from other directions, this is your front view where you are looking.

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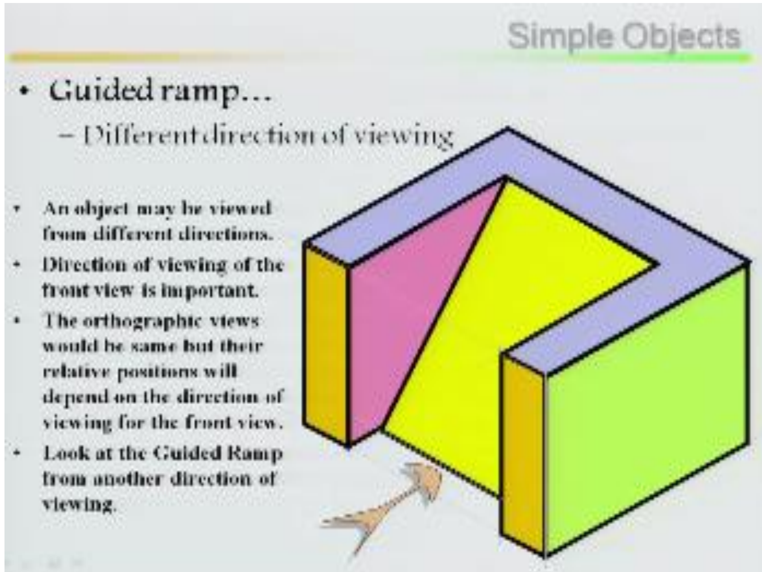

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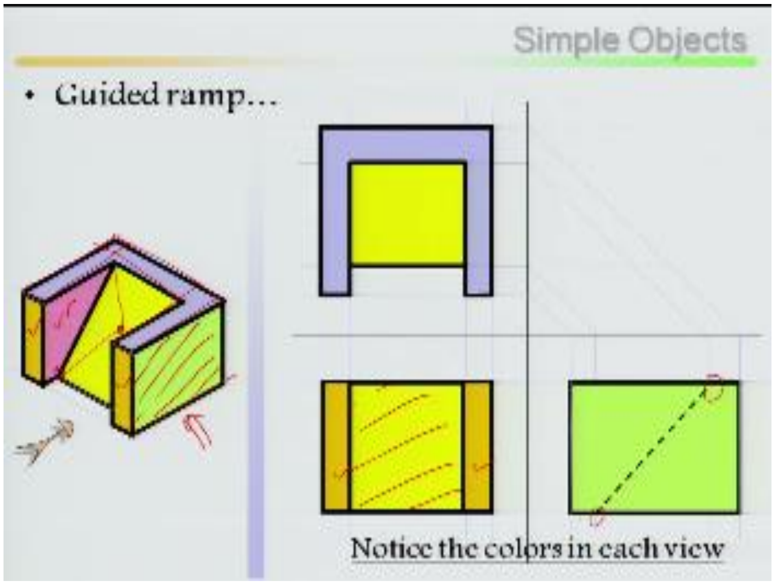

So then in this case, in this case your front view we will look at these are the two, two different front view, then similarly your top view as well as your side view will come into picture, so as it is already shown, so then in the side view the moment you are looking from this side, right hand side view that means you can only, you can only visualize this surface, this surface, so this surface once you are going to visual then this, this will be going to merge, this is going to be merged, this will be going to merge.

So this slanted surface, this slanted surface that will be your hidden line, so here it is slanted surface is your hidden line. How the hidden line it has come, as I said last class side view is easiest way we can draw once you draw your front view, as well as top view. So from this take it back, take it back, from this you take it back so you will find it out your where is your slanted surface is there you can put your dotted. Notice this colors in each view.

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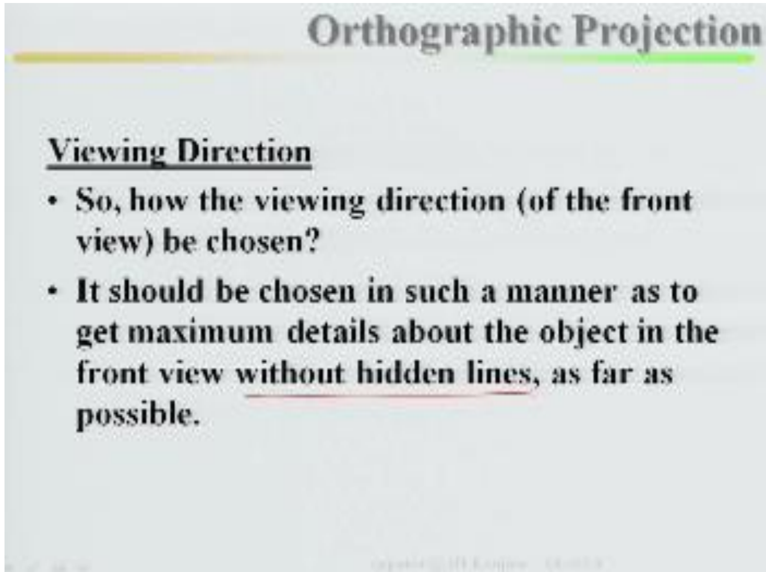

Then viewing directions, so how the viewing direction of the front view to be chosen or be chosen. It should be chosen in such a manner as to get maximum details about the object in the front view without hidden lines, remember without any hidden lines as far as possible maximum details of the objects, that means dimensions, is there any curved features, is there any slanted features, if it is it a continuously throughout the in the depth direction, is there is any gap, so maximum details about the object

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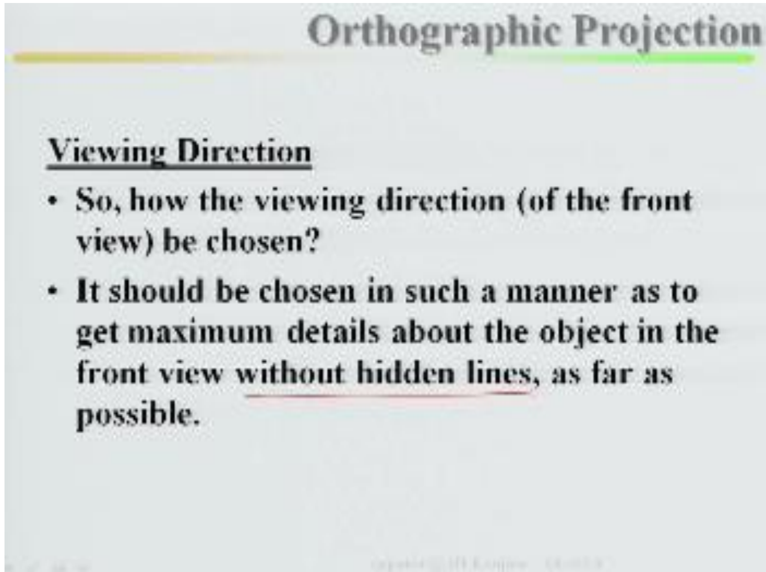

You can visualize, then that direction has to be chosen as your front view, as far as possible less number of hidden lines would be chosen particularly in, in case of your front view.

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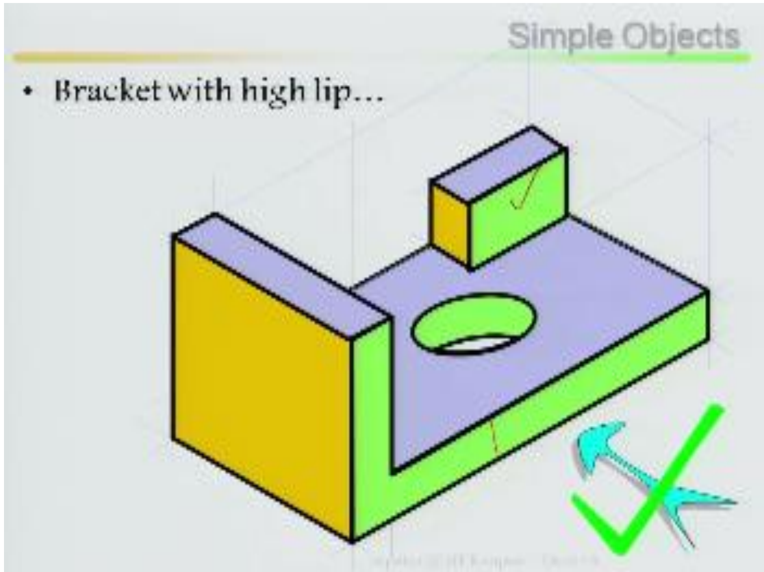

Then for example say this is your bracket, this bracket which direction I can visualize, it is given here I can visualize in this directions, I can visualize in this directions, I can visualize these directions, I can visualize from these directions. So which one is correct, is this correct, let us check, no. Why it is not correct, if I visualize from here what will happen? I will visualize only the surface, in the front view it is very difficult to see what are the object, what are the inside the object that means this curved is not going to come, there is another shape here, it is not going to come.

So it is not going to come, so this is wrong, that means choosing the direction of your view particularly front view it is most important in graphics particularly in engineering drawings, can I visualize from this directions yes, as she said yes, because here if I visualize I can visualize there is a here, guided map is here, here there is a hole or a drill throughout the drill so that it is not half away, along the depth it is throughout and there is also guided map. So this is correct, this is most important in drawing whether it is a first angle or third angle projections. Front view, the direction of your front view you have to choose, remember as I say.

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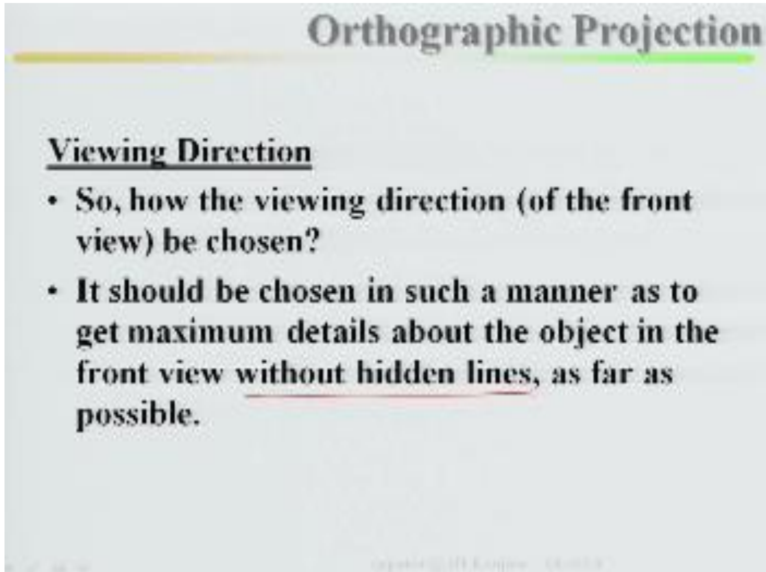

Let me repeat it, it should be chosen in such a manner as to get maximum details about the object in the front view, maximum details about the object in the front view, second condition is without hidden lines as far as possible, as far as possible, it may possible one or two hidden lines may come but try for without any hidden lines.

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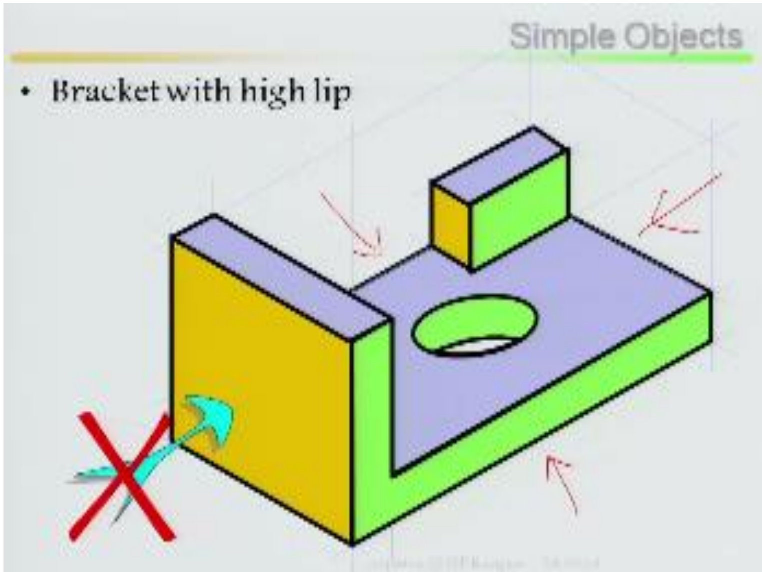

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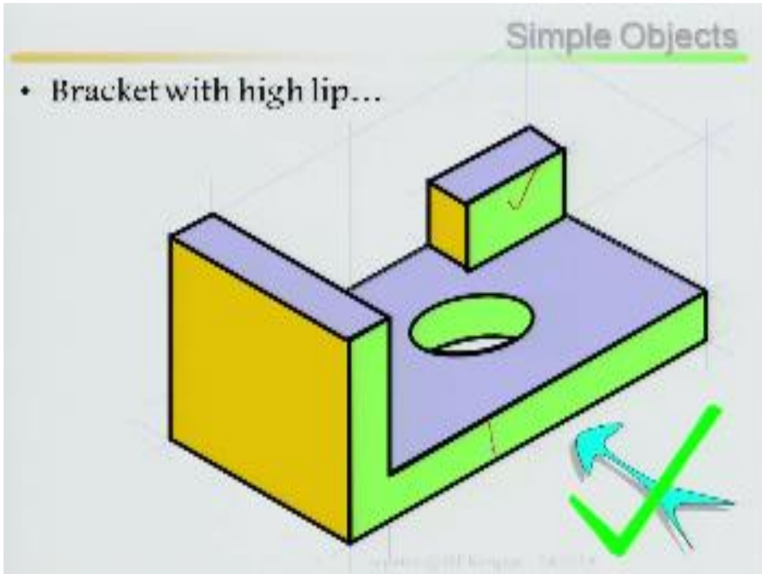

This is your example one, now come to.

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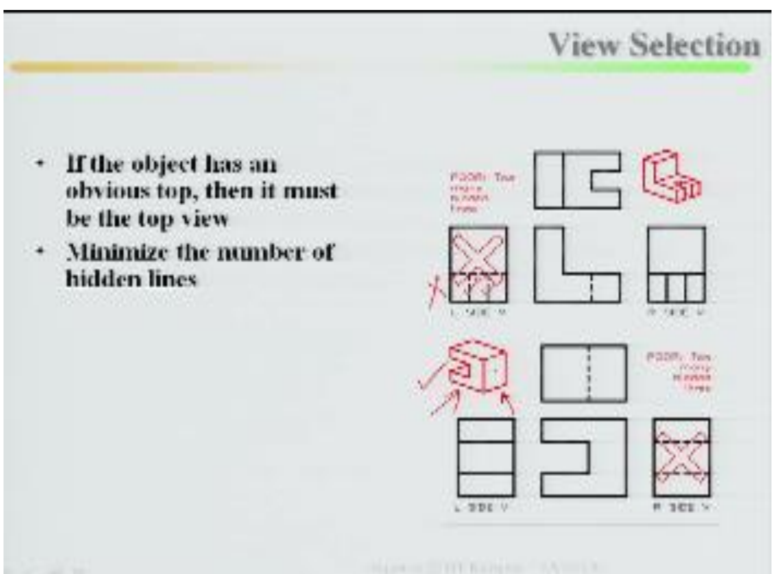

Second example, if you look at here, if the object has an obvious top then it must be the top view, minimize the number of hidden lines, if you look at here this is the view has been given, then again view selection also most important. What happened in this case top view, front view, right side view, left side view is there, as I said last class minimum number of views required is three views for describing a object unless otherwise it is not complicated, you can try for other three views. In this case where is your maximum number of hidden lines, maximum number of hidden lines are there in left hand side view.

If I compare with left hand side view with your right hand side view maximum hidden line 1, 2, 3, here there is no hidden line, so then if it has to be represented by three views then you discard your left hand side view, that means top view, front view and right-hand side view, this is your correct orientations. Similarly in this case this is your object look at here, here is your front view, here is your top view, I am looking front view here, this front view, top view, then this your top view, then this is your right hand side view, right hand side view means there will be definitely

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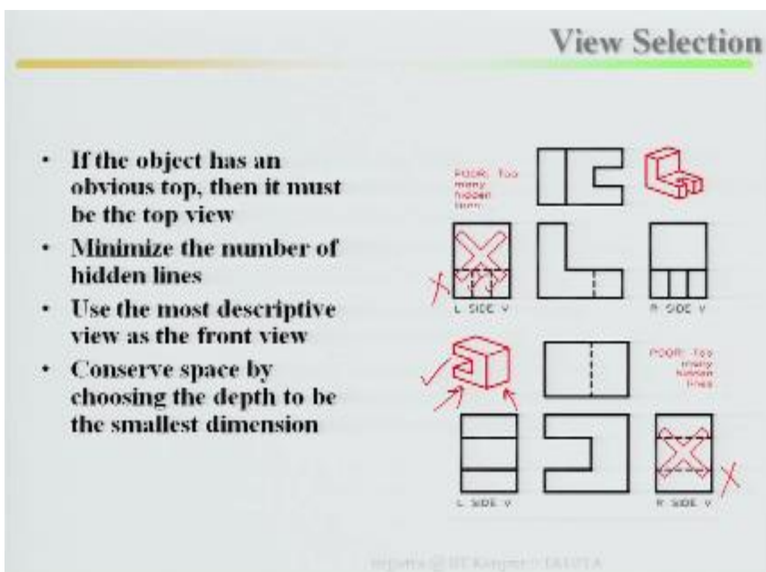

Hidden lines will be there and this is your left hand side view, if I compare left-hand side view and right-hand side view in this case right hand side view more hidden lines are there, so as far as possible you discard this, too many hidden lines, that means you represent to this case particularly this case you are viewing in this directions then you represent with your top view, front view, and left hand side view, same object if I change from position to positions then your views also representing for your orthographic you have to change.

Because as far as possible you avoid hidden lines, use the most descriptive view as the front view, most descriptive view as I said also even in previous slides maximum number of features you can describe in that view use as a front view. Conserve space by choosing the depth to be the smallest dimension remember this, choose depth to be your smallest dimensions otherwise what happen depth is your larger dimension if you are chosen then it will be difficult to plot, depth to your smallest dimension so that.

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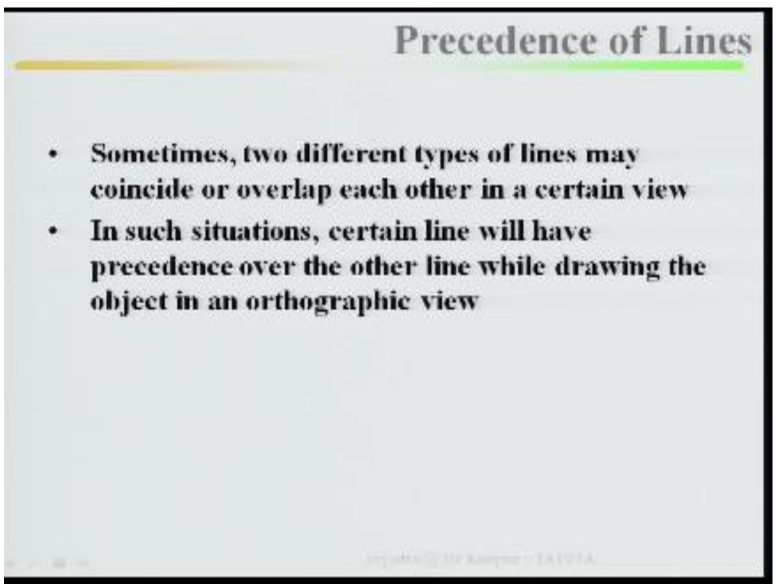

It can be easily plotted; sometimes two different types of lines maybe coincide or overlap each other in a certain view, in such situation certain line will have precedence over the other lines while drawing the object in an orthographic view.

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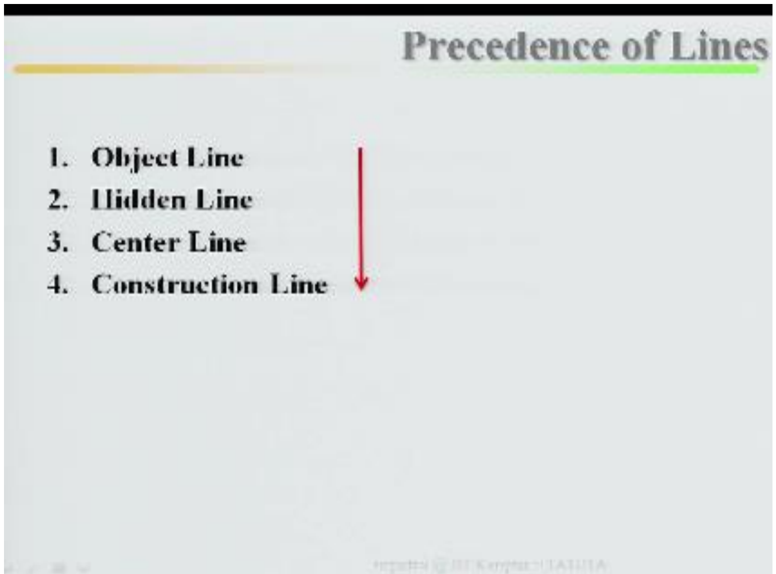

Look at here Object line, Hidden line, Center line, Construction lines.

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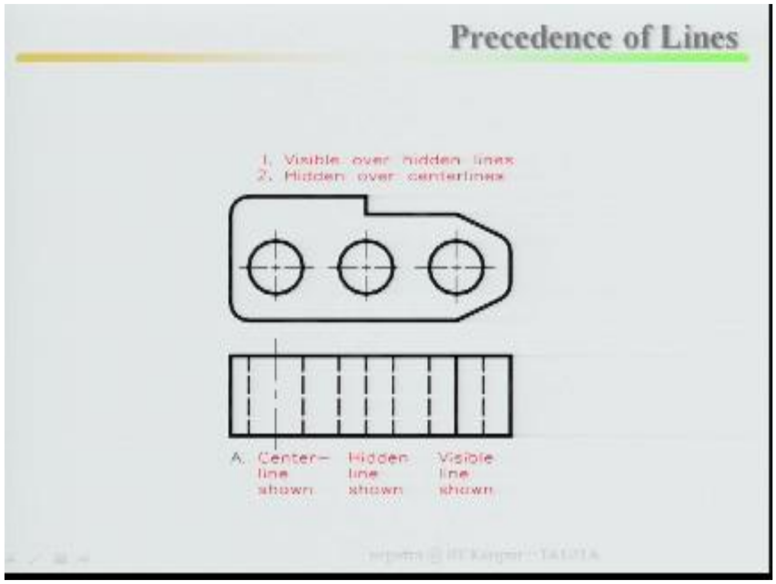

First visible over hidden lines, second hidden over your center lines, visible over first one is visible over your hidden lines then hidden over your centerlines, here if you look at here hidden lines shown, centerline shown, visible line shown.

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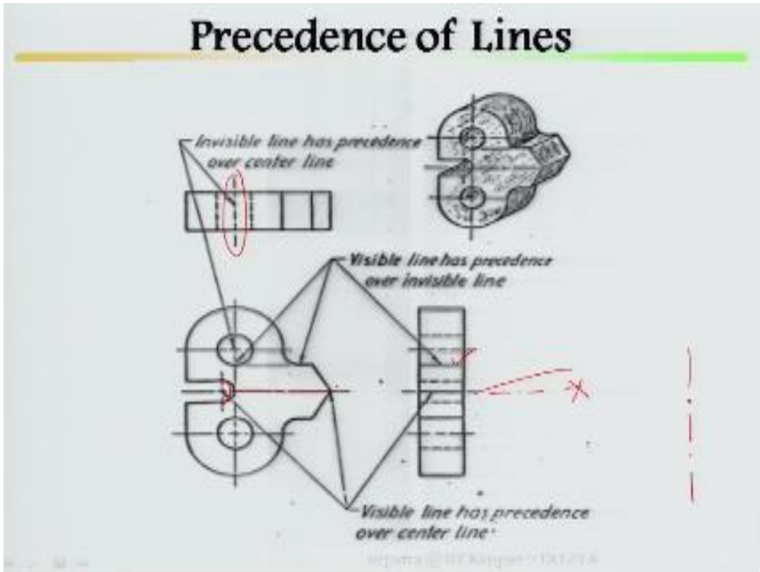

Precedence of the lines you understand precedence of line what I am explaining? Invisible lines has precedence over the centerlines, suppose in this case if you look at here, in this case what happened from the top view or from the front of view, from the top view if you are looking at here in this case this part is not visible, that is means this is below this, that mean there is a invisible lines, hidden lines but at the same time this is a circle, this is a circle, that means then your centerline will come into picture.

You have to define for a circle your center line will come into picture because it is invisible, invisible line has to be shown rather showing your centerlines, so in this case instead of showing the centerline as on your invisible lines. So that means invisible lines has precedence over your centerlines, similarly visible lines has precedence over your invisible lines, that is true, that is true, if there is invisible lines there is a visible lines definitely we will show the visible lines rather than your invisible line, but with this invisible lines with the centerlines invisible lines has come first rather than your centerlines.

Then again visible lines has precedence over your centerlines, this is a typical example where visible, invisible, and center lines is there. Case1 invisible lines has precedence over your centerline, case2 visible lines here it is visible lines has precedence over your invisible lines, case 3 visible line has precedence over centerline. In this case if you look at here this is your line where is your visible lines is going on but at the same time there is a circle here, half the circle that means here also centerline will also come into picture.

So centerline I am not going to draw, the centerline as well as visible line is coming, here you have to put your visible lines, this comes automatically over the period of time in practice. In the exam particularly where you are showing this, particularly what is the confusion it starts, the moment you show the drawing to somebody else about the features then if it is not visible line, if it is a particularly centerline that means what does it mean only this part is there, that means the visible line throughout the continuous it is not there, so it will create difference while reading this particularly from the views your entire object.

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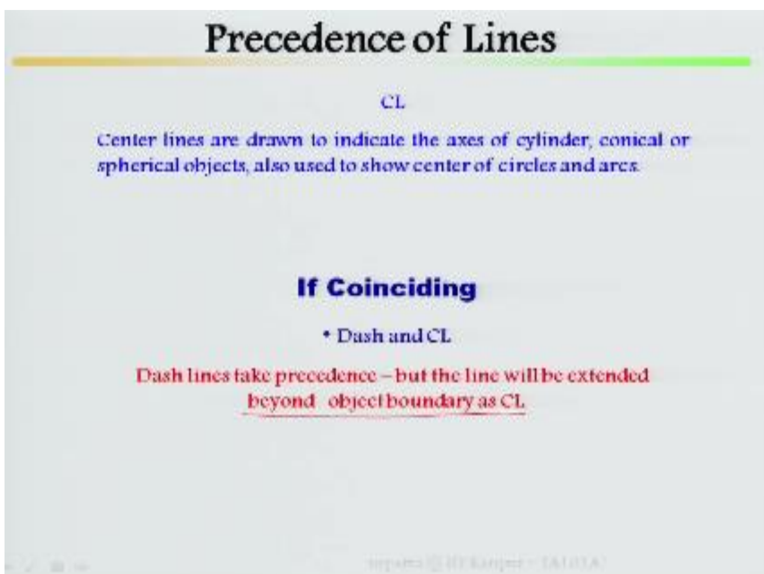

Centerline, centerlines are drawn to indicate the axis of cylinder, conical, or spherical objects, just a little bit definitions also used to show the center of circles and arcs, remember centerlines are drawn to indicate the axis of cylinder, conical, or spherical objects, also used to show center of circles and arcs. If coinciding Dash and center line then what will happen, Dash line takes precedence, Dash line means as I said it is your hidden line, hidden line take precedence but the line will be extended beyond the object boundary as centerline.

Remember the condition here, line will be extended beyond object boundary as center line.

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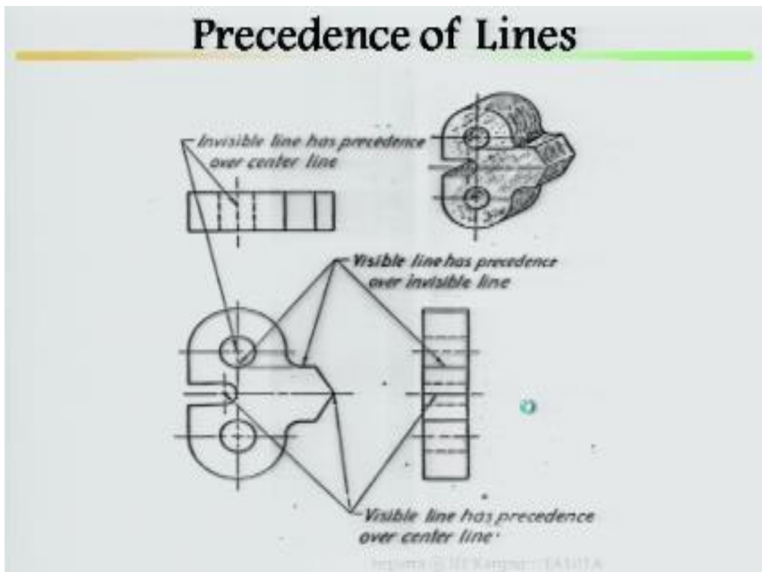

Let me go back.

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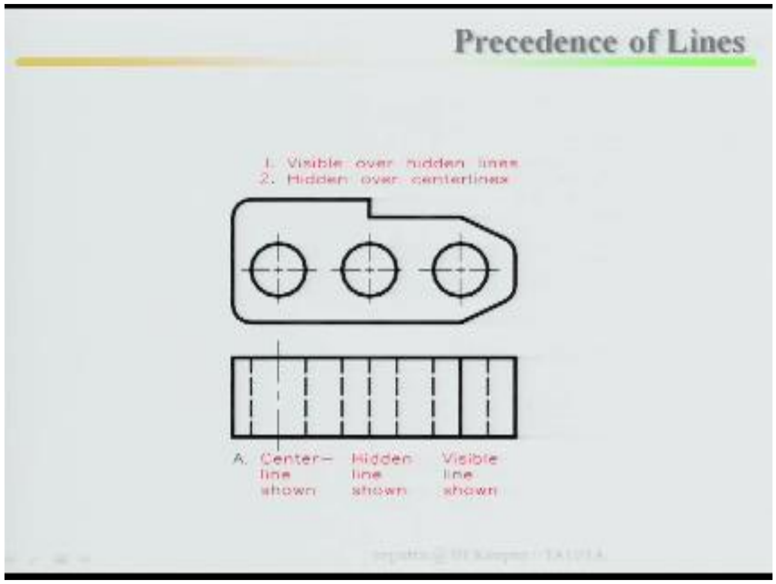

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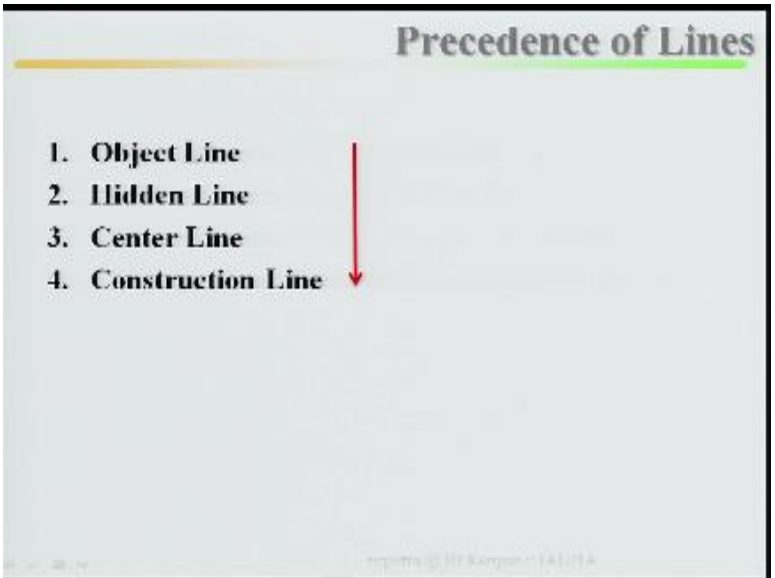

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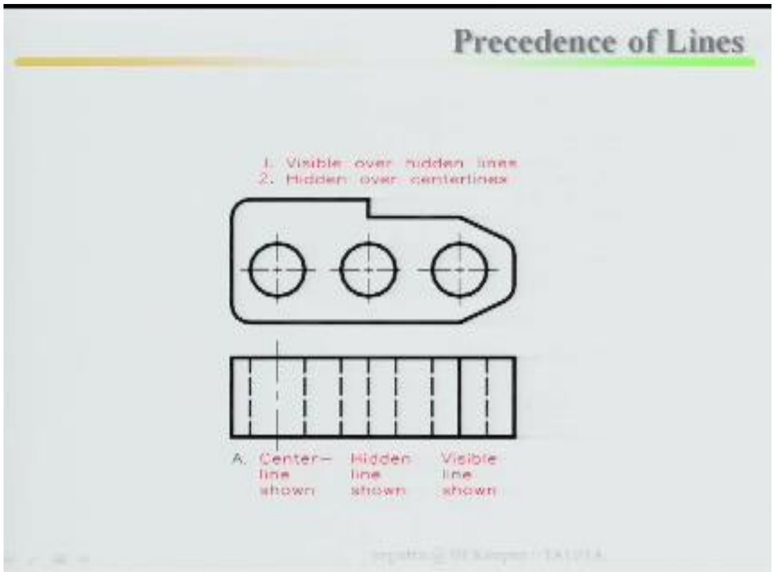

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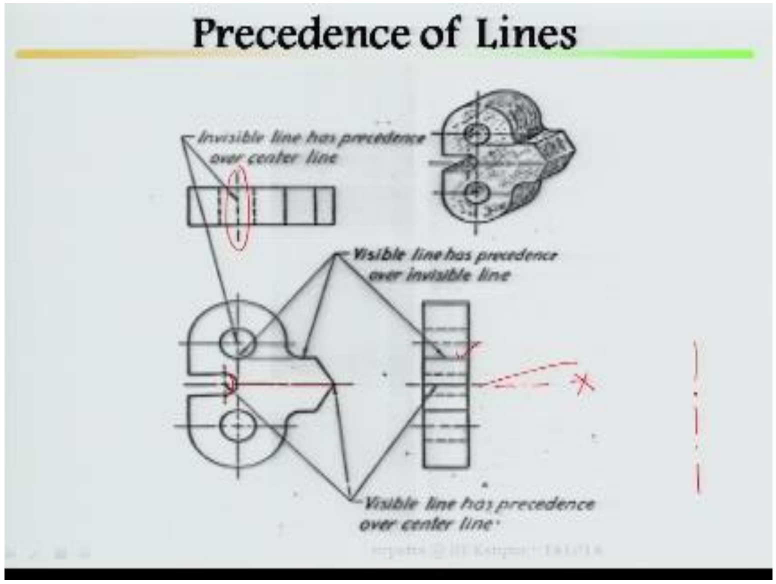

See line has been extended here, once the moment your visible lines precedence over invisible lines determines this line has been extended beyond this, that means the moment somebody will read about the object they will think that visible line + center line is there because it has been extended.

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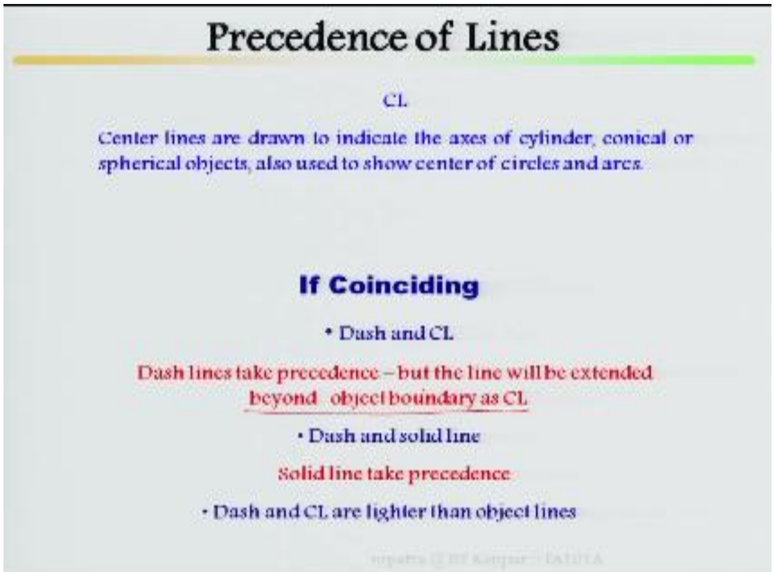

Dash line, centerline if coinciding, Dash line and solid line obviously solid line takes the precedence as I said visible line will take the precedence, Dash and centerline are lighter than object lines, Dash and centerlines are lighter than the object lines remember.

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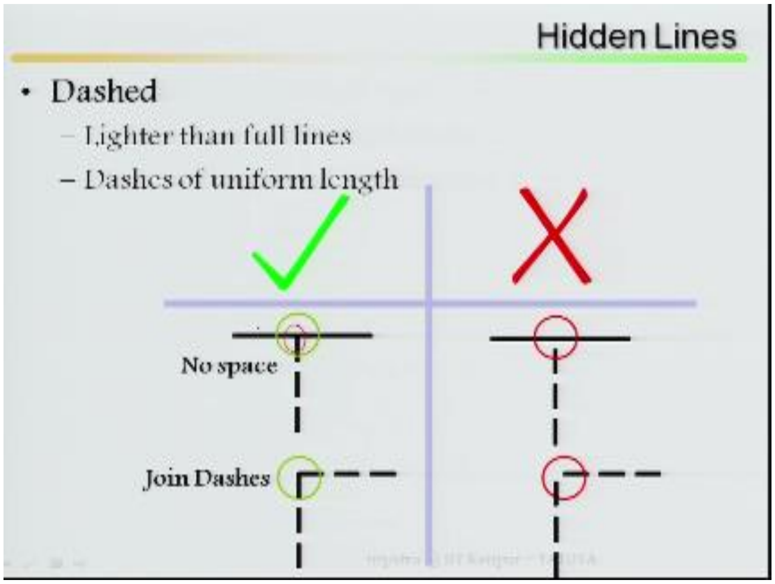

Dash lighter than full lines, if you look at here, here it is let me finish it, look at the two parts, this is your object line, this is your Dash lines so if I draw it here there should not be any space, there should not be any space, it should be uniform length and it should be continuous, this is wrong.

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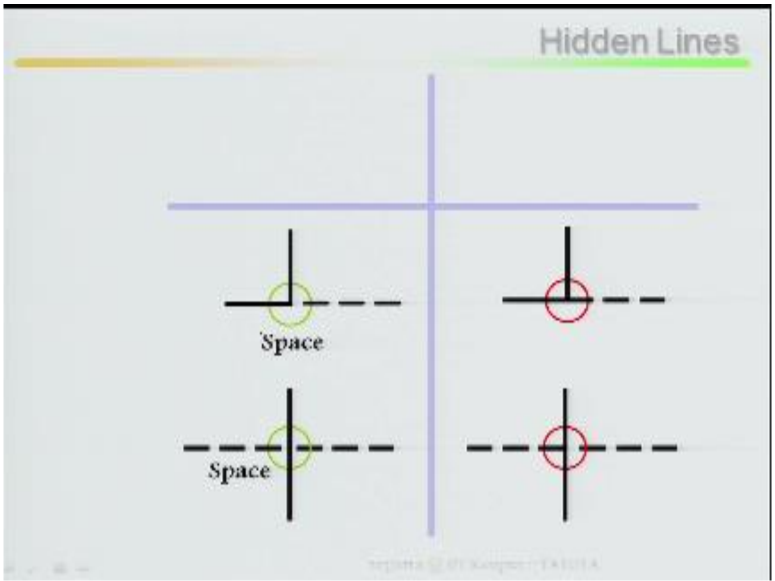

Here look at here there is a space here, in this case once it is there this part is again wrong during the intersections, this is wrong there should be a space.

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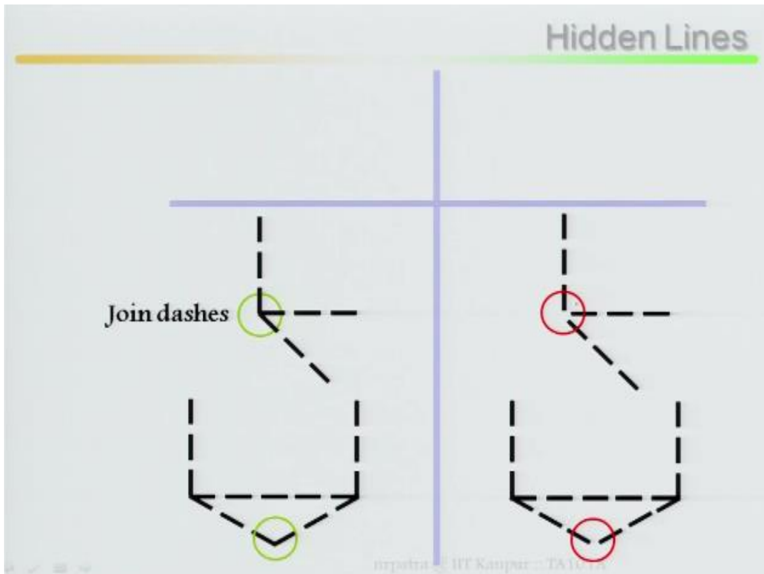

Then join dashes if there are three hidden lines, join at one point there should not be any gap.

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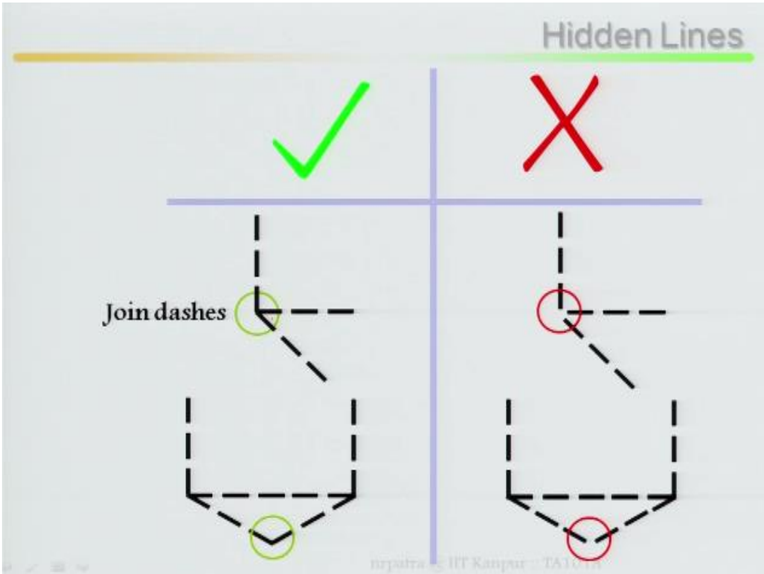

There should not be any gap this is wrong, once it is joined three hidden lines it should be continuous it is there should not be any gap, here there should not be any gap.

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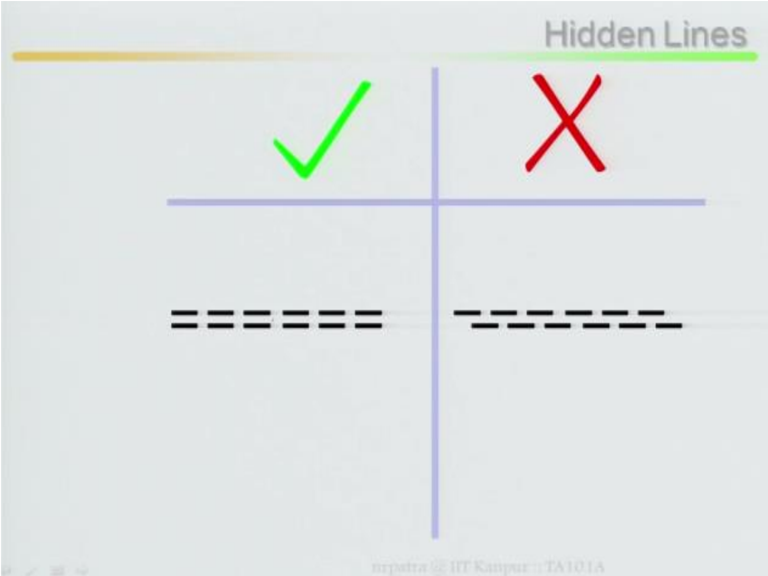

Hidden lines, two hidden lines if you draw it should be parallel to each other it should not be like uneven hidden lines it is correct, these are all kind of a thumb rules it is there in orthographic projection before I start the examples taking one by one example how the orthographic projection has been drawn.

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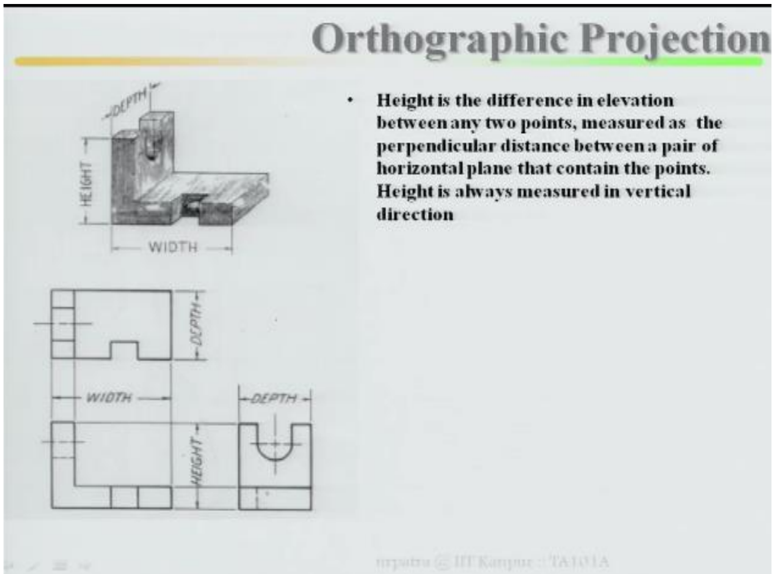

Height is the difference in elevation between any two points measured as the perpendicular distance between a pair of origin to plane that contains the points. Height is always measured in vertical directions, then if you look at here this is your width, this is your height, this is your depth, height is always measured in vertical directions remember, you cannot take this as a height, height is always measured in vertical direction this to this you cannot change it.

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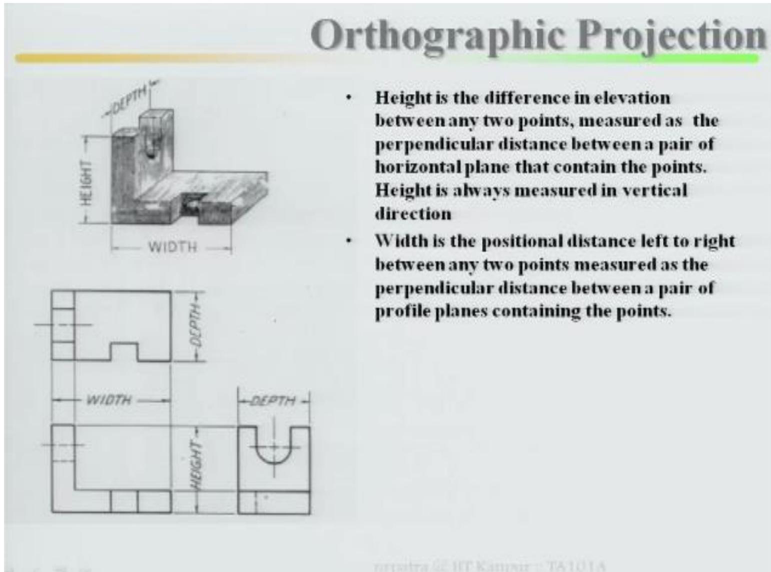

Width is the positional distance left-to-right getting my point, left to right, this is the left this is the right, there are many mistakes people do while doing. Somebody can say that sir I can take this is height, this is width, no, width is your positional distance left to right between any two points measured as the perpendicular distance between a pair of profile planes containing the points, this is your width, you cannot take this is your width, this is your width.

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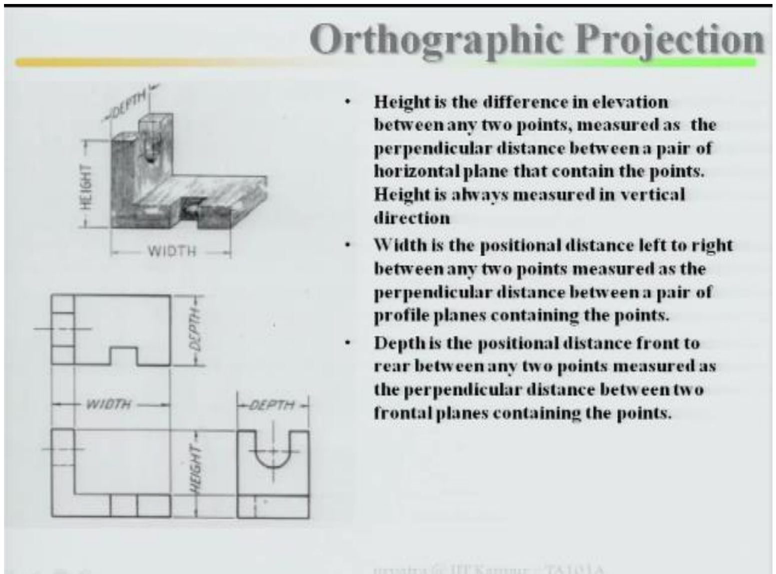

This is the positional distance front to rear, always once you choose this is my front view, once you choose.

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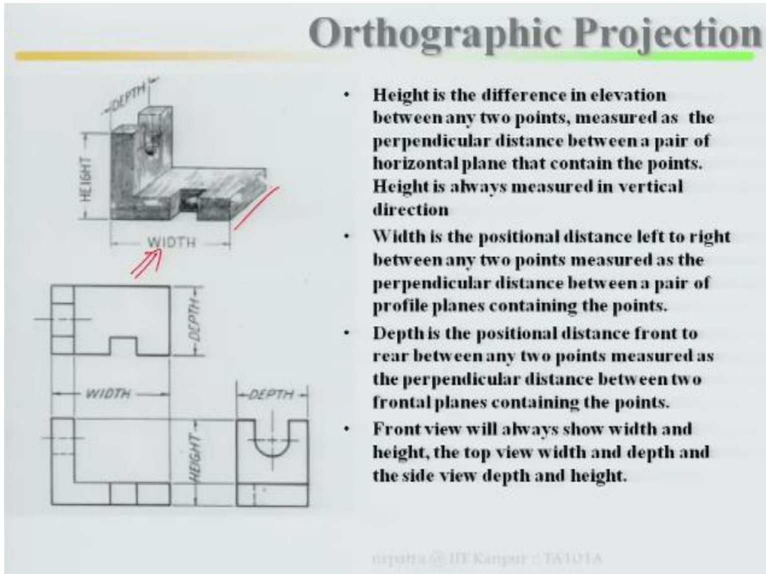

This is the direction of the front view, that means from front to rear obviously this will be your depth, you cannot change the depth, so front to rear between any two points measured at the perpendicular distance between any two frontal plane containing this points, so that means depth, width, height, definition, has to be followed and it will be width has to be marked real width position, depth has to be marked real depth position, height as to be marked real height positions, you cannot change it.

Front view will always show width and height, front view always will be width and height, front view should not be width and depth. Top view similarly top view depth and width and side view depth and height. If this part if you know then everything will be clear. Latter part you are not going to mistake anything else if you look at here this is your front view this part is your front view will be width and height, this is your top view depth and width, this is side view side view will be your depth and height. I think I will stop it here and next class I will continue further, thank you

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