An Introduction to Microeconomics
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Lecture – 74
Isoquants

Let us move little further, coming back to the production function again.

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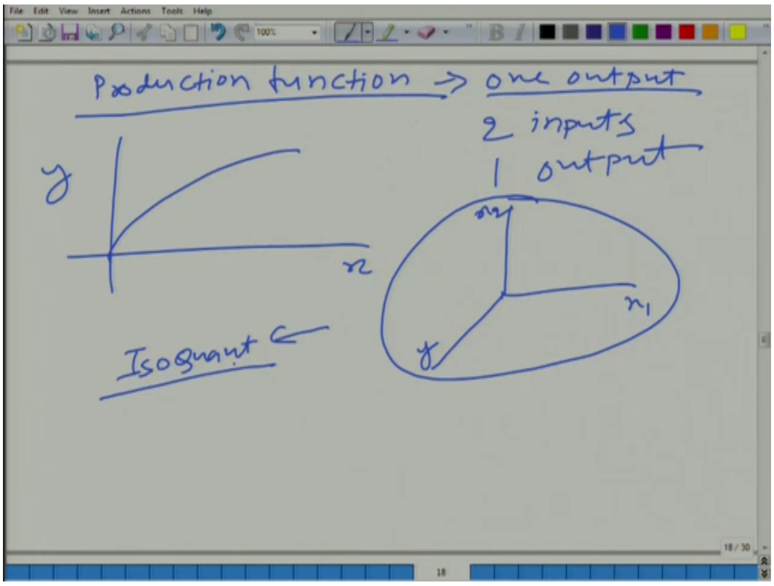

We will go back and forth rather than finish one and go to another, I am describing it in this particulars way; so, that you can relate the, these 2 representation. So, now, we have, we had drawn a graph where we have 1 input and we have 1 output.

Now, let us say what if because I said that production function we will do when we have only 1 output. I did not put any restriction on number of inputs, what will we do when we have let us say 2 inputs and 1 output.

Student: Then we.

We will have a 3 dimensional graph.

We can have here input 1, input 2 and on the third axis we can have output, that is one way to do it, but this is quite if this 3 dimensional graph is little less tractable than a 2 dimensional graph. So, a better way to represent this production function is to use something called isoquant.

And what do we mean by a by an isoquant? What is an isoquant?

Student: Isoquant is a curve having fetched output.

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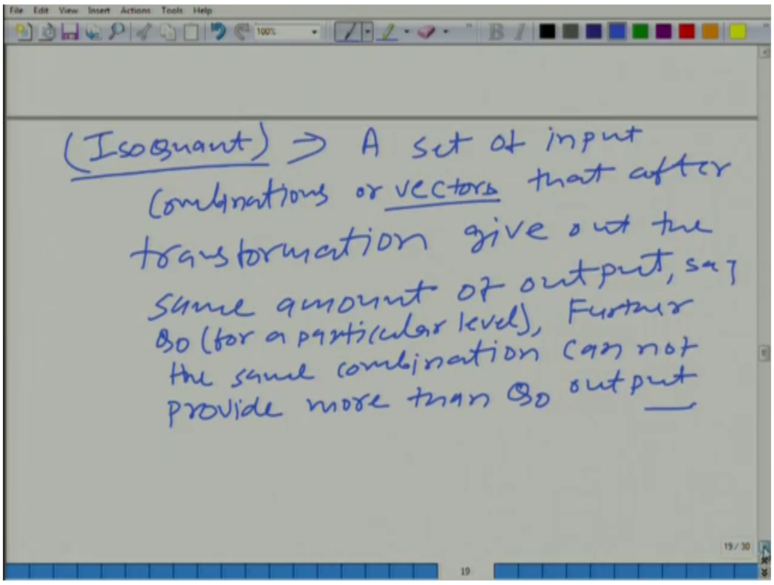

Not bad. So, what we have is basically a set of input combination or vectors, why I am saying vectors because vectors is well suited to represent the input combination; That after transformation, give out the same amount of same amount of output.

Let us say for example, say Q naught for a particular level, further the same combination, further the same combination cannot be used, cannot provide more than Q naught output that is very important, this is very important.

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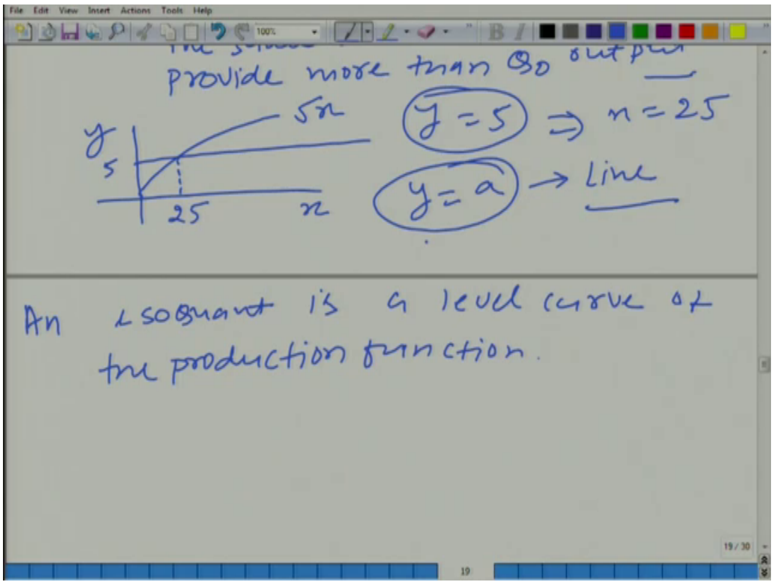

For example let us take is it clear, let us take this here we have 1 dimensional world where we have 1 input and 1 output.

So, 2 dimension input is 1 dimensional.

Student: (Refer Time: 03:40).

Fine, now we have the example that we took root x, can you tell me the isoquants here, single point at any level let us say we talk about y is equal to 5. So, we draw a line y is equal to 5. So, it is only.

Student: 25.

25 units of x would give us 5 units of y. So, isoquant y is equal to 5 has only 1 point.

Has only 1 point, we are talking about and that is x is equal to 25.

So, similarly what did we do here, we try to obtain basically isoquant is nothing, but a level curve of the production process, isoquant. Let me say an isoquant is a level curve of the production function and how do we obtain the level curve, we draw like here in this case we draw y is equal to a, if we are interested in level curve a then we draw y is equal to a and here in this case it is a line and of course, it will intersect the curve wherever it intersects the curve all those combination would be on the isoquant.

Student: Isoquant.

So, it is in 1 dimensional. So, we get only 1 point, but what we have typically here in the 2 3 dimension.

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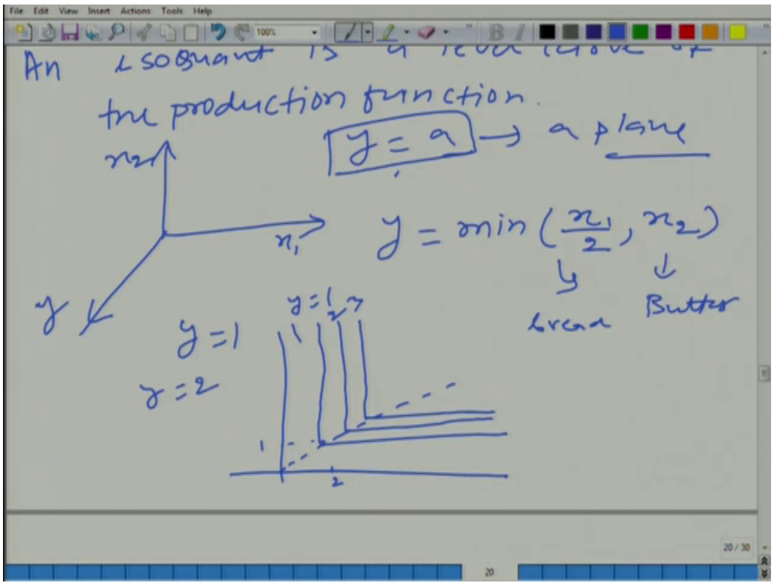

Where input are on 2 dimension and output on the third dimension what we do when we draw y is equal to a what do we get a plane.

Student: Plane.

A plane.

And then we may get more than 1 point.

Student: (Refer Time: 05:47).

y is equal to a will be a plane here.

Student: (Refer Time: 05:50) little bit thing.

So, what we this plane may intersect the production function at more than 1 point and all those points will be on isoquant y is equal to a.

Student: a.

What it means that you take the combination of those inputs you will be able to produce a amount of output and you cannot produce more than a amount of output ok, fine.

So, for example, let us take 2 dimensional world that you have already looked at earlier, let us say the bread, let us continue with the bread example, the production of sandwich. What we have here is y is minimum of x 2, x divided x 1 divided by 2 and x 2, x 1 is amount of bread and this is butter. How, would the graph look like here?

Student: Right (Refer Time: 06:53) curve.

In this, try to draw a 3 dimensional.

Student: Set of things.

Ha.

Student: A set.

Here is set of plane.

Student: (Refer Time: 07:01).

It would not be a set of plane.

Anyway think about it, that is what I said, the easier way is to use the concept of isoquant to describe this production function. How can we describe it, we can take a particular value of y starting with y is equal to let us say 1. So, to get 1 units of, 1 unit of sandwich, how many units of bread you need 2.

Student: 2.

And what we need 1 unit of butter.

Student: Butter.

That will give, so let me say this is the line, here we have 2 and here we have 1, but also notice in this particular case even we if we have 3 bread, 4 bread, 5 bread or just 1 unit of butter we are still able to produce only 1 sandwich. So, all these lines here that represents that butter remains fixed at 1, but amount of bread keeps on increasing, does not matter we get the same amount of sandwich and similarly in the other direction also. So, this is the isoquant and similarly we can draw for y is equal to 2 y is equal to 3 and so on.

If you remember sorry, is it clear these are the isoquant 1, 2, 3 we had drawn very similar curves when we talked about indifference curve ok.

Student: (Refer Time: 08:34).

In case of perfect complementarity between 1 goods, can you say what is the big difference from their and here, any difference that you can think off.

Student: (Refer Time: 08:51).

Any difference that comes to your mind from the earlier case or it is exactly the same.

Student: Production we have their 1.

Of course this is we are talking, I am not talking about the process I am talking about mathematically what is the big difference of course, here we are talking about production and there we talked about consumption.

Student: Consumption.

Student: Consumption.

Now, of course, that is the difference, but here the bigger difference is that 1, 2 and 3 these are cardinal in nature.

Student: which are (Refer Time: 09:28) ordinal in nature.

They were ordinal, they were the 1, 2, 3 there represented only the levels.

Here these are cardinal.

Student: Cardinal.

2 is twice as much as 1.

Student: 1.

So, if you think in this way, this topic is much easier than the consumer theory isn't it that here everything is cardinal. You do not have to you know here that is what we deal with all the time numbers and immediately if cardinality pops in in our mind.

Student: (Refer Time: 09:55).

So, this is what we are more familiar with and so we will use the very similar concept fine, is it clear ok. Let us look at one more production um, one more isoquant and this time for Cobb Douglas function.

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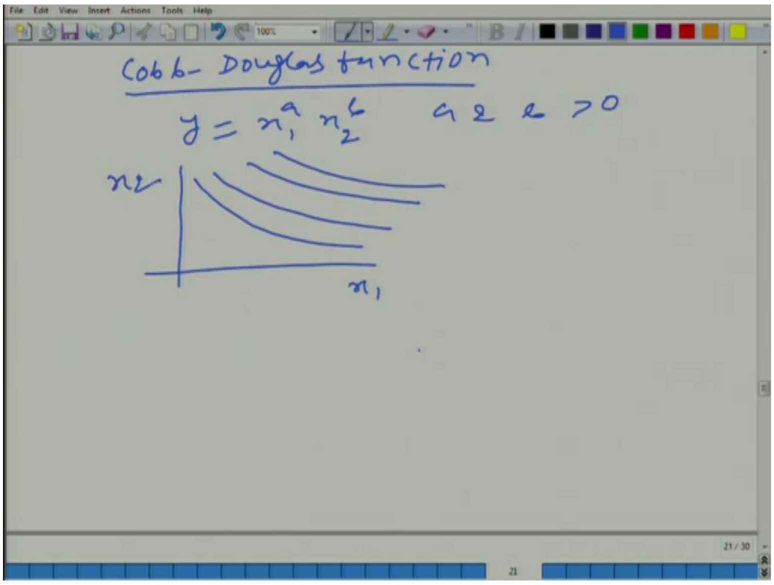

Student: (Refer Time: 10:21).

And how can we represent the Cobb Douglas function.

Student: (Refer Time: 10:27).

Here be particular about it when we say Cobb Douglas function we write here x 1 a x 2 b.

Student: b.

Where a and b are.

Student: Greater than 0.

Greater than 0 and typically, I am not saying always that a plus b is equal to 1 , but this is not true always that we will learn shortly ok. Here, be careful you cannot do the monotonic transformation you can do if you are putting log on both side then of course, log x 1 plus b log x 2. Remember earlier we did the monotonic transformation and we took this out.

We said that level would be preserved.

So, we do not need to put here log, but here we have to put log because the numbers have meaning.

So, we cannot take blindly monotonic transformation on only 1 side, is it clear to you.

Student: yes.

And isoquant in the case of cobb douglas function would look like something like this.

Student: Downward sloping curves.

Downward sloping curves, fine.