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

Lecture – 13
Isometric Projection - Part-V
&
Oblique Projection - Part- I

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So last class up to drawing arcs in

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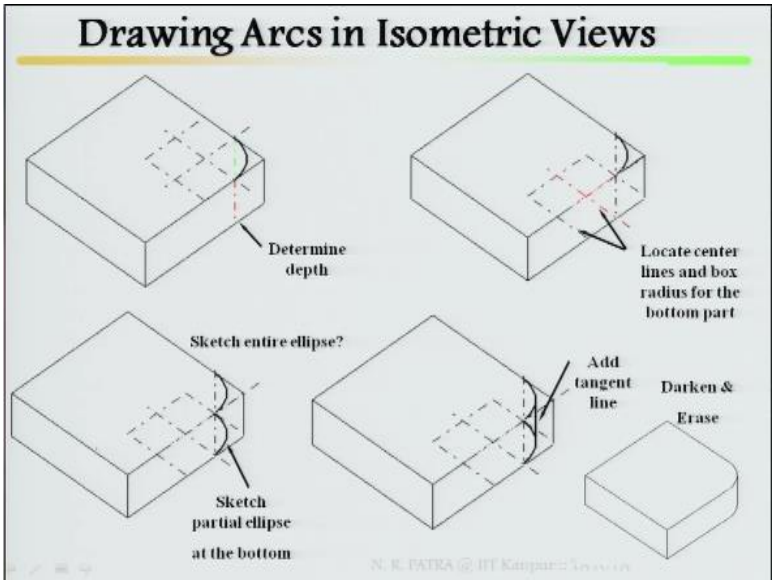

Isometric views have been completed.

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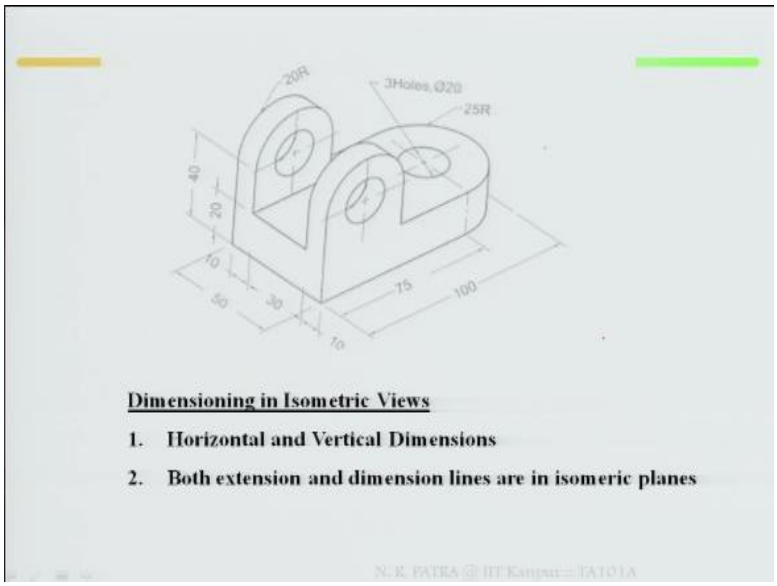

Let us start with dimensioning in isometric view, though dimensioning I have covered earlier for orthographic views, so horizontal and vertical dimensions both extension and dimension line in, lines are in isometric planes, remember dimensioning should be done in isometric planes x, y, and z you cannot do dimensioning beyond isometric planes because if you look at here

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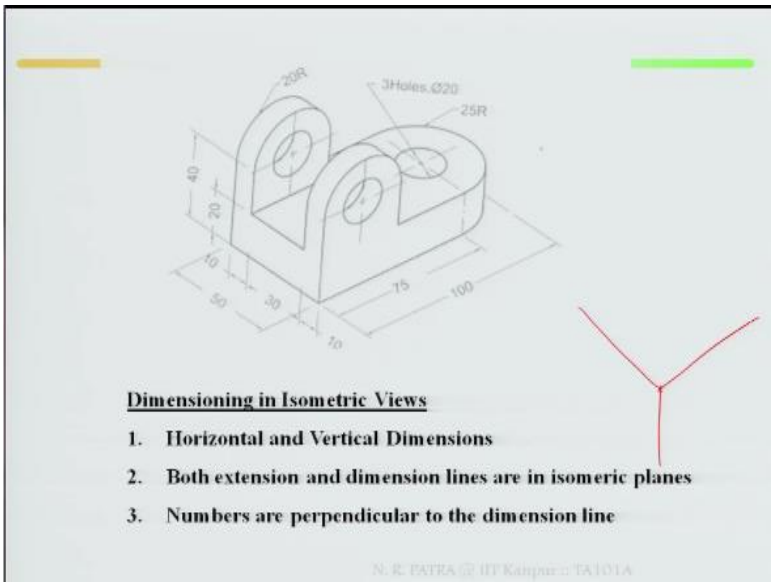

This is your object and this is my planes x, y, and z, numbers are perpendicular to the dimension lines.

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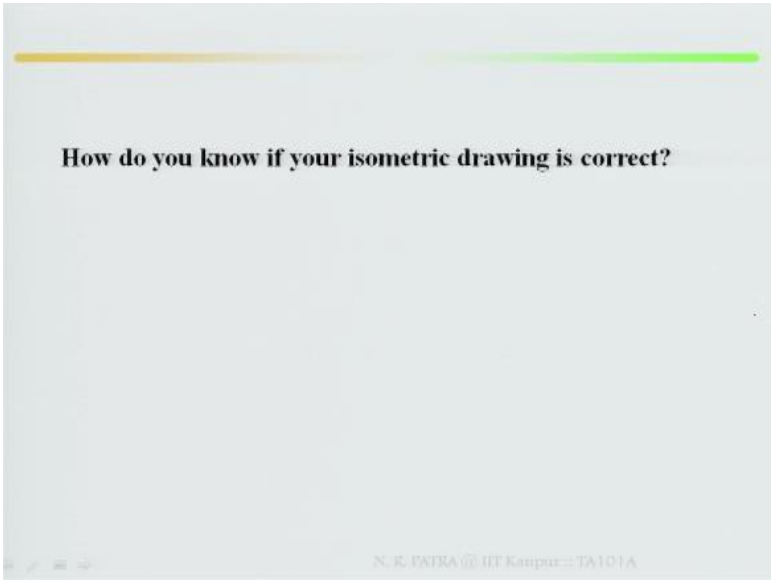

How do you know if your isometric drawing is correct? As I said earlier from isometric drawing you again draw front view means three orthographic views can redraw it then you can check whatever the view has been given to you, top view, front view, and side view, whether it is matching or not if not then there is a problem in isometric drawing.

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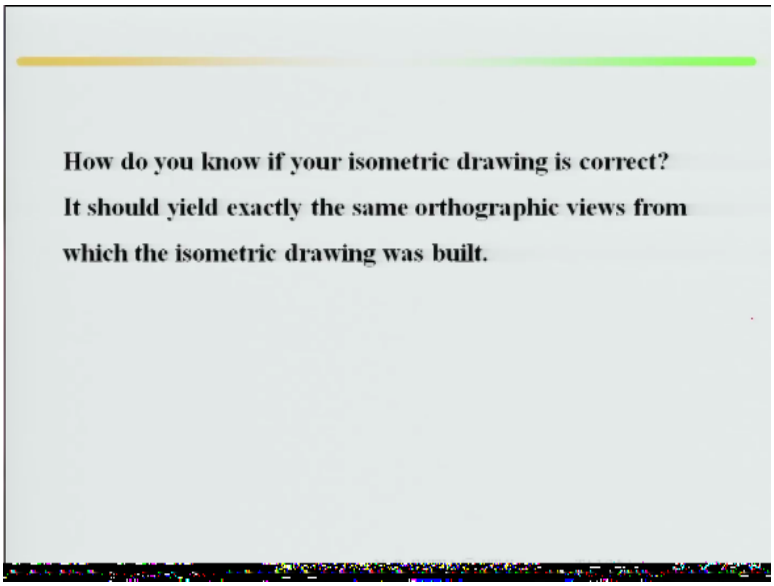

It should yield exactly the same orthographic views from which the isometric drawing was built.

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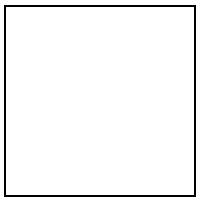

So let us start with this some basic constructions more number of examples that will help, we have finished by means of box method, offset method I have not shown, offset method also easy, so isometric axes.

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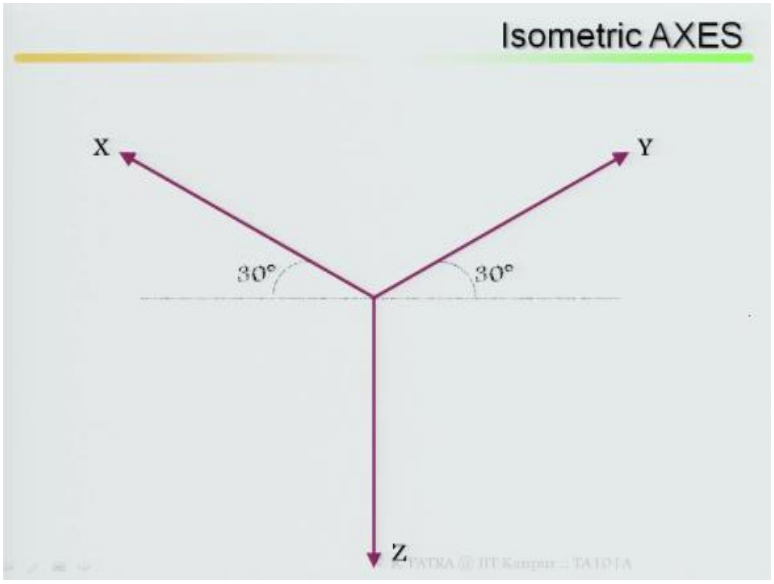

Fist you draw a line with respect to that 30 degree x and y you can draw then j to that perpendicular you can draw it, or you can draw it under 20 degree each.

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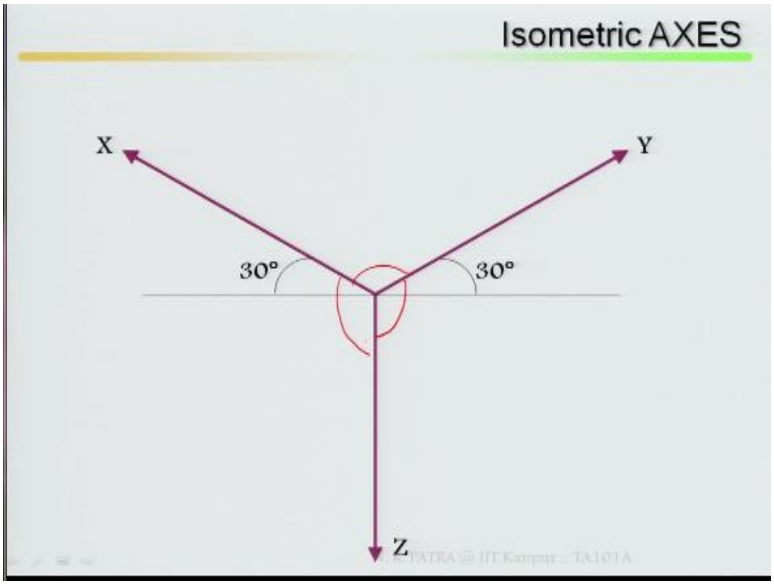

This is under 20 degree, this is under 20 degree, and this is your 120 degree, once you draw the isometric axes, then laid the dimensions.

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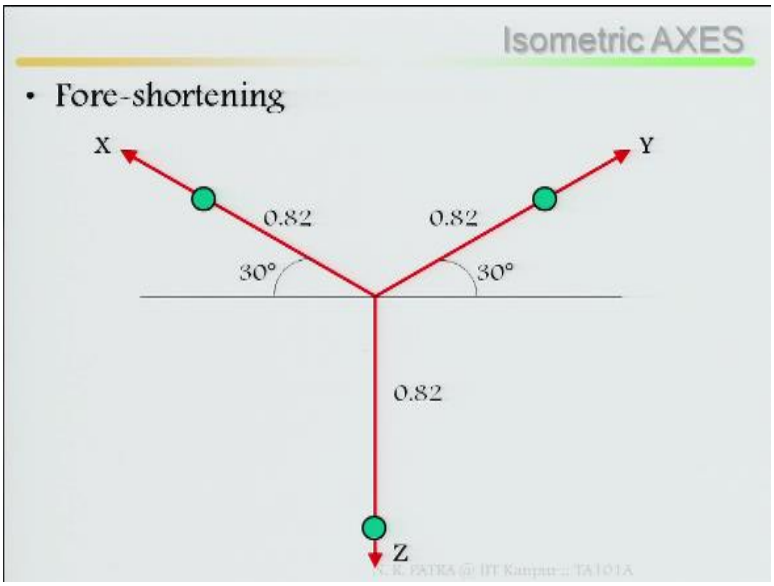

Corresponding to actual dimensions sorry then if it is a isometric drawing, isometric drawing then it should be actual dimensions, if it is isometric projections then it has to be reduced equally by means of 0.82, so these dimensions from isometric scale you take it and mark it.

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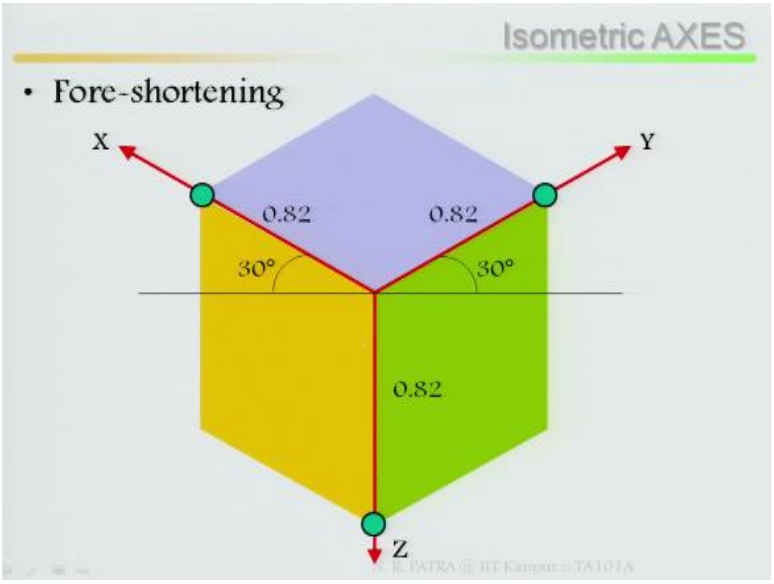

So that you can finish you isometric box, that means you are foreshortening in x, y, and z directions.

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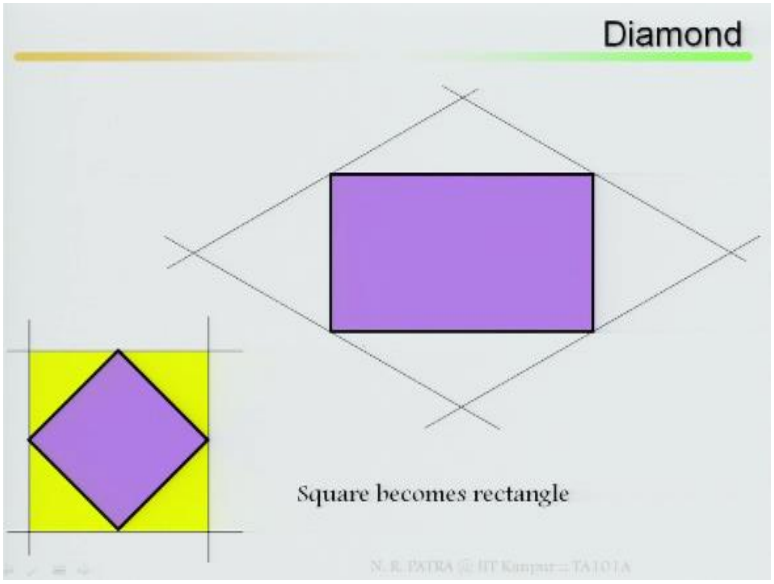

So for example square in a diamond shape, square becomes rectangle in isometric.

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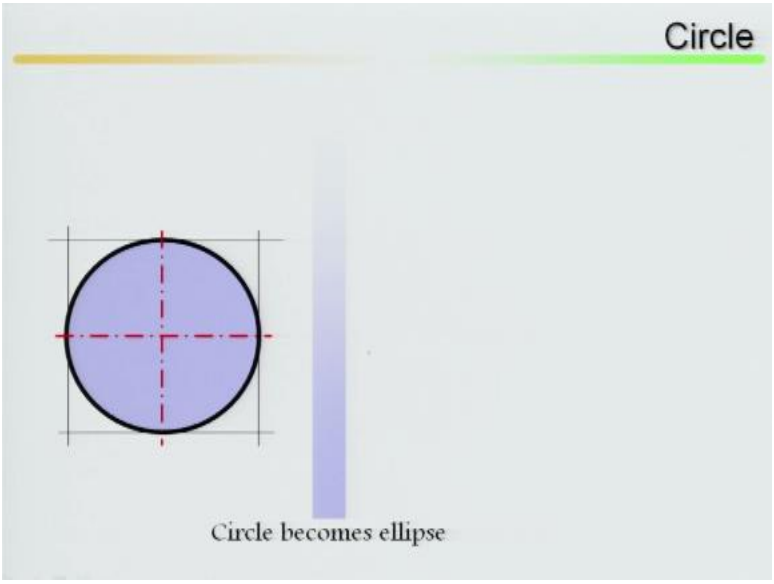

Circle becomes ellipse as I said earlier so how do you draw, in the front view in the orthographic view in the front view if there is a circle or in the top view there is a circle or may be in the side view there is a circle.

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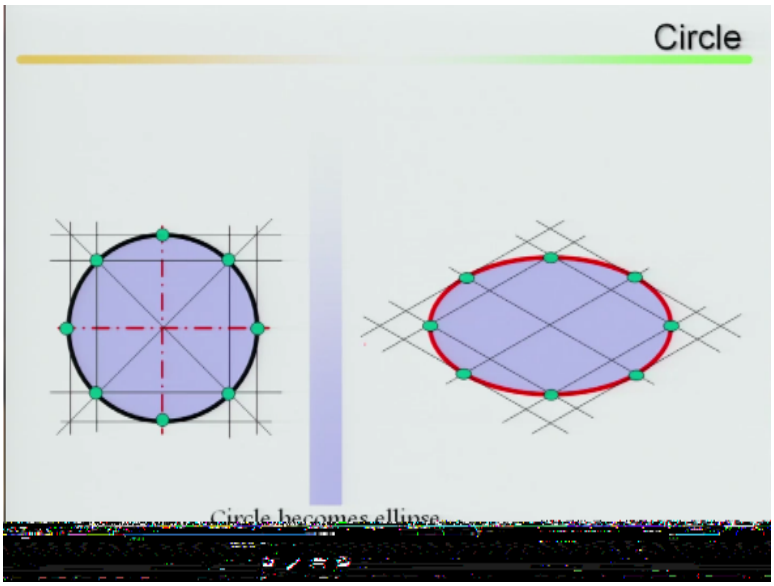

Take equal number of points around this circle, what I am doing I divided into four parts then again I draw it and mark the points along the circles. Mark different points 1, 2, 3, 4, 5. 6 more number of points you take it, it will be easy to plot of your ellipse in accurate way, then draw your same dimensions you draw it in isometrics, isometric scale or isometric view, then mark this points respective points taking the code units with respect to as I said by means of box method.

Taking a reference point take the code units with respect to that you mark your coordinates, then draw the ellipse so circle becomes.

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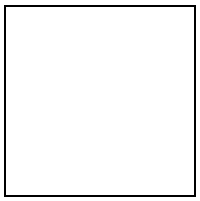

Ellipse, now similarly this circle can be drawn ellipse in top, front, as well as side view.

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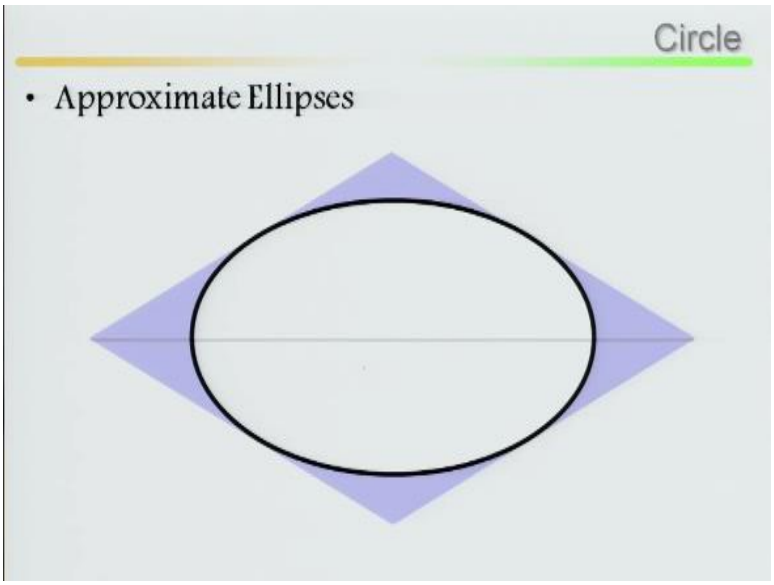

Approximate ellipse I have covered.

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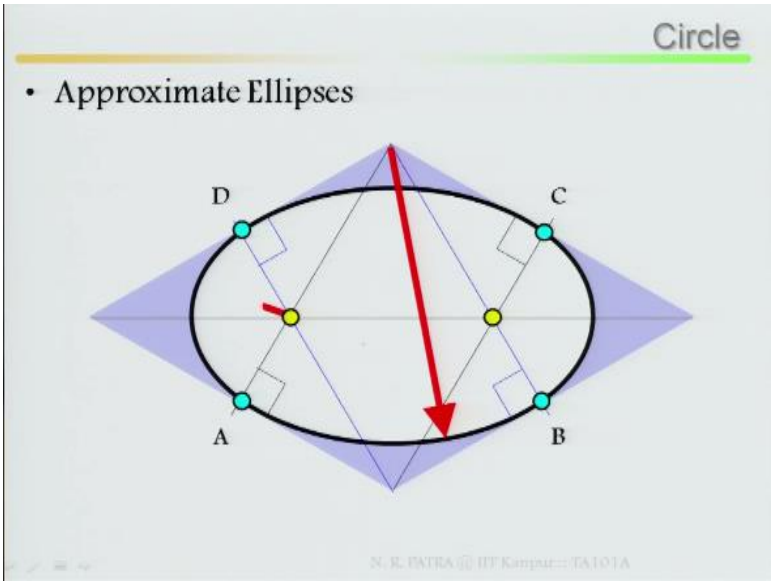

By means of fore center, methods you can draw your approximate ellipse.

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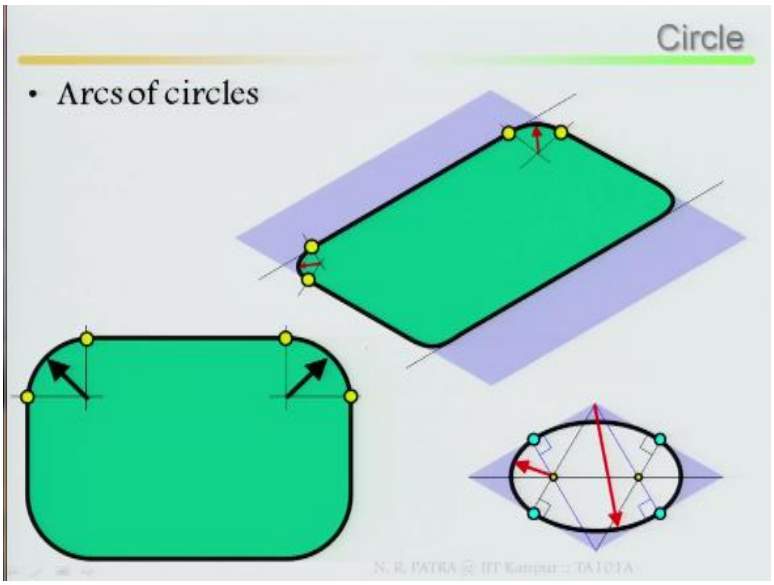

And arcs up to this we are covered arcs series.

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Then let us start few many examples by means of offset methods or you can draw it by means of box methods, winner stand.

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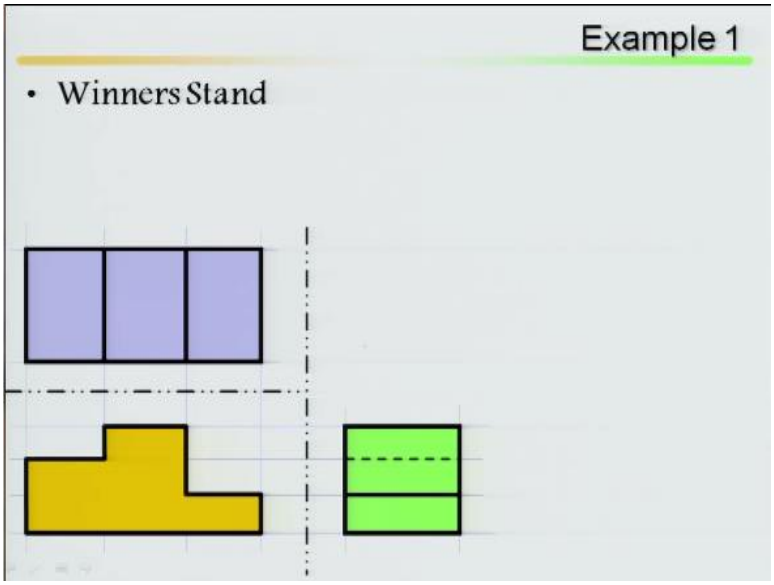

If you look at the winner stand, simple winner stand where your number one winner, first runner up, second runner up, then your winner they have to stand one by one, this is simple winner stand and this is your top view, front view, and this is your side view.

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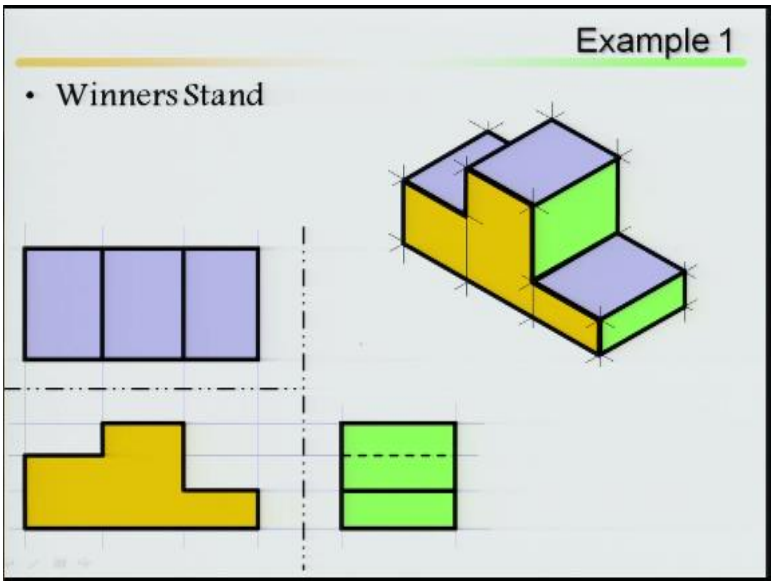

Then by means of offset method draw the base then take the, take your respective offsets, offset means that means you are raising, first you draw, first you if you look at your first you draw the base, then take the respective dimensions in the box instead of constructing box then do it, you can do it by means of offset methods directly you can measure the dimensions with respect to coordinates and take it by means of offsets, do it, finish it you can do, do the coloring you can do the coloring how it looks, so this is a simple stand, simple winner stand like first runners up, second runners up, then champions is simple rule stands.

Then you can cross check, then you can cross check with this whether this is correct or not by taking this front views, where is your front view, we are looking from this side if you look at the color this is my front face, look at the color this is the top face, obviously this will be merge

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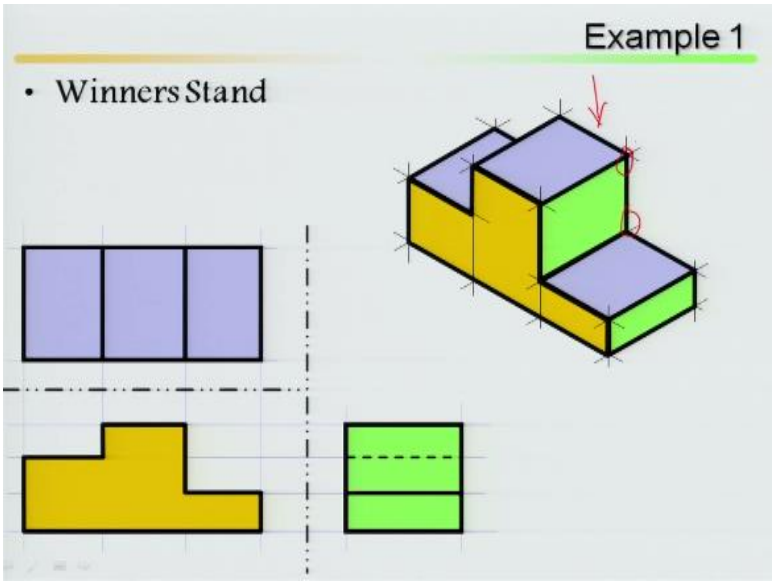

Because this point and this point once we are looking from the top will be merged so it will not be there this color will not be there in the top view. Then go to this side view then you can check whether is your top view, side view, and front view is correct or not, if it is correct your isometric view is correct.

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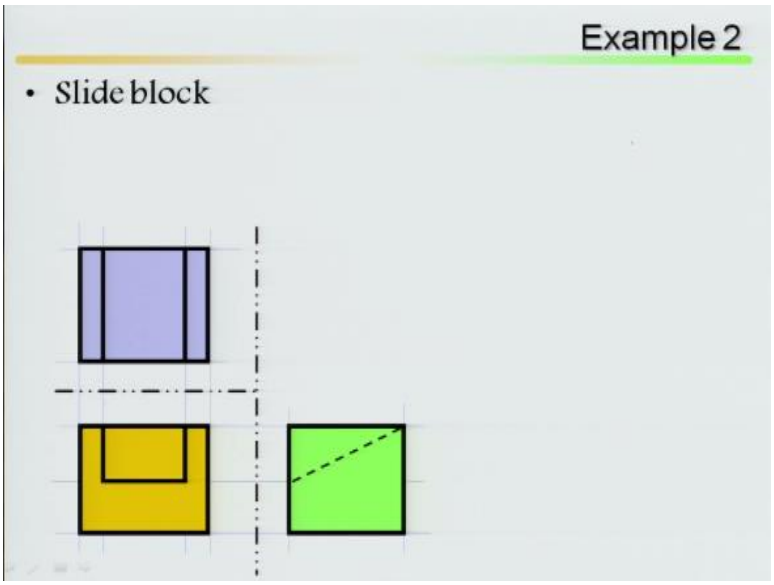

Now come to this second slide block, second example slide block, just many number of examples I am solving you can try these same examples at your home practicing by means of box method or by means of offset method, so that very easily you will be familiar to drawing isometric, either dissymmetric drawing or isometric projections.

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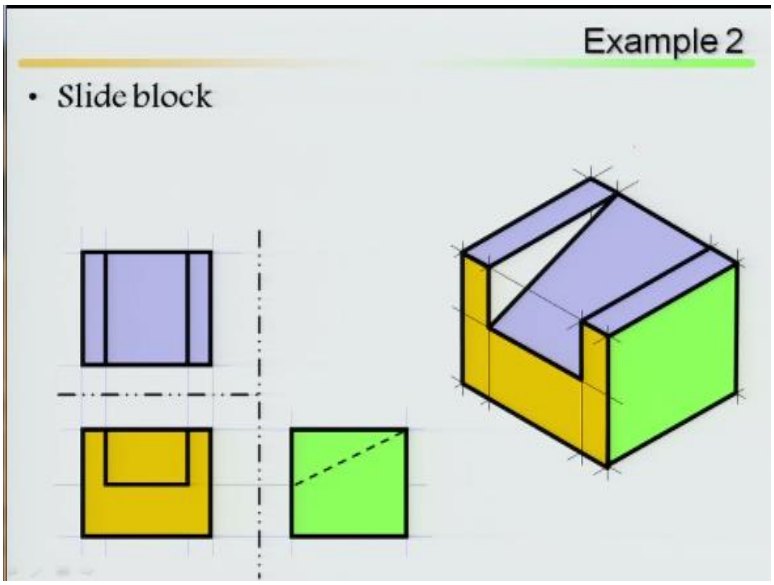

Now it has been tried by means of box methods, just put it a color, slide block, this your slide block is coming you can cross check with your top, side, as well as front view.

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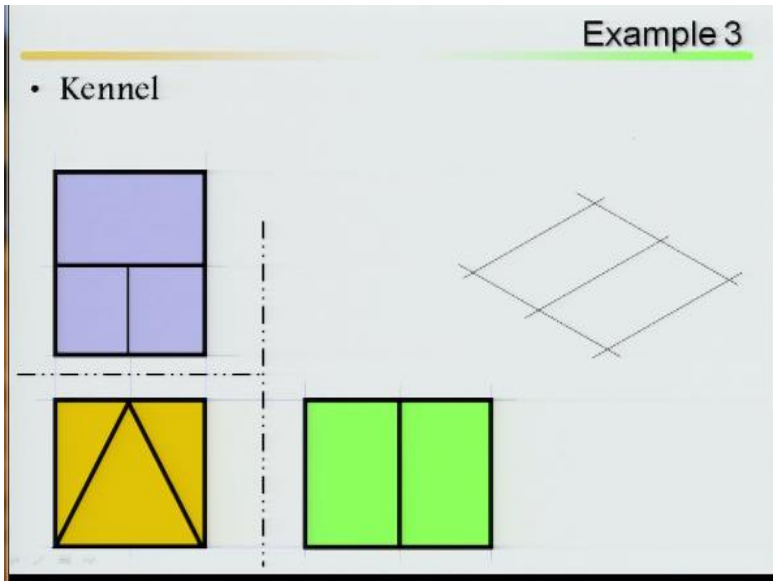

Then kennel, offset method this is not by means of box method remember in the box method first, first in the box method finish the isometric box taking the dimension of width, height, and depth finish your box, complete box finish it, then project it back then erase it. In case of offset method draw it the bottom part then from with respect to that coordinates direct mark your points with respectively then finish your drawings.

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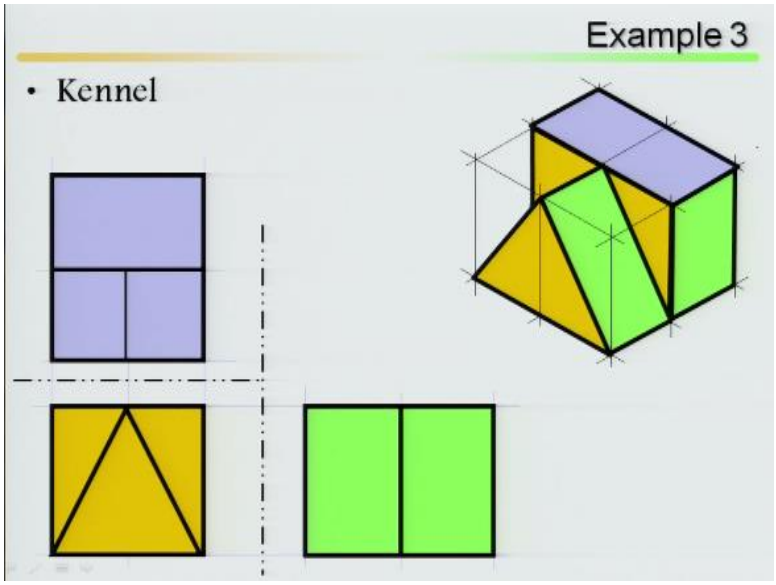

This is by means of offset methods, for your convenient I have drawn it by giving the colors, I am slightly doing not going in detail so that you try unless you do not try then it will be difficult, if you try it, it will be slowly, slowly you will practice so it will be easy for you.

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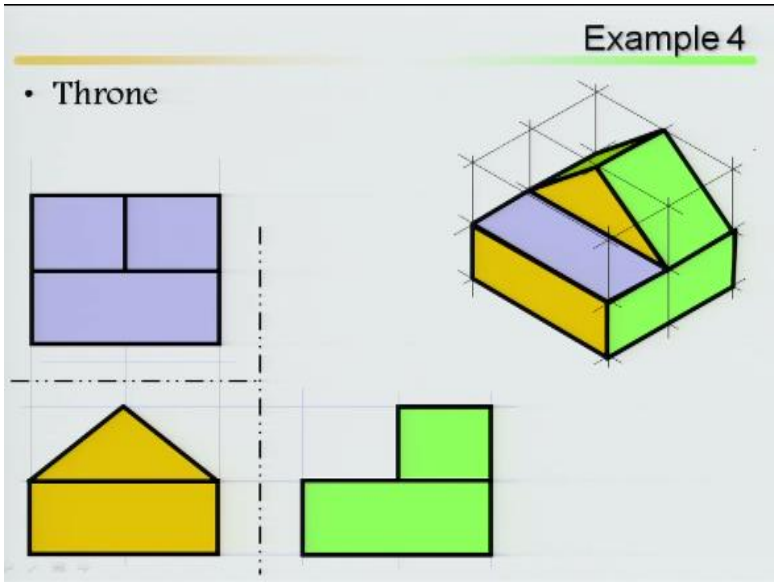

Then throne it has been drawn by means of your offset methods, this is your example pore.

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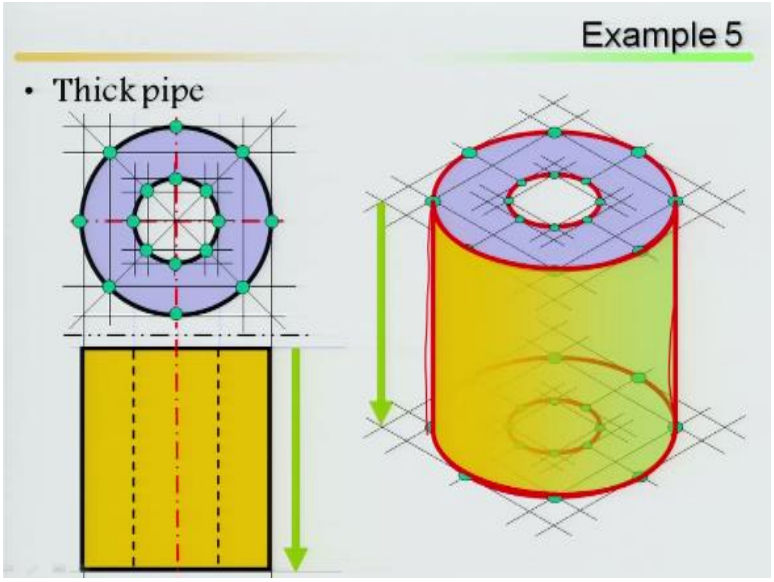

Thick pipe, in the thick pipe what happen look at these example, example pipe, thick top view is circles, two concentric circles, this two concentric circles looks to be in isometric ellipse, so basically along this circles find it out on take as many as number of points so that you can redraw or you can draw ellipse very easily, so it has been marked your points inner as well as outer first is your outer as well as the inner circles, then draw these outer circles at the base.

Because thick pipe is your continuous this is your top view and this is your front view it is continuous, if you look at the front view then there are dotted lines here so that means this is your inner circle, inner circle this is your outer circle, so concentric circles thick pipe, so then base of this you draw it, mark this points and same points you take it draw the ellipse, then go to your inner part at the base, take these points draw it, so this your top view top part is over then if you remember here this top part I have drawn here, then in height on the depth directions.

I am going back then again in the, after taking this height at the depth taking it again draw your ellipse, then draw the ellipse both this concentric circles draw the ellipse, once you have finished at the top and at bottom then it will be very easy draw the tangents, draw the tangents, first what we are going to do draw the tangents from here to here, then draw the tangents from here to here, then once the tangent is over then you visualize which part you are going to visualize you see.

Now if you look at here in this way if I draw it I can see because top view I can see it with looking at the front view, front view this is your dotted lines I cannot see the inside circle or throughout it is there it is your dotted line so that means you erase it, out erase it out in the frontal face only put it this outer circle, so then it will become you can finish it your drawing.

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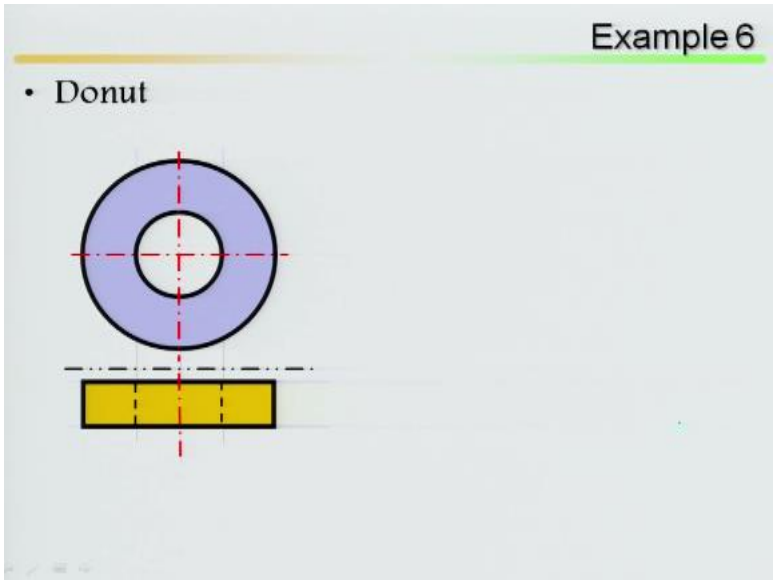

Then this is your final drawing.

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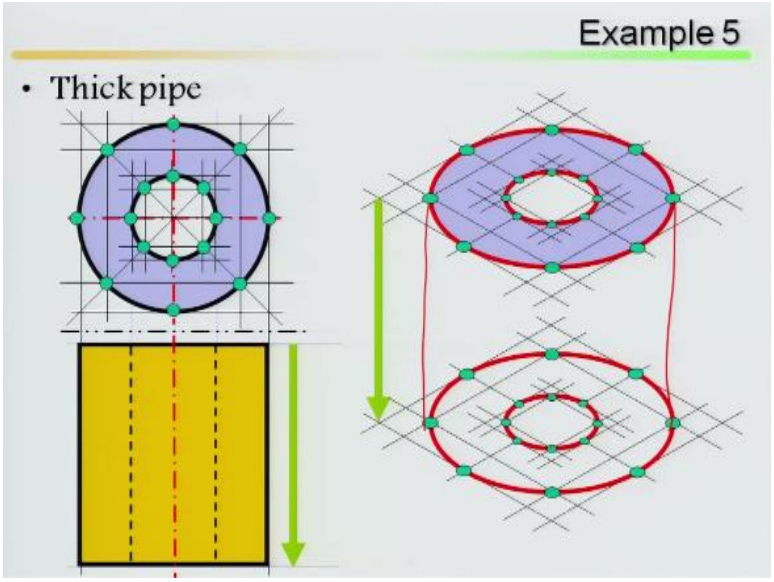

Before this, this part is there top and inner circles bottom inner and outer circles, or then this outer circles projected back here then it will become ellipse, top and bottom ellipse once you finish draw the tangents then look at how it looks, how do you isometric drawings looks like, so that it if you are looking from the front face so that it can coincide.

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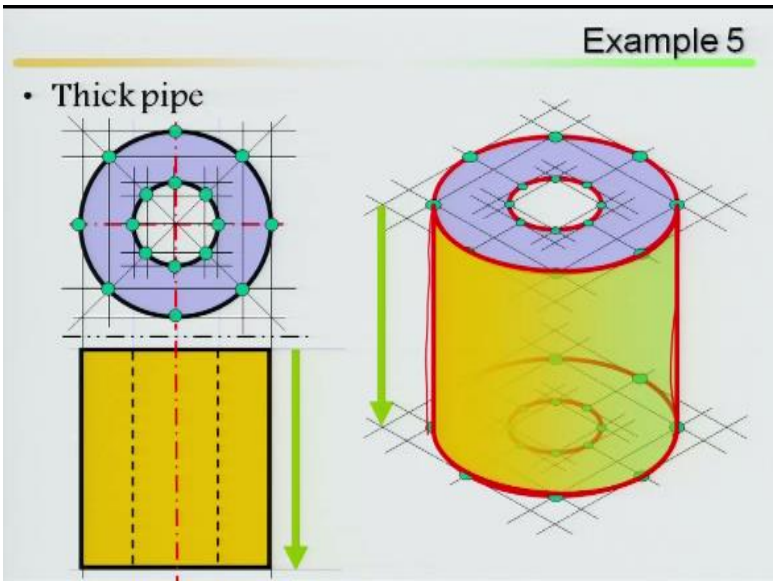

Your front view, if you are looking from the top face you are it is going to coincide what is your top view is given.

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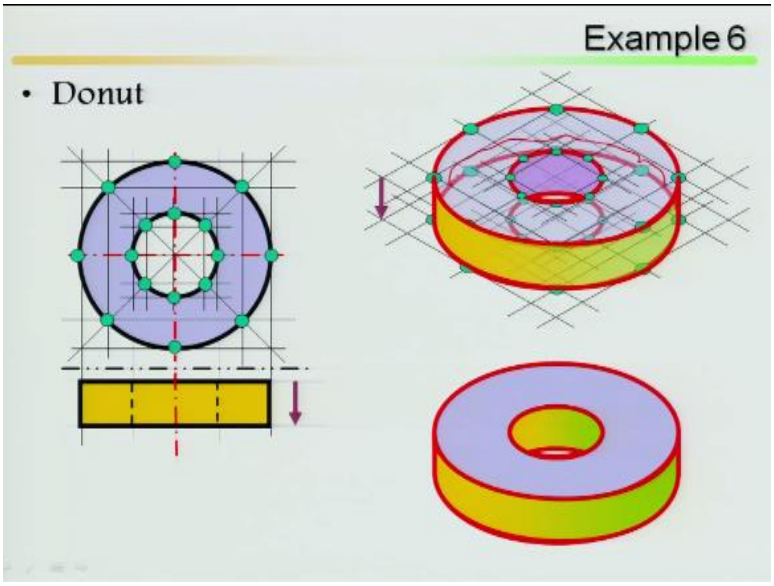

Donut, now same thing two circles are there, make it mark these points, do your ellipse outer ellipse then look at your inner ellipse, then go to your depth directions, go to the depth directions do it again, outer ellipse, do your inner ellipse, do it inner ellipse then draw the tangent, look at, this is my drawing whatever I have drawn then how the object should looks like, then you take the object and look from the front, look from the top, so that match your both the views then remaining part like this part and this part will be your it is not supposed to be visible.

So you make way with that some part is going to be visible in isometric, how it is throughout then obviously once it is throughout other part like this part is not going to be visible.

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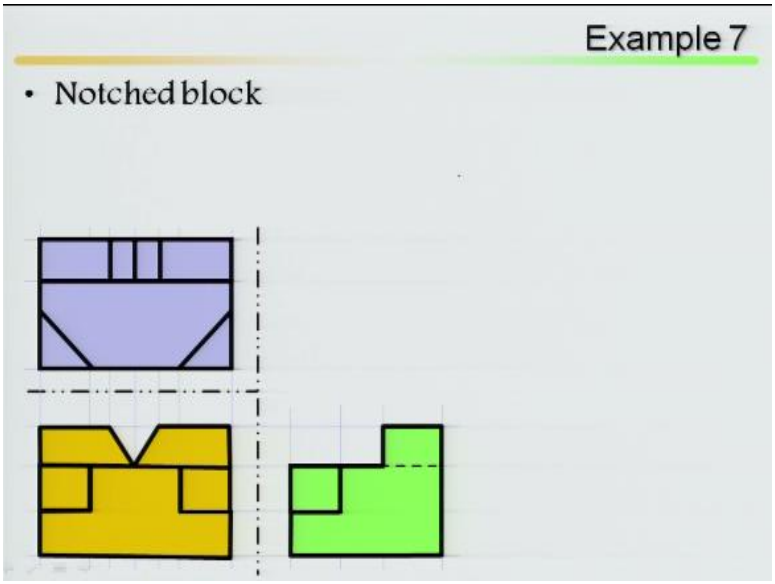

Example 7 notched block, in the notched block if you look at here from the front view there is a notch like this, from the top view again there is there, and side view is there looking at this.

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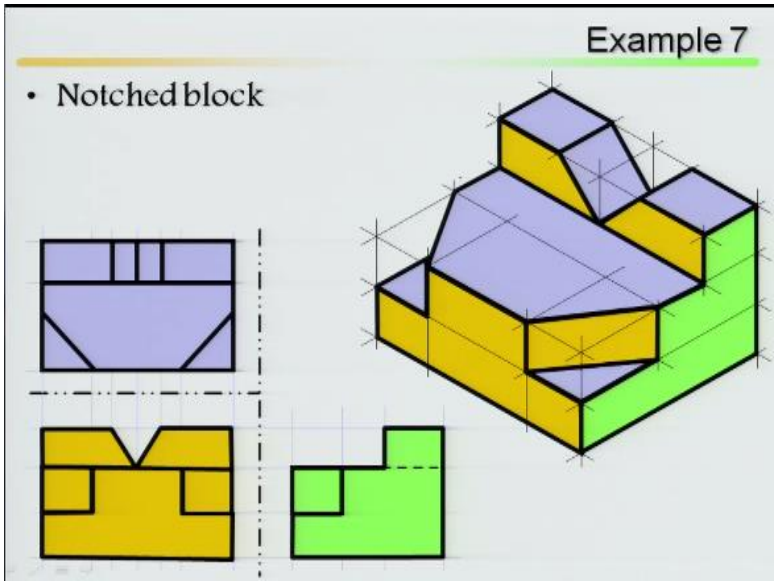

We can draw it by means of box method or offset method, how it looks by mean it has been drawn by means of offset method, this is your object.

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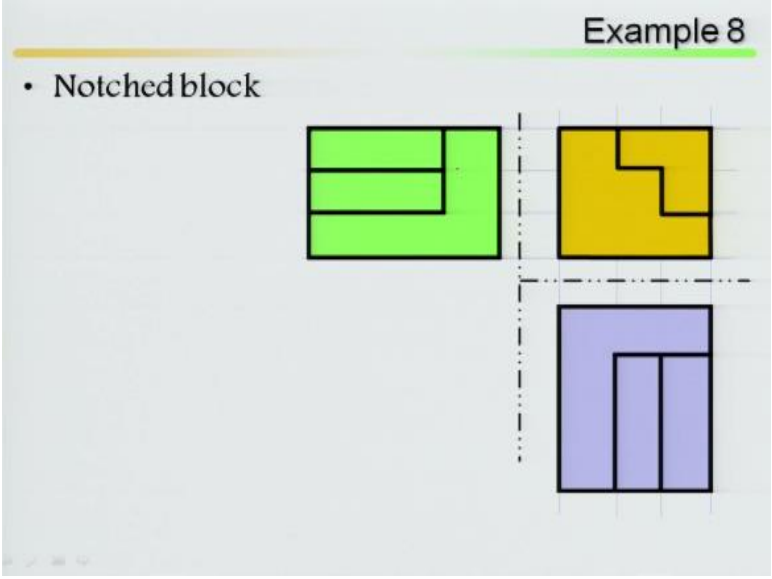

Then notched block

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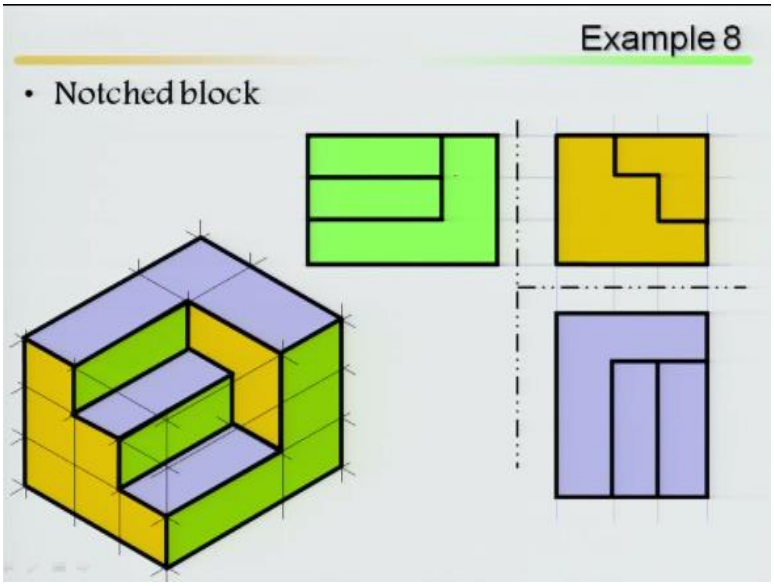

Example eight how it looks, these are all examples you can try I am just going slightly faster, just explaining one by one example you can try both these methods as I said either box method or by means of offset methods, this is all about your isometric examples, after isometric examples there is a new chapter, let me start with your oblique projections.

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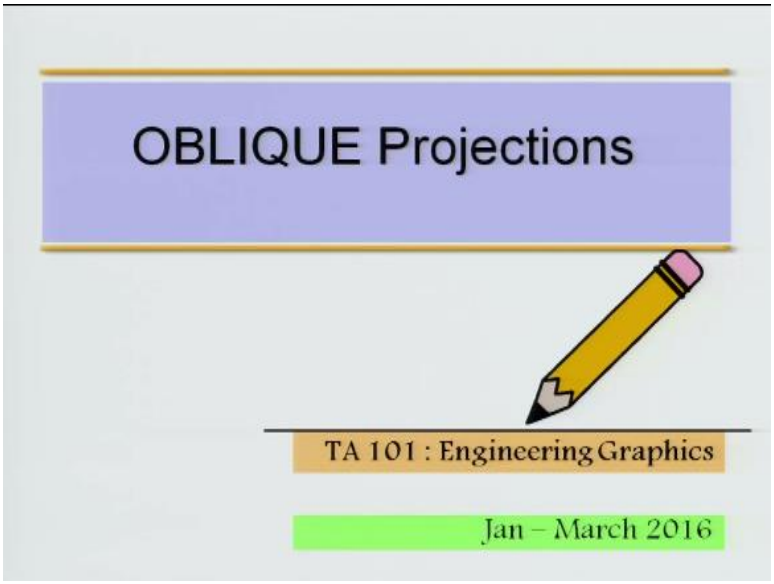

Oblique projections.

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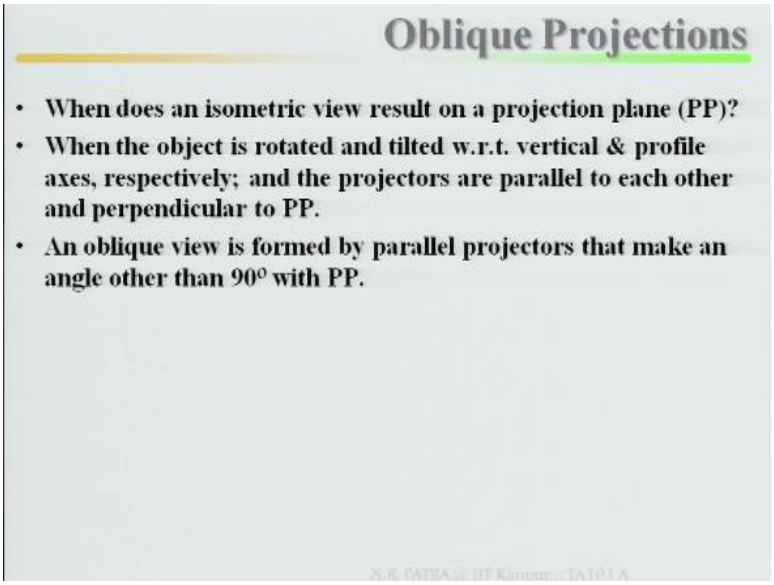

Look at these, this is a first introductions first you understand then it will be easy, when does an isometric view results on a projection plane this is a question, when does an isometric view result on a projection plane, projection plane is your PP. When the object is rotated and tilted with respect to vertical and profile axis respectively what happen in isometric views? In isometric views what happen first you rotate with respect to vertical 45 degree, then rotate along your profile plane 30 degrees some minutes then you are supposed to get your isometric.

When the object is rotated and titled with respect to vertical and profile axis respectively and the projectors are parallel to each other and perpendicular to picture plane, remember projectors are parallel to each other that means this projectors are parallel to each other and perpendicular to picture plane, perpendicular to a picture plane, an oblique view is formed by parallel projectors that makes an angle other than 90 degree with your picture plane, look at the difference, an oblique view is formed by parallel projectors.

Projectors are definitely parallel to each other but makes angle not perpendicular to your picture plane, other than your perpendicular to your picture plane.

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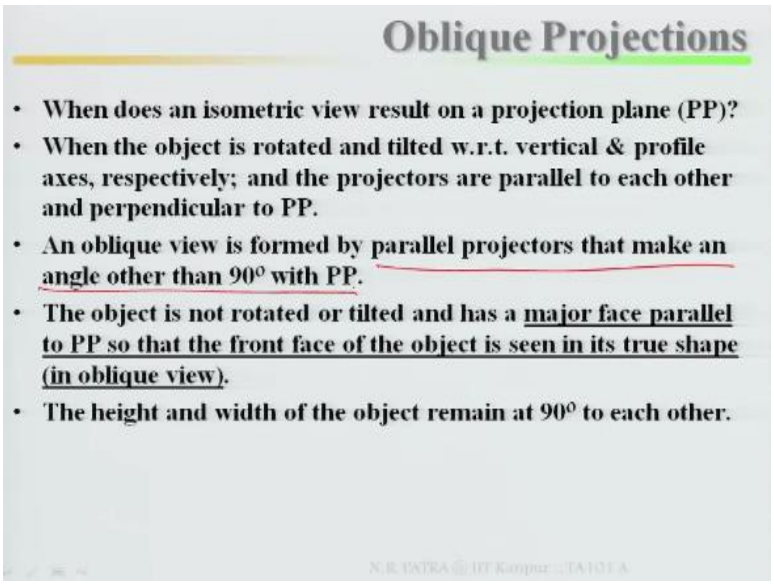

The object is not rotated first difference you got it this is your first point you are getting, not perpendicular to your picture plane but the projectors are parallel to each other. The object is not rotated or tilted remember like the way isometric it has been rotated and titled has a major face, has a major face parallel to your picture plane, major face parallel to picture plane, if there is a picture plane one face is parallel to your picture plane so that front face of the object is seen in its true shape. In oblique view front face of the object is always in true shape why, because that face is parallel to your picture plane. The height and width of the object

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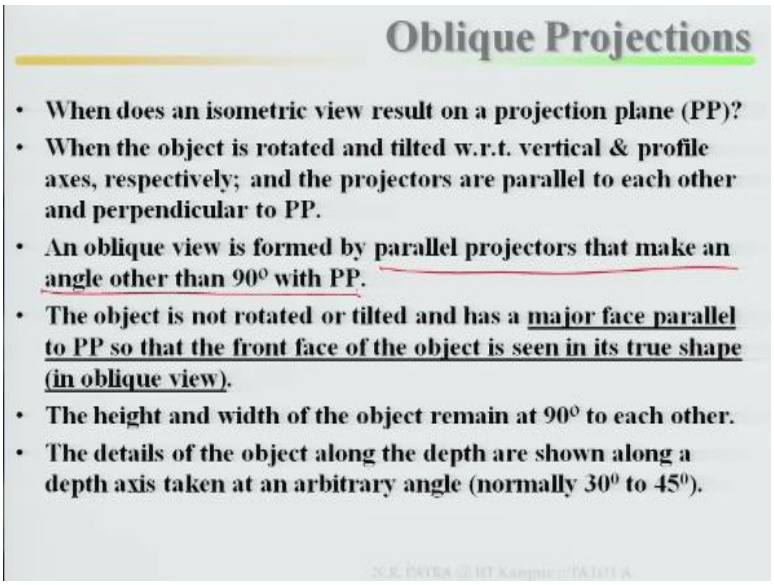

Remains at 90 degree to each other, the details of the object along the depth are shown along a depth axis taken at an arbitrary angle normally 30 degree to 45 degree. Last point the details of the object along the depth are shown on along a depth axis taken at an arbitrary angle that is 30 degree to 45 degree, that means oblique view in depth directions, for oblique view in depth direction it has been made an angle of 30 degree to 45 degree however for front face always is parallel to your picture frame that means your front view is in your true set.

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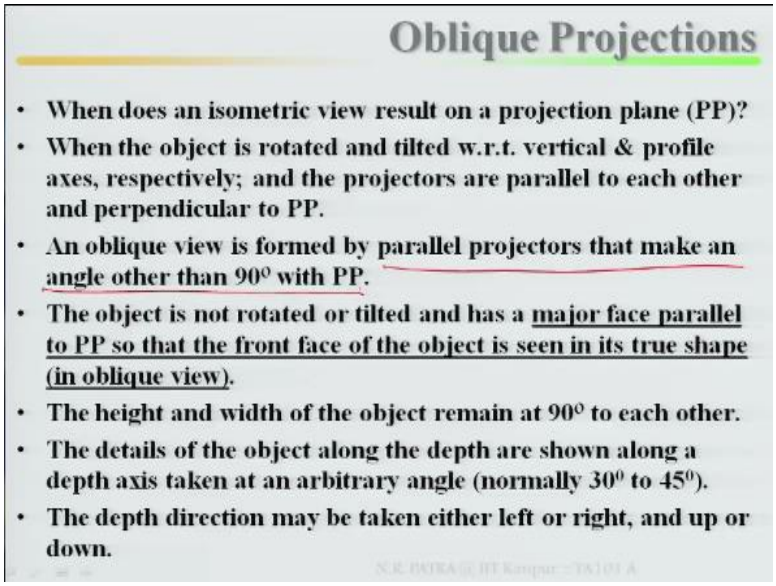

The depth direction may be taken either left or right and up or down, the depth direction may be taken as left, right, up, or down, we will go in detail.

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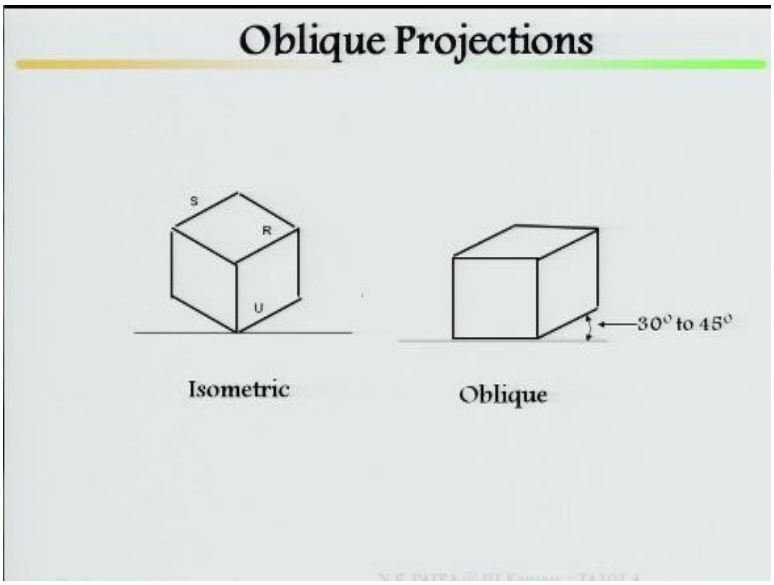

First one I have drawn this is your rotated with respect to vertical axes, then tilted with respect to your side plane, this is your isometric, oblique look at here, this is your front face.

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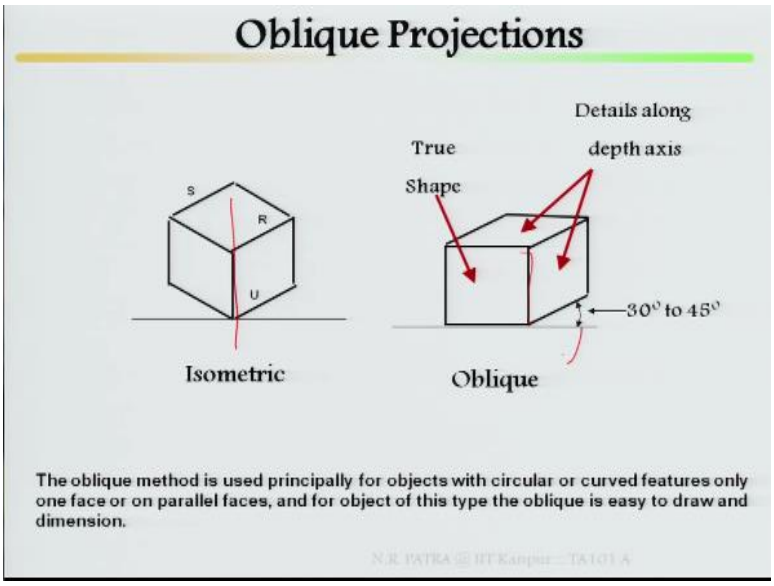

And it is parallel to your picture plane, picture plane is somewhere else here, parallel to your picture plane, then, then what will happen look at here, in depth directions it makes an angle of 30 degree to 45 degree but here first it is isometric, it is rotated with respect to vertical axis, vertical axis 45 degree then tilted or maybe rotated in, rotated with respect to your side view then it is coming all the view you can see it all the sides sorry all the view, not all the view all the sides you can see it.

Oblique view, oblique projections, front face is parallel to your picture plane that means you are suppose to get if it is parallel to picture plane you are suppose to get true shape of the front in depth directions it has been made an angle 30 degree to 45 degree, either it is up, down, right, or left. If I am telling up this up, it can be made down with respect to left or with respect to right, if it is there with respect to right of this side if you are doing with respect to left.

True shape details along depth axis, the oblique method is used principally for objects with circular or curve, now next question you can ask whether the difference between, why we are doing orthographic, why we are doing isometric, why we are looking for oblique, oblique method is used principally for objects with circular or curved features, only one face or on parallel faces and for objects of this type the oblique is easy to draw in dimensions, particularly it is for circular and curve features only in one face or parallel to that face.

So that oblique can be easily drawn and you can do the dimensions.

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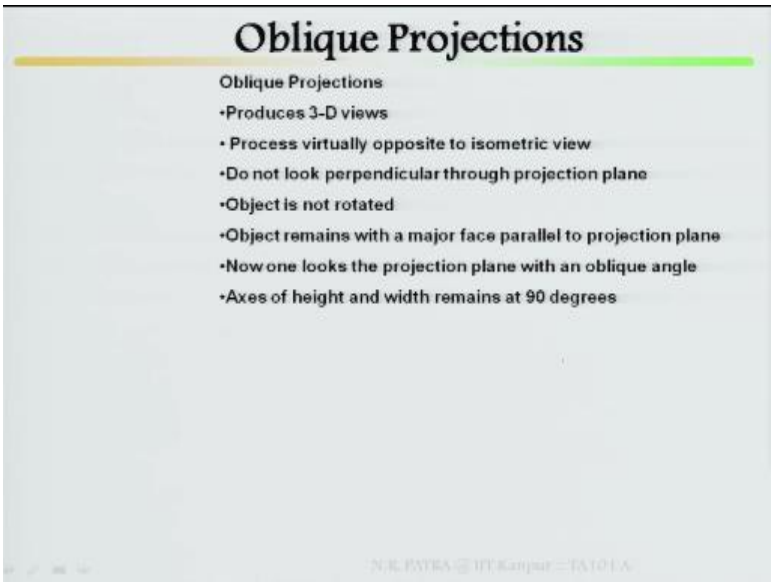

Oblique projections produce 3-D views first point, process virtually opposite to isometric view, process virtually opposite to isometric view, do not look perpendicular through object plane, do not look perpendicular through object plane, object is not rotated, object remains with a major face parallel to your projection plane, major face front side depending upon that parallel to your projection plane, one looks the projection plane with an oblique angle, one looks the projection plan with an oblique angle, axis of height and width remember here axis of height and width remains 90 degree, not in depth height and width if I am taking this object is like this.

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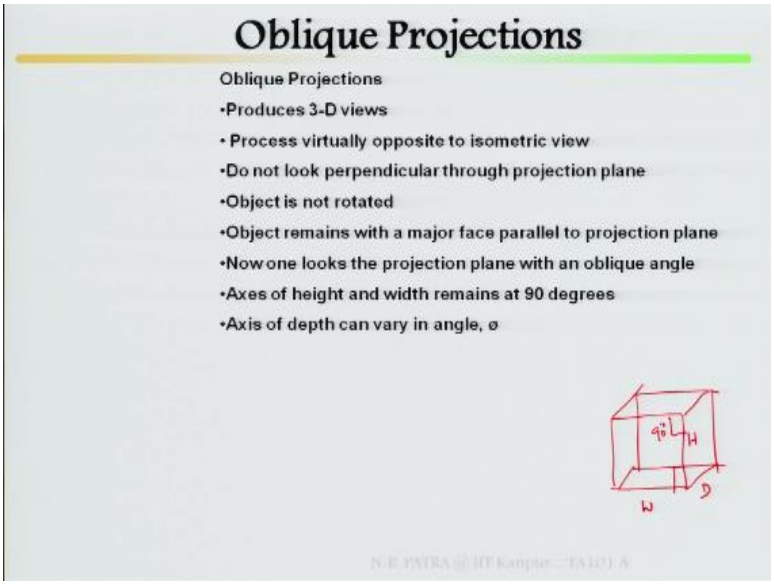

If I am going in this directions that means this is my width as I said, this is your height, and this is your depth, so width and heights remain 90 degree, that means this is your true shape you are supposed to see width and height. Axis of depth can vary in angle of Ø varying from 30 degree to 45 degree.

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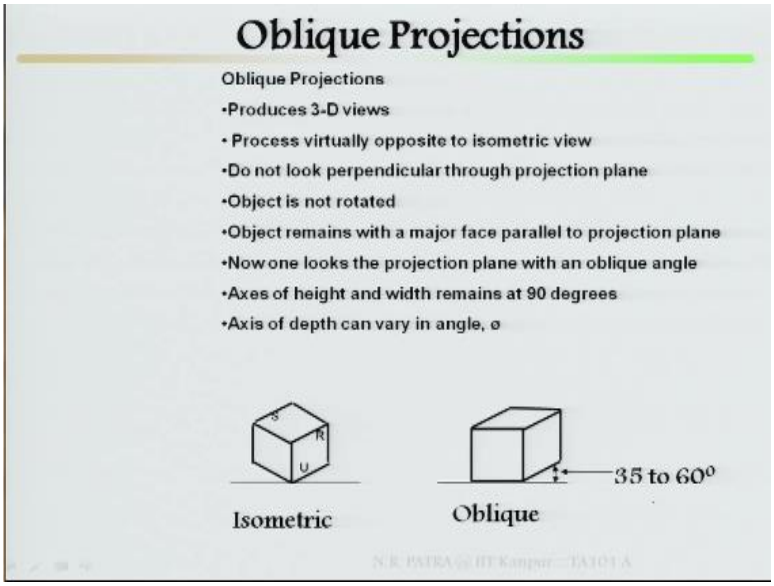

Isometric this is what your oblique 35 degree to 60 degree.

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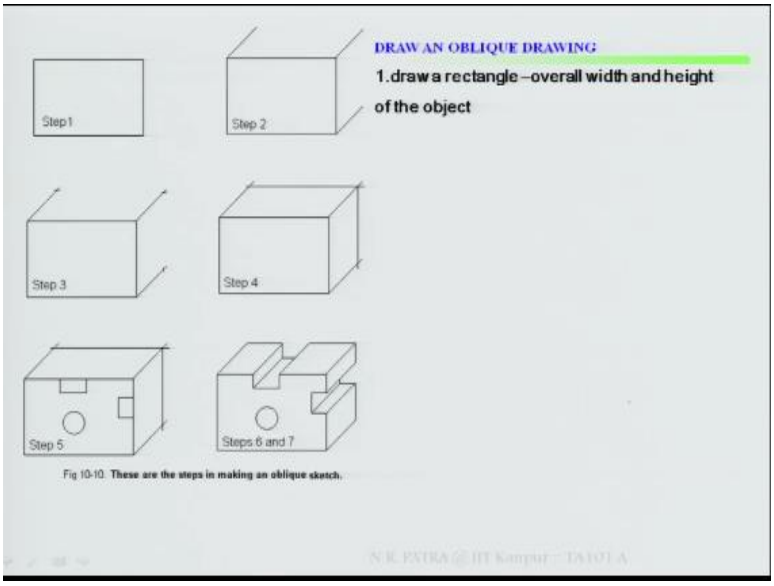

Step 1 there are different steps, step1, step2, step3, step4, step5, step 6 and 7, will explain what is your step 1 drawing an oblique drawing. Draw a rectangle overall width and height of the object, why I am looking at width and height, width and height they are particularly front face and they are perpendicular to each other so that the front view, front face is giving your true shape that means this true, true shape first you draw, draw a rectangle overall width and height.

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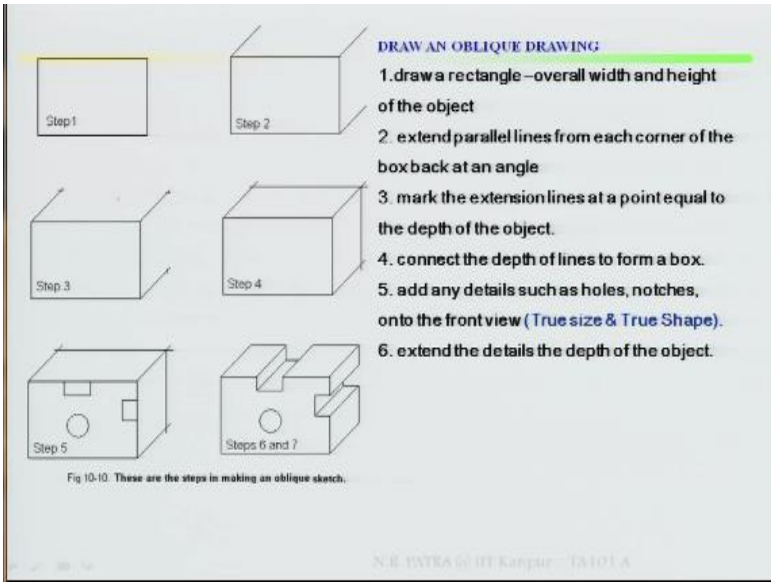

First one draw rectangle overall width and height, step 2 extend parallel lines from each corner, from each corner of the box back at an angle. Each corner of the box extend your parallel lines at an angle in the depth direction what is your angle has been given, mark the extension lines at a point equal to depth of the object, you are extending mark the extension what is your depth direction, depth dimensions, connect the depth of lines from a box, connect the depth of the line from a box with this respect to that step 1 draw your width and height, then parallel lines from each corner, then mark the depth directions, then connect it.

Add any details such as holes, notches, onto the front view, that means this is your true size and true shape in the front view, any anything is there add it, extend the details the depth of the object, extend the details in depth directions then once you extend it because this is in true shape once you extend it complete this case by darkening this object, you finish your sketch darken the object, this is all the steps how to start with your oblique drawing.

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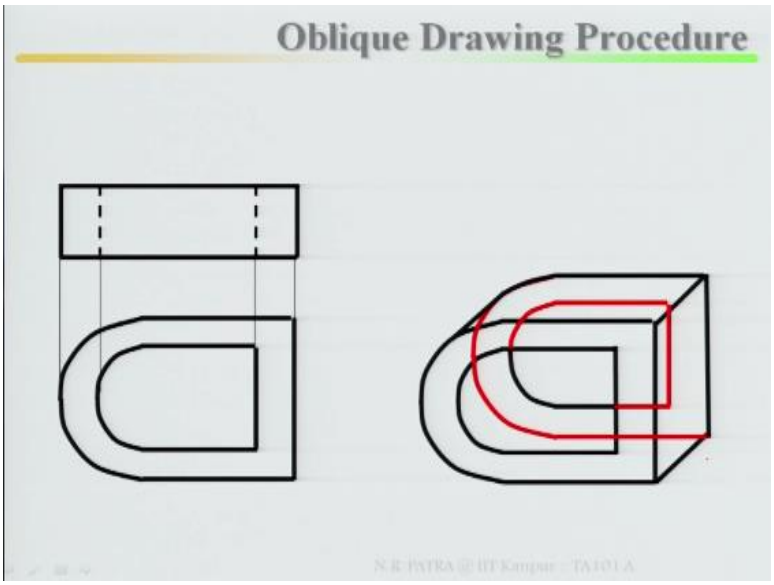

Procedures, look at one example, front view and top view has been given, reference points coordinates has been taken here is your reference point, reference point, next is your draw the reference point then first step is your draw width and height, draw width and height, this direction is your width, mark the width, mark the width, this is your height, mark the height, this is your height, mark the height, then in depth directions it is 30 degree to 60 degree, mark the 30 degree in the depth directions, take your depth dimensions, finish it all, all you finish, this is your front face, this your width, this is from her to here dimension, this is your height, this dimension is from here to here height

Then with respect to that here it is given with respect to that this arc you will be always given inner and outer arc will always be give, so then find it out the centre, find it out the center then draw the arc, outer, inner, then once you finish it because this is your true shape this is your front view, this is your true shape in depth direction you go, go in depth directions, what I did front face has been finished in the depth directions I have taken, mark the depth and again parallel to this with this parallel to this I have taken, mark the dimensions, here mark the dimensions then join it. I have joined it then here you mark the dimension, then draw the inner and outer circle then join it by means of a tangent, then finish your drawing is it going to show that all the views no, some part you have to erase it, see this part I am not going to see in oblique red mark.

This you have to erase it because this is your inside.

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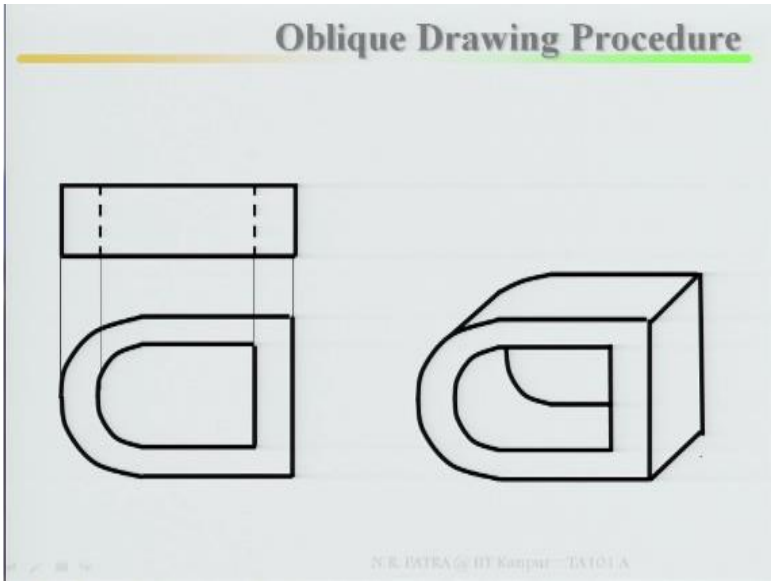

So I have taken it out, now how it looks, this is what it looks your oblique drawing.

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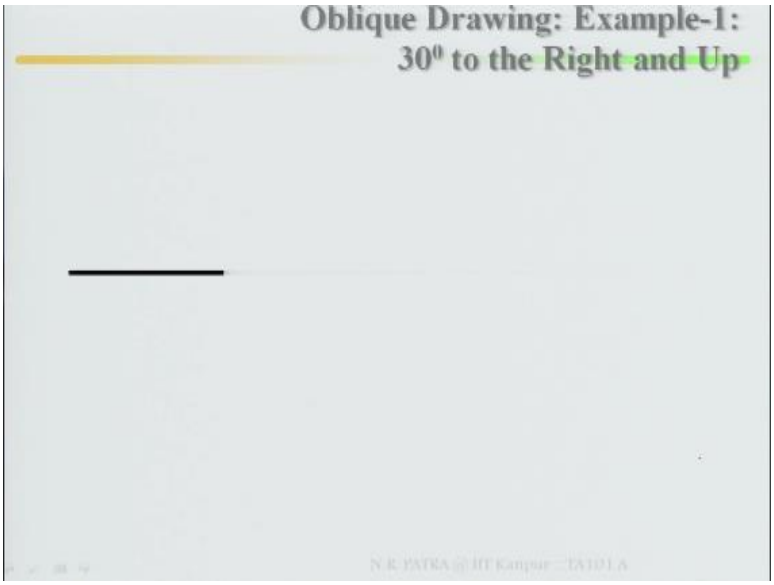

Oblique drawing example one 30 degree to the right and up, 30 degree to the right if I am sitting here 30 degree to the right and up remember

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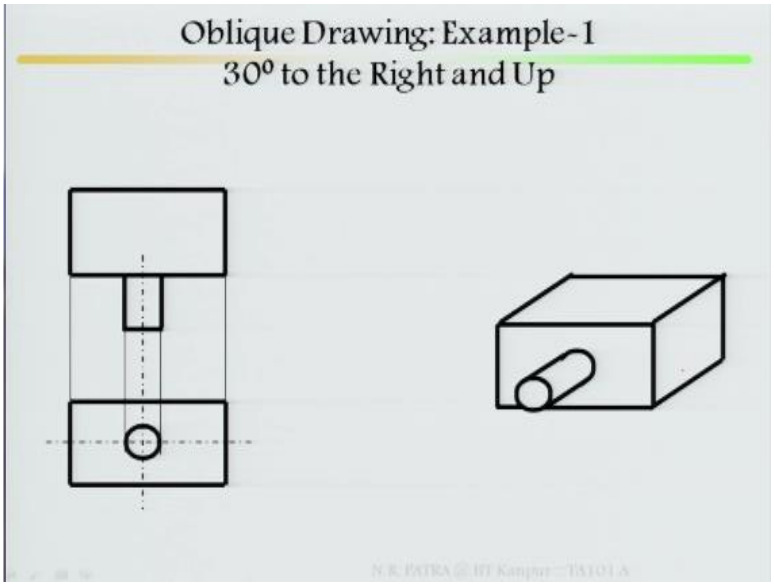

This is your top view and front view, take the reference point coordinates, draw the width and height, draw the width and height, 30 degree to the right, 30 degree to the reference to the right and up, up means it will be towards up 30 degree up, finish your depth, mark your centre line, draw your circle, this circle is your true shape, this is your true shape because this is in front view, extend it in depth directions, draw the circle again, finish it, do it width and height, then extend it in depth directions, then I have shown which part has to be removed. I have marked which part I am not going to see it, this is what I am not going to see it, this is what I am not going to see it, other I am not going to see it. I am going to stop it here, next class I will extend oblique drawings or more examples, thank you.

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