Managerial Economics
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Lecture - 12
Consumer Behavior

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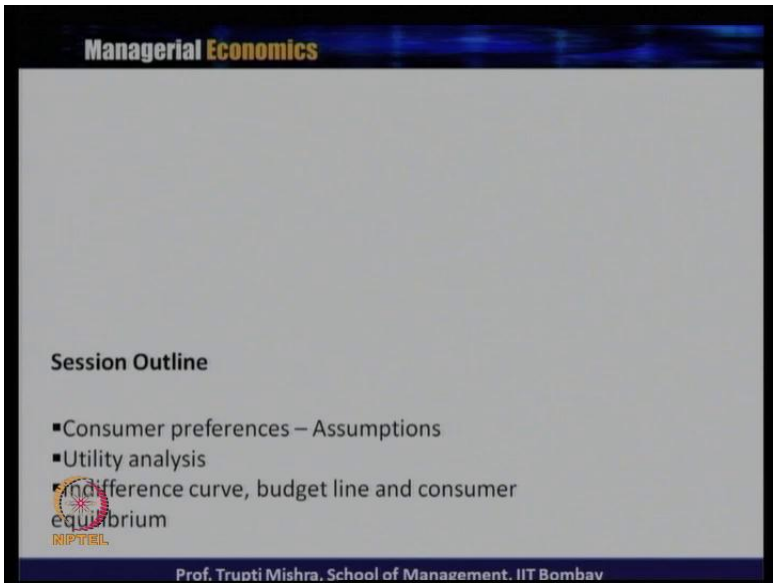

We will introduce the third topic under this module, theory of demand: that is, theory of consumer behavior today. And the session outline for this consumer behavior will be, we will first look at generally what are the pre-condition or assumptions for consumer preferences. What is utility analysis? Both cardinal and ordinal utility analysis; then we will discuss about the indifference curve, budget line and the consumer equilibrium.

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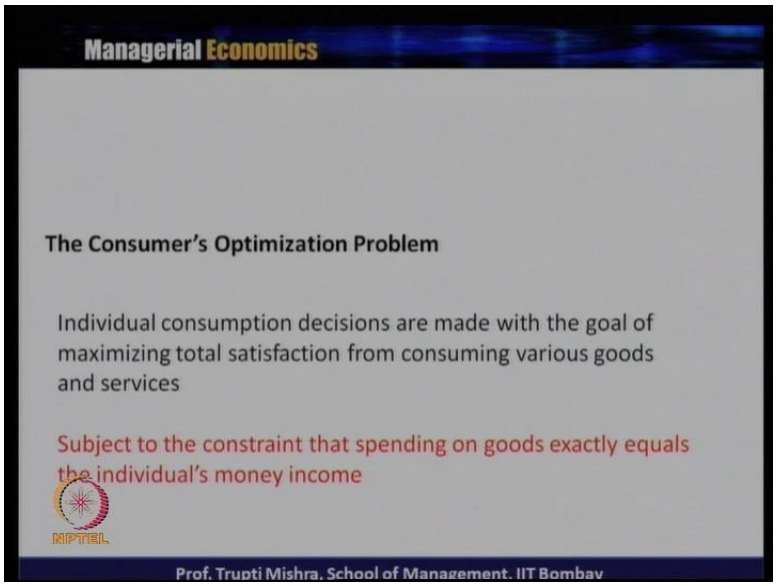

So if you remember in the very first class, we talked about the optimization problem of all the market agents or all the economic agents. So like for producer, always the optimization problem is to optimize or maximize the output. Similarly for the consumer, always his optimization problem is to maximizing the total utility or the maximizing the total satisfaction, when he or she consumes the various goods and services.

So, the today's focus is on consumer's optimization problem because we are talking about specifically the theory of consumer behavior and what is consumer optimization problem? Consumer optimization problem is to maximize a satisfaction from which limited money income or the limited budget available to him. How he can maximize the total satisfaction from the various goods and services what he consume.

Now what is the constraint over here? The optimization problem is to maximize the satisfaction, but the constraint over here is to the income constraint or the budget constraint. Because whatever the consumer wish to buy it is not possible always. Because there is always a value associated with each of the goods and services and there is a money income required to consume the different goods and services. So, the optimization problem is to maximize the satisfaction or the maximization of the utility by consuming various goods and services and here, the constraint is the spending on the good should be exactly equal to the consumer's money income.

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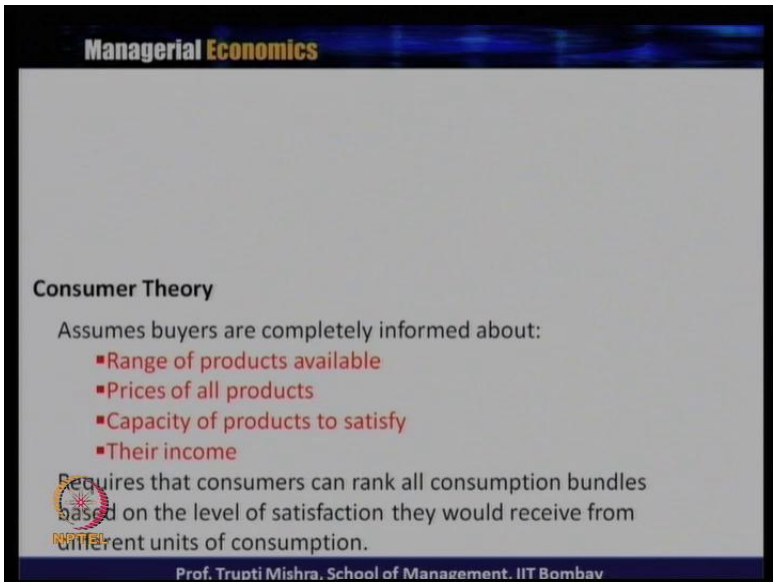

Now what are the assumptions to be practiced here? We assume that when the consumer are making decisions regarding consumption of goods and services, we assume that the buyers are completely informed about the range of products available, what are the products available in the market, then what are the market prices of all the products; like what is the value of the products. Now what is the capacity of product to satisfy? This is a subjective term, but we can always bring it to a monetary form.

Suppose if you are minimum spending ten rupees or hundred rupees on a goods, whether the satisfaction or whether the usefulness of the product is worth of the value of the product or not; like if am spending hundred rupees on consuming a product, I always look for whether the product has the usefulness or not, is it worth to produce hundred rupees or not. So first, the consumer or the buyer has to have information about all the products available in the market, what are the market prices available for all the products, or at what price all the products are available.

The capacity of the product should satisfy and what is the consumer's money income? This requires that all the consumers can rank all consumption bundles, based on the level of satisfaction they would receive from the different unit of consumption. Like if the products are ten or the products are twenty, the consumers can rank all the consumption bundles based on their level of satisfaction. Suppose there are ten products available to me, and on the basis of my income I can spend only on two or three products.

Now, what is the role of rational consumer? Here the role of the rational consumer is to first rank on the priority basis that what is the requirement, and second is that what is the usefulness I am getting from each of these products and after ranking the various products, then only I will see how much I can buy from these different kinds of products. So, that requires the consumers can rank all the consumption bundles. Based on the level of satisfaction they would receive from the different units of consumption and all this information will help them to rank all the consumption bundles; like range of products available, prices of all the products, the capacity of the product to satisfy, and what is the consumer's money income.

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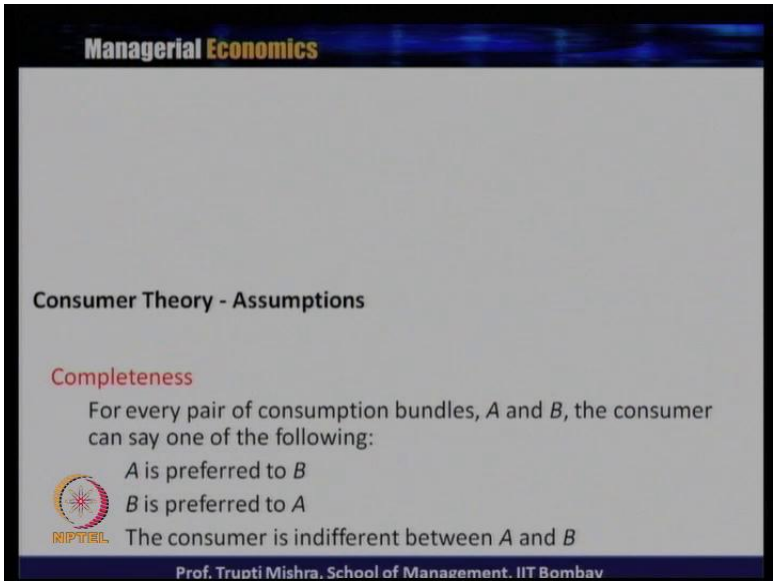

There are few assumptions when it comes to the consumer theory or the theory of consumer behavior. First one is the completeness; for every pair of consumption bundles, A and B. Suppose there are two consumption bundles A and B and may be consumption bundle A considered a different category of goods consumption, bundle B considered different bundle of goods or the different combination of goods. The consumer can say one of the following: Either A is preferred to B, B is preferred to A, and the consumer is indifferent between A and B.

What does this imply? This implies that, whether it is A, or whether it is B the consumer is getting the same level of satisfaction or the same level of usefulness after consuming the products. That is the reason. The first one is since the consumer has the information

about what are the goods available under bundle A, what are the goods available under bundle B and on that basis the first assumption goes that, if A is preferred to B and B is preferred to A. The consumer is also indifferent between A and B.

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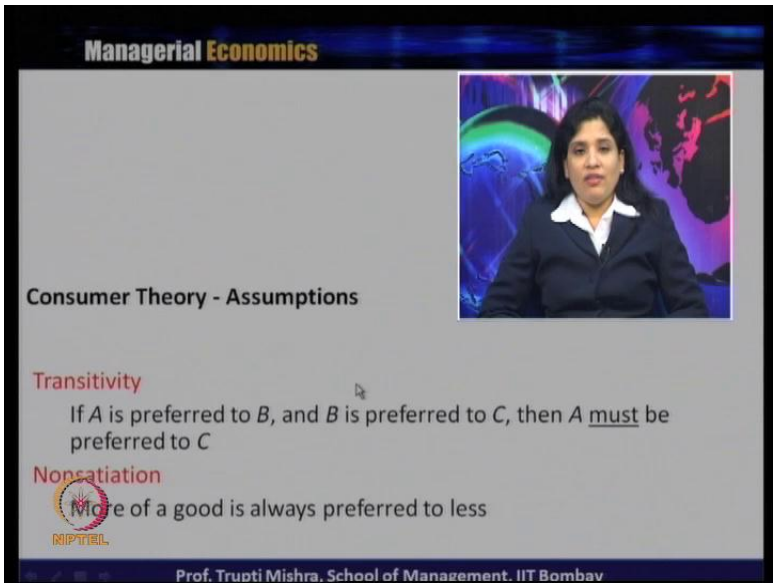

Then we have this transitivity. Under transitivity, if A is preferred to B and B is preferred to C, then A must be preferred to C. So, here A is one consumption bundle, B is another consumption bundle, and C is another consumption bundle. So, transitivity assumption says that if a consumer prefers A, consumer prefers B to A, or B to C, or C to B, then A must be preferred to C, because A is preferred to B, B is preferred to C and A must be preferred to C. The third assumption or the most important assumption in case of consumer theory if you look at, the non-satiation; it means the consumer never gets satisfied with the consumption of goods and services, and more of good is always preferred to less. The consumer never says that I have enough of this I am not going to demand for more, I am not going to consume more.

So, always they prefer a combination of more goods and services, which the consumption bundle consists of, rather than less goods and services what the consumption bundle consist of. So more is always better, that is evident to the non-satiation assumption of the consumer theory. Then we will come to the core of this consumer theory, because all that if you look at the basis we are always using the word the consumer should get satisfaction, the consumer should get usefulness, the consumer

should make a decision, on the basis of the satisfaction what they receive from the goods and services after consuming this.

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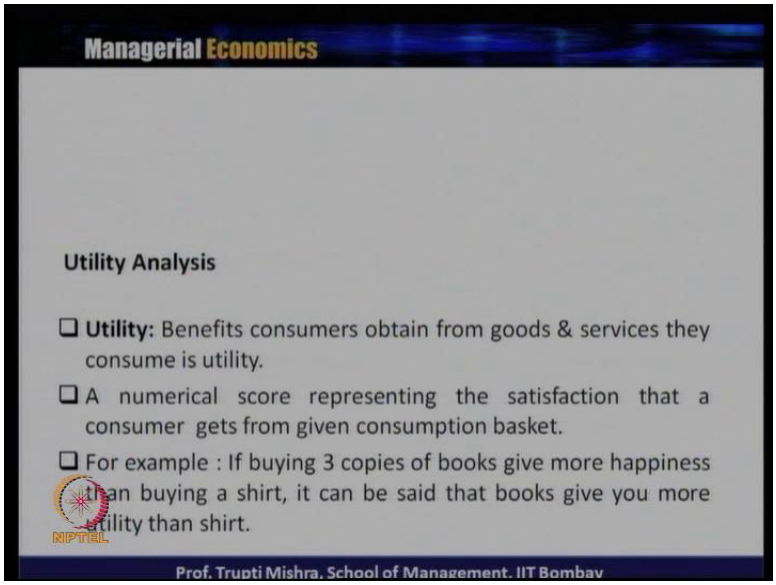

So, the core for this is that how to identify or how to measure the satisfaction, what the consumer gets from the product. The basis for this is the utility. So, we will come to the utility analysis now. We will define what is utility, we will see what is a utility function, and how this utility gets use when the consumer takes a decision regarding buying a typical product or not. So, utility is this; the benefit what the consumer gets from goods and services they consume. So, when they consume goods and services, whatever the benefit or whatever the usefulness of the product, that becomes as the utility.

So basically, it is a numerical score representing the satisfaction that a consumer gets from given consumption basket. So, it is like is I have a consumption basket which consists of ten goods; after consuming the consumption basket, if I am able to give a new numerical score or if I am able to identify what is the benefit associated with the consumption basket, then the consumption basket has the utility. So, basically, this is the benefit what the consumer gets from goods and services after consuming, and generally you can convert it to a numerical score, which represent the satisfaction that consumer gets from a given consumption basket.

So, if you can take an example: If buying 3 copies of books gives more happiness than buying a shirt, it can be said that books give you more utility than shirt, right? There are

two food items A and B. If you get more satisfaction in A as compared to B, you can always say that A has more utility than in compared to B. But this utility is always a relative concept; it is not that all the consumers they are going to get the same level of utility by consuming A. May be some consumers they get more utility when they consume B, and for them B is always having a measure more utility as compared to the A. So, utility is the benefit what the consumer gets after consuming a product or consuming a consumption basket, and it can be converted in to a numerical score which represents the consumer satisfaction; and on that basis they can take a decision whether to buy this product, whether to consume this product or not.

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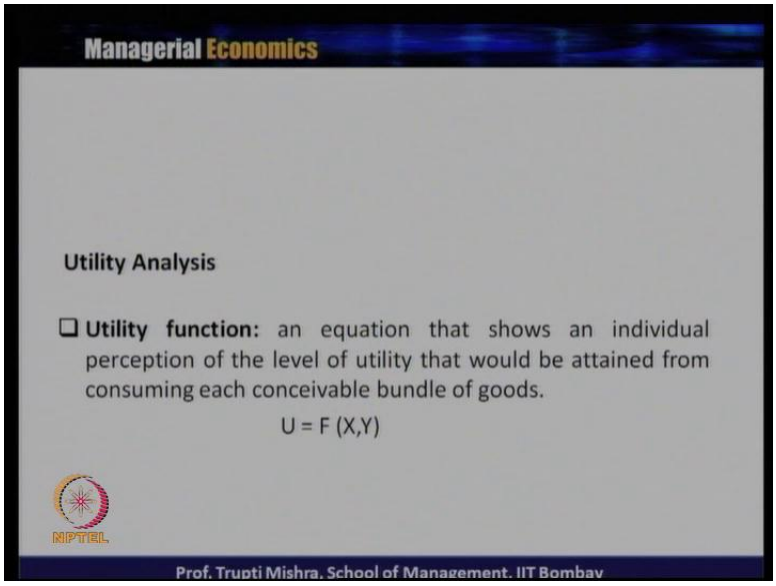

So, what is a utility function? If you are making it to a mathematical relationship, this utility and the consumption of goods and services; so utility function is an equation that shows an individual perception of the level of utility that would be attained from consuming each conceivable bundle of goods. So whatever we are explaining the numerical score of the total satisfaction, same way when you are bringing down its mathematical equations, utility is the function of the different goods or the function of the level of utility of different goods. So, U here is the utility, X and Y is the two goods what the consumer is consuming. So, the total utility what the consumer is getting is the utility of the X and utility of Y, or we can always say this is the satisfaction what the consumer gets after consumption of both the goods, that is X and Y.

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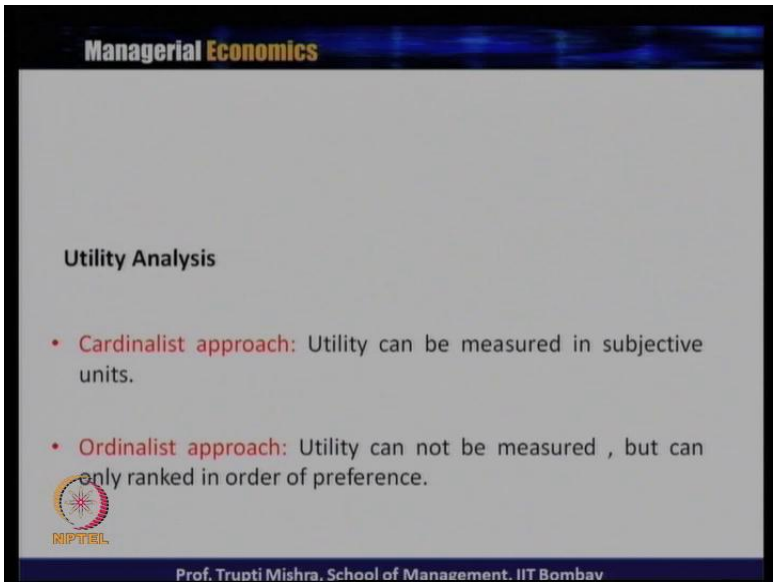

There are two ways to measure this utility; one is cardinalist approach and the second one is the ordinalist approach. So, when utility can be measured in subjective unit according to the cardinalist approach and according to ordinalist approach, utility cannot be measured but can rank only in order of preferences. So, in case of cardinalist approach, the core is again utility can be measured, utility can be quantified. Whereas in case of ordinalist approach, utility cannot be measured; rather it can be ranked in the order of the preferences.

The unit by which we can measure the utility under cardinalist approach is utils; that is called the utils. The unit of measurement under cardinalist approach is utils. Whereas in case of ordinalist approach, we cannot quantify it or we cannot measure it; rather we can rank them in the order of the preferences. Like if you are taking the example of may be having food in different restaurants. Now how it works for both the cardinalist approach and ordinalist approach? In case of cardinalist approach, I can say if I have taken food in three different restaurants, I can say after having food in restaurant one, I get 10 units of utils; after having food in restaurant two, I get 12 unit of utils and after having food in restaurant three, I get 8 units of utils; this is cardinalist approach.

But how this example can be taken in the ordinalist approach? After having food in all these three restaurants, if I am asked to give my preferences, I will give always third is the first preference, second is the second preference, and first is the first last preference,

because I have got more satisfaction in having food in the third restaurant. So, one is assigning some unit in term of utils that is cardinalist approach, and second one is that on the basis of the preference, I can rank the different goods or I can rank the different products. But if you look at the basis, it is again same. In worst case, again it is a total satisfaction represented in utils term and second is again the basis is total satisfaction, which is represented on the basis of a ranking.

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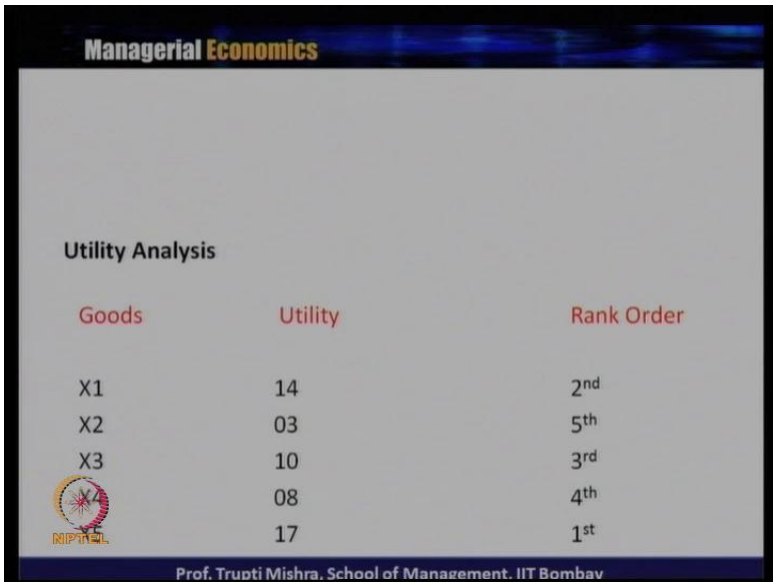

So, if you take an example; now suppose there are five goods X1, X2, X3, X4 and X5, and the second column gives us the utility what we get; that is in case of X1, we get 14 units of utility; in case of X2, 3 units of utility; in case of X3, 10 units of utility; in case of X4, 8 units of utility and in case of X5, 17 units of utility. So if this is the utility what I am getting, the first column always gives us the cardinalist approach because it is assigning a number to the satisfaction, what the consumer is getting from the different units of goods.

But the second one, the second column that is the rank order. In this case if you look at, this is the example of the ordinalist approach, because here the number is not given for each goods; rather it is preferred according to the satisfaction or according to the preferences. So in this case, if you look at X5 is given as the first preference, X4 is given as the fourth preference, X3 is given as the third preference, X2 is given as the fifth preference, and X1 is on the second preference. It means according to the priority,

according to the preferences or may be according to the satisfaction received from each of the goods, the goods are ranked and in case of first one; in case of cardinalist approach, it is like whatever the total satisfaction the consumer is receiving after consuming each goods and services.

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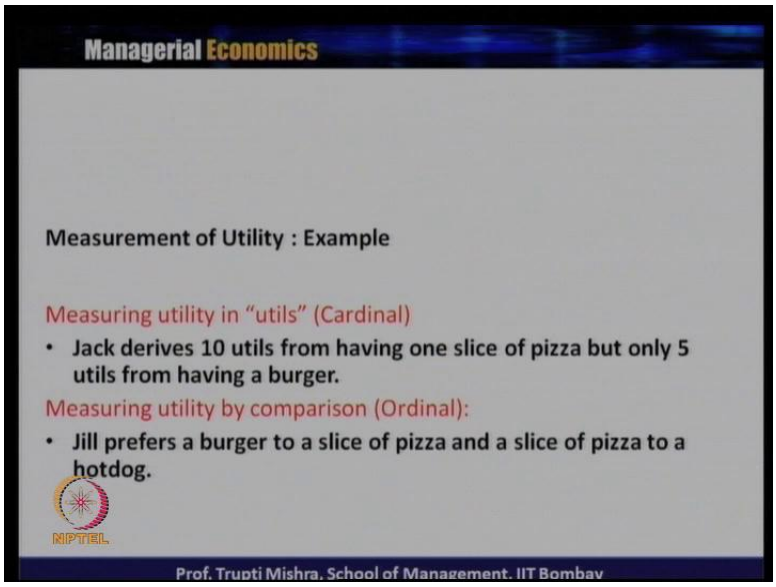

So if you take an example that measuring utility in utils, that is again example of a cardinalist approach. Like, if you are taking the example that Jack derives 10 utils from having one slice of pizza, but only 5 utils from having a burger, this is the example of a cardinalist approach. And in case of ordinalist approach, we can always take the example like Jill prefers a burger to slice of pizza to a hotdog. So, in the first case in case of cardinal, if Jack is the consumer we can always quantify in this case what is the utils he is getting when he is consuming one slice of pizza, and what is the utility when he is consuming one burger. But when it comes to ordinalist approach, we cannot quantify what is the utility; rather we can always prefer like, if you look at Jill, she is the consumer.

Jill prefers a burger to a slice of pizza. It means she is assigning more utility, more satisfaction after having a burger than a pizza and a slice of pizza to a hotdog. So, if it is a comparison between a hotdog and slice to slice of pizza, again she gives more importance to a slice of pizza because she gets more satisfaction from slice of pizza than to the hotdog. So in the second case, Jill is preferring one product over another product

on the basis of satisfaction he receives, or on the basis of the satisfaction, on the basis of the utility what she gets from the different quantity of or different types of goods and services.

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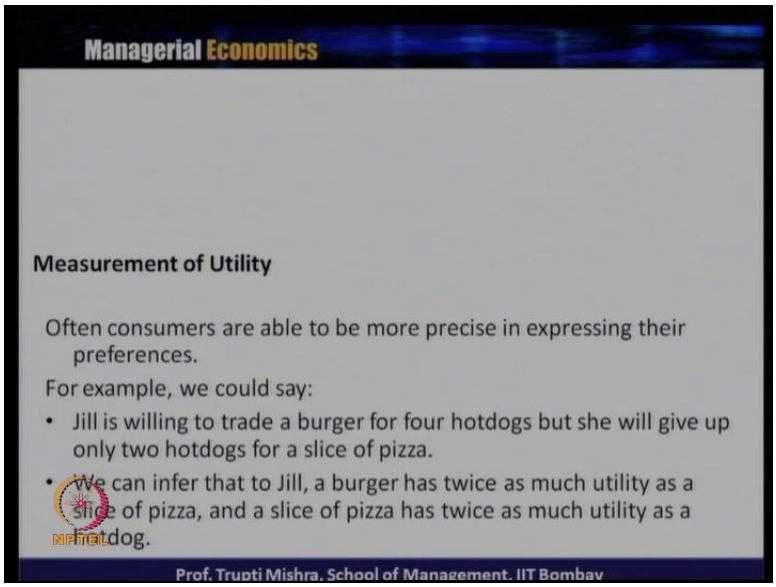

Now so when it comes again to the measurement of utility, there are two approaches: One is the cardinalist approach, the second one is the ordinalist approach. If you look at often consumers, they are able to be more precise in expressing their preferences. Like in the previous example if you look at, Jill is willing to trade a burger for four hotdogs, but she will give only two hotdogs for a slice of pizza. So, look at the trade now; all the rational consumers they are very precise in expressing their preferences, which products they want and which they can give.

So if you are taking the case of Jill, she is willing to trade a burger for four hotdogs. But she will give up only two hotdogs for a slice of pizza; she is ready to forgo four hotdogs for one burger, but two hotdogs only for the slice of pizza. It means she prefers burger more than pizza, and we can infer to that to Jill, a burger has twice as much as utility as slice of pizza and a slice of pizza has twice as much as utility of the hotdog, because she is exchanging four hotdogs for one burger and two hotdogs for one slice of pizza.

So when it comes to measurement of utility, for her the highest utility is always the burger. The second highest utility is the pizza and third utility is the hotdog because she is ready to sacrifice four hotdogs for one burger, two hotdogs for one slice of pizza. So,

burger has twice as utility as slice of pizza, and slice of pizza has twice as utility as the hotdog and when it comes to ranking the preference, then Jill can always prefer the burger, then pizza, then the hotdog.

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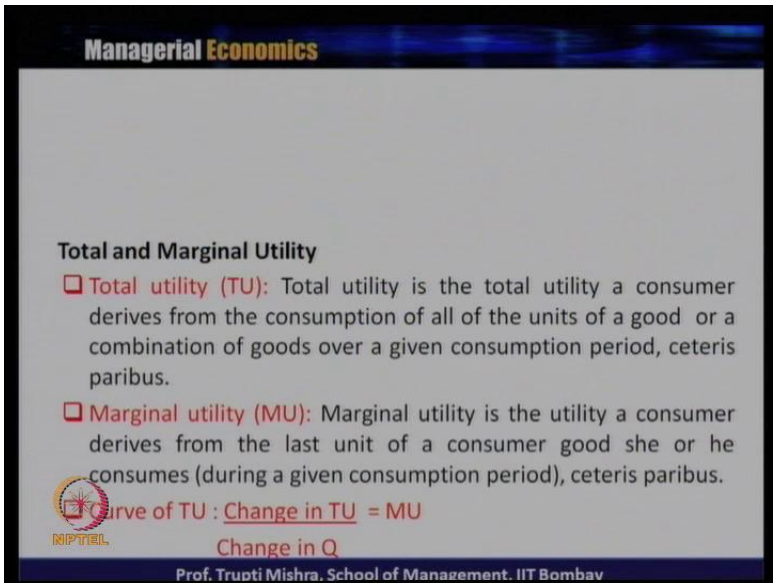

Then we will see what the total utility is; we will introduce two new concepts here; one is total utility and second one is the marginal utility. Now what is total utility? Total utility is the total utility a consumer derives from the consumption of all the units of goods and services or a combination of goods over a given consumption period, ceteris paribus. All of these are constant. Total utility is nothing but the total utility of the consumer what he or she gets after consuming all the units of goods and services. And what is marginal utility? Marginal utility is the additional utility that a consumer derives from the after consuming goods and services, any additional unit of the goods and services. So, marginal utility is the utility a consumer derives from the last unit of consumer goods she or he consumes during a given consumption period, ceteris paribus, all other thing remaining constant.

So, if you plot it, the total curve; the total utility curve is or from the total utility curve we can get the marginal utility curve. And this is nothing but the change in the total utility, when there is change in the quantity of the consumption. So if there are 10 units to consume, the marginal utility between the ninth and tenth is always what is the last additional unit of utility the consumer has added to the total utility after consuming the

last unit of the product. So, total utility is the sum total of the utility what the consumer gets after consuming all units of goods and services, and marginal utility is always the additional utility to the total utility when the consumer consuming one more additional unit of the goods.

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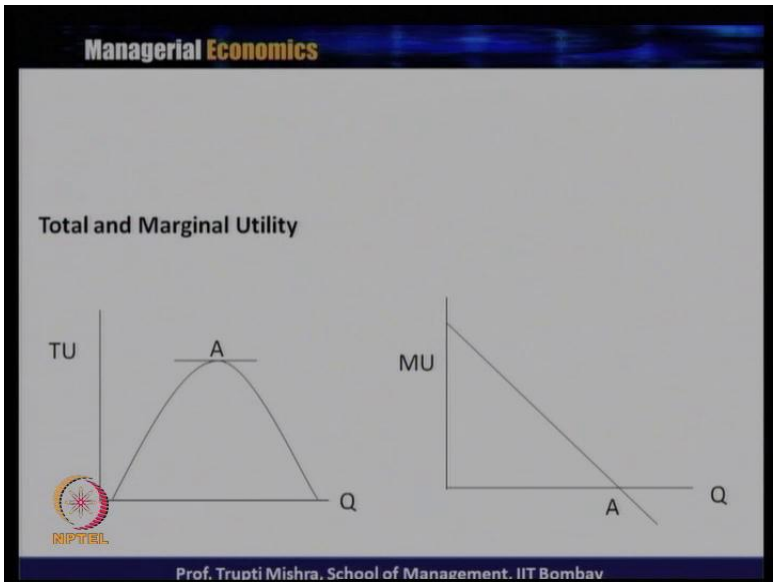

So if you graphically represent, then total utility generally takes an inverted U-shaped. Initially it increases, reaches the maximum, then it decreases, and marginal utility is generally the slope of the total utility. So that is reason if you look at, marginal utility starts at a higher level and then slowly slowly it decreases, and then it reaches zero. We will see why the shape of the total utility is like this, why it increases at the beginning and why it decreases, may be after reaching the threshold level, and to a simply, may be a simple version of this marginal utility is just the slope of the total utility. So, initially those marginal utility if you look at, marginal utility decreases and then it reaches zero and then it goes to negative; that means there is a decreasing slope of total utility. Even if total utility is increasing, it is increasing at a decreasing rate. Then when it is decreasing, then marginal utility goes on a negative direction.

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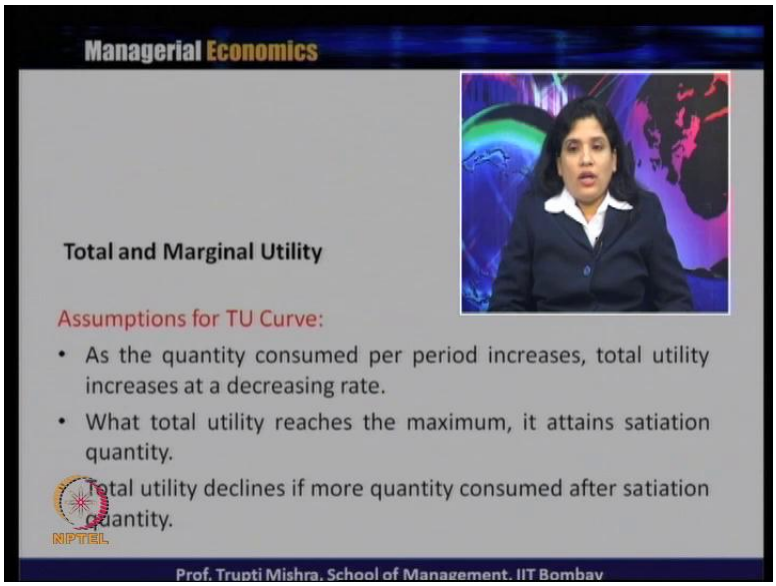

Now what are the assumptions of this total utility curve? As the quantity consumed per period increases, total utility increases at a decreasing rate. So, when there is more and more quantity, if the consumer is consuming more and more of the goods, generally the total utility increases at a decreasing rate. So, some utility the benefit the consumer is getting, but whatever he was getting earlier that becomes less now. When total utility reaches maximum, it attains the satiation quantity. So, if you look at the top point, may be when it has stopped increasing, that point the total utility reaches maximum and that is the satiation quantity or that is the threshold level up to which the consumer gets the satisfaction. Total utility declines if more quantity is consumed after satiation quantity.

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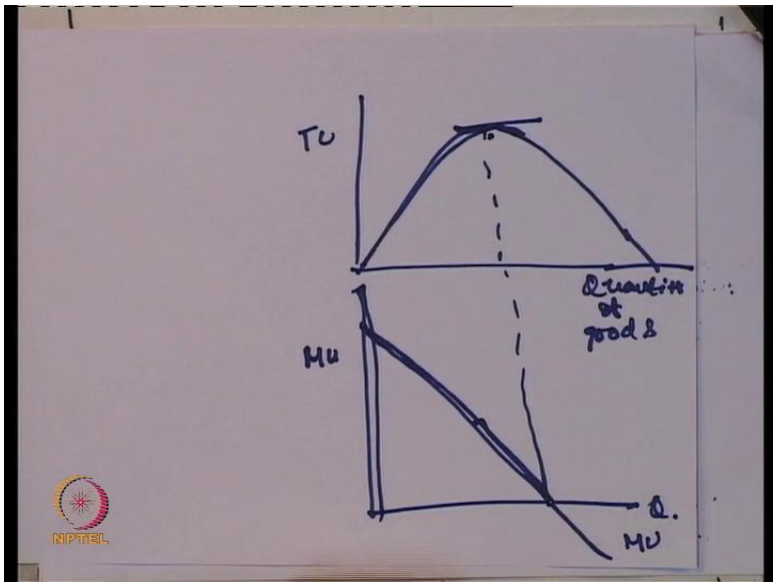

So if you look at, how this total utility and marginal utility they are related. Here suppose if you are considering total utility, this is the quantity of the goods getting produced. So, initially it increases, then it reaches the maximum, and then it decreases. So corresponding to this, our marginal utility initially decreases. So corresponding this, when this is maximum, we get a zero marginal utility, and after that this is negative. So, how these two are related? Initially total utility increases at the decreasing rate, reaches the maximum and after this total utility decreases.

Corresponding to this, the marginal utility is decreasing up to the point total utility is increasing at a decreasing rate. Marginal utility is nothing but the slope of the total utility. So if the slope is decreasing, similarly the marginal utility has to decrease and that is the reason marginal utility is reaching at this point, zero. Then when it is maximum, marginal utility is zero and when it is decreasing, marginal utility has become negative. So from there, the concept of actually the diminishing marginal utility comes, and what is diminishing marginal utility or why we get a negative slope of the total utility.

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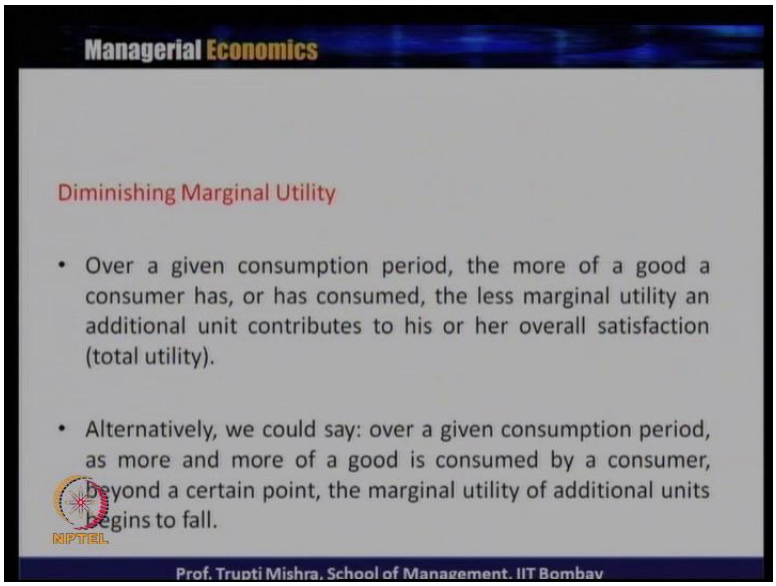

Over a given consumption period, the more of a good the consumer has or has consumed, the less marginal utility an additional unit contributes to his or her overall satisfaction. Alternatively we could say: Over a given consumption period, as more and more of good is consumed by a consumer, beyond a certain point, the marginal utility of additional unit is begins to fall. So, if you look at why the total utility is decreasing. Like take a small example of the consumption of coffee or tea. May be when you take the first cup of tea or first cup of coffee, you get the maximum usefulness or the maximum satisfaction from this product.

Then when you have the second cup of coffee, again you get some amount of the benefit or some amount of the satisfaction. But if you compare between the first cup of the tea of the day and the second cup of the tea of the day, then again there is a difference because whatever the satisfaction you have got in the first cup, you will not get in the second cup. Then may be again, it happens again you are going to have the third cup of tea or third cup of coffee within a specified time period.

So, if the time period is fixed and the same amount of product you are having, then whatever the satisfaction you are getting at the initial consumption, you are not getting that in the following consumption, where following consumption when you are having more and more of that. Similarly, if you can take an example of watching a movie or reading a book; when you first time read a book, you get the maximum utility because

this is a newer one and you get to know all the things in a new version. When you watch a movie for the first time, again you like it most. May be you have liked something, that is the reason you are watching the movie for the second time, third time or so on.

But whatever the satisfaction you have got or whatever the utility you have got in the first unit of consumption, that is always higher, and when you are going on watching the same movie, reading the same book, or may be consuming the same product, the marginal utility goes on decreases and finally it reaches a zero. So at a point of time, you can say that I am not going to have any more tea today, because I have had enough. At any point of time you can say that, I am not going to watch this movie for next three months, next one year, next two years, because I watched for ten times or twelve times or you can say that I am not going to read this book for next few weeks, because I have had enough in last few weeks. So, in the specific time, specific product, the utility decreases when we are consuming more and more of it.

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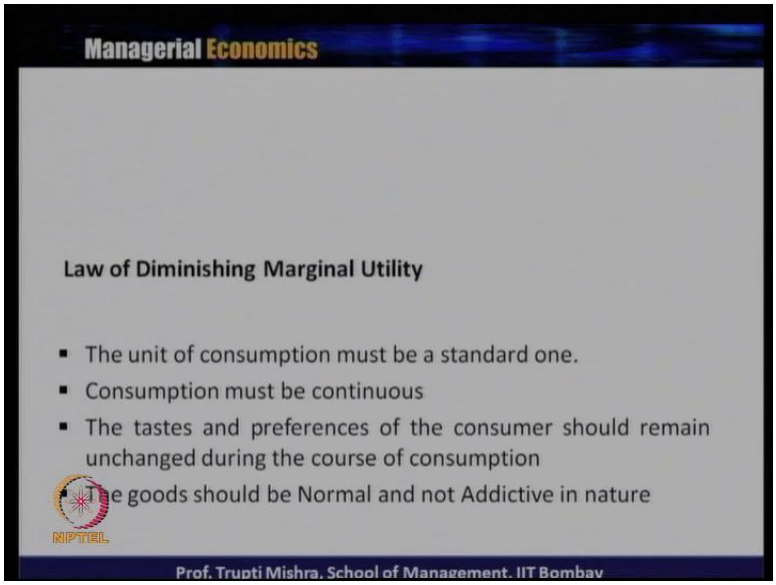

Now what are the pre-conditions in which the case the law of diminishing marginal utility is valid? The unit of consumption must be standard one; it means if you are taking the example of a book, if you are taking the example of a movie, if you are taking the example of a coffee or tea. In this case, if the first time you are having a just half cup of coffee, second time you are having a quarter cup of coffee, third time you are having

again less of it, the possibility is that you may get still the same amount of satisfaction what you would have got in the first cup of coffee.

So, the unit of consumption should be standard one, otherwise this law of diminishing marginal utility is not going to be valid, or like if you take the example of a movie, or if you are taking the example of a book, you can always say that you have to read the book full, you watch the movie full, not only part of it. If you are watching part of it, again you can get the same utility level if you are watching a different part, may be next few hours or next few days. So, unit of consumption has to be standard one then only the diminishing marginal utility has to be valid.

Consumption must be continuous; you cannot give a gap. Suppose you are having one cup of tea in the morning and one cup of tea in the afternoon, again you will get the same level of satisfaction. So in this case, law of diminishing marginal utility is not valid because the consumption is not continuous. If you are giving a gap, the possibility is that you are getting the same level of satisfaction again. The taste and preference of the consumer should remain unchanged during the course of consumption. So, if you are generally having coffee or you are generally having tea, the taste should not change during the course of consumption. If you like the products, then only you are consuming it. So, that should be there till the end of this consumption period.

The goods should be normal, not addictive in nature. Like if I am addicted to coffee, if I am addicted to tea, if I am addicted to smoking, or if I am addicted to liquor and so on, I will go on consuming, I will not get the lesser satisfaction because I am addicted to it. Someone is addicted for smoking. So, the more they consume, more satisfaction they get. Someone is addicted to tea, more they consume, more they get satisfaction. Someone is addicted to liquor, more they consume, more they get the satisfaction. In this case, the law of diminishing marginality is not going to be valid because these goods are not normal, they are addictive in nature. So, one of the pre-condition for the application of law of diminishing marginal utility is the good should be normal, not addictive in nature.

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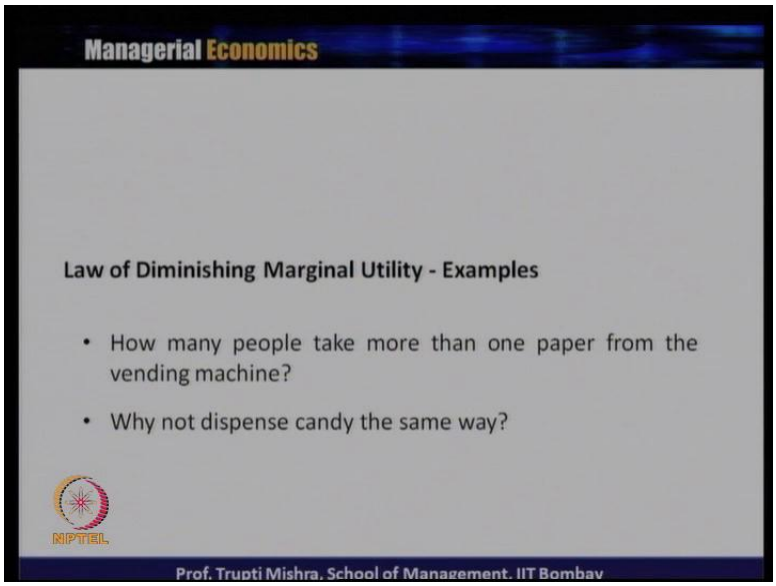

So, like if you are taking a specific example, you are taking two products: one is the may be the paper wending machine; another is the candy wending machine. So if it is a simple question, how many people take more than one paper from the wending machine? May be the answer is none of them because if you take the newspaper, it is a durable good. You go on reading for throughout the day. You do not require a second set of newspaper. But when it comes to candy, may be again, people they go on dispensing candy because may be they are having one now, may be they are having one later. So, in both these cases if you look at, there is a case of diminishing marginal utility.

But in case of diminishing marginal utility, that comes at the very first unit in case of the newspaper. But for candy, it comes at a little later because they go on consuming candy till the time the marginal utility is not reaching zero. But if you have already taken newspaper from the vending machine, the second one is again will not generate any level of utility, because you are always having the similar one for the first time. You are not going to consume again and again the same newspaper, even if you are getting a chance to get it from the vending machine. So, these are the typical examples that how the law of diminishing marginal utility is valid. As the consumer consumes more and more of a specific product, the utility generally goes on decreasing.

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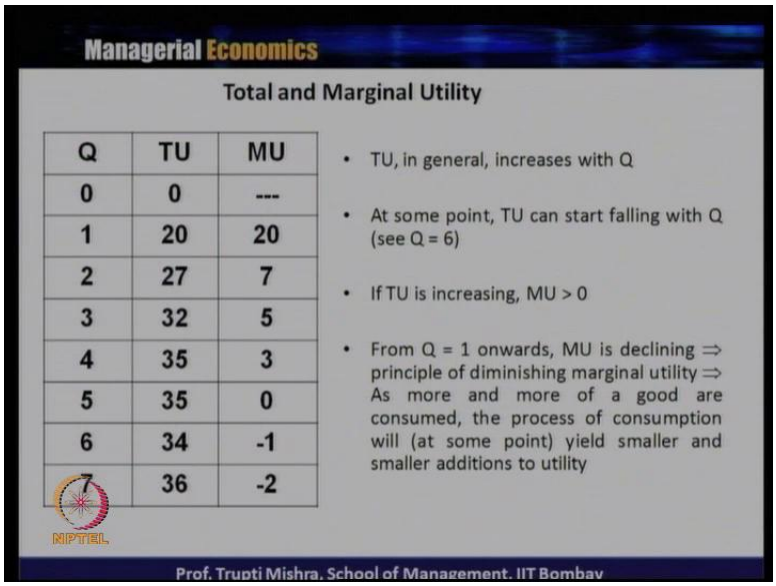

Then we will take a numerical example that how this total utility, marginal utility, they are related. So, in the first column we have Q, in the second column we have total utility. Q is the total product that is getting consumed. Second column this is total utility. Third column, we have the marginal utility. Total utility in general, increases with Q. So if you look at, from unit 1 to unit 4, the total utility is increasing. At some point, total utility can start falling with the Q. So if you look Q from 6, total utility is decreasing. But in forth unit and fifth unit, total utility is constant. Marginal utility is, if you look at it, it goes on decreasing from the beginning. If total utility is increasing, marginal utility is always greater than zero. That is evident in the fifth unit because total utility is increasing and marginal utility is greater than zero.

When total utility is maximum, beyond this the marginal utility is 0 and then negative. So from Q is equal to 1 onwards, marginal utility is declining, which follows the principle of diminishing marginal utility. As more and more of a good are consumed, the processes of consumption will at least at the same point yield the smaller and smaller addition to utility. So, if you look at between after consuming the first unit and the second unit, the additional utility is just 7 units; that is marginal utility. When it comes to third unit, again the marginal utility is 5. When it comes to fourth unit, marginal utility is 3. When it comes to fifth unit, marginal utility has become 0. And in case of sixth and seventh units, there is negative marginal utility.

It means when you are consuming more and more, you are getting a negative utility, which leads to negative marginal utility, and this is the evidence of law of diminishing marginal utility. Initially when total utility increases, marginal utility decreases. When total utility is maximum, marginal utility is zero and when total utility is decreasing, marginal utility goes to the negative segment and the consumer get a negative marginal utility from it.

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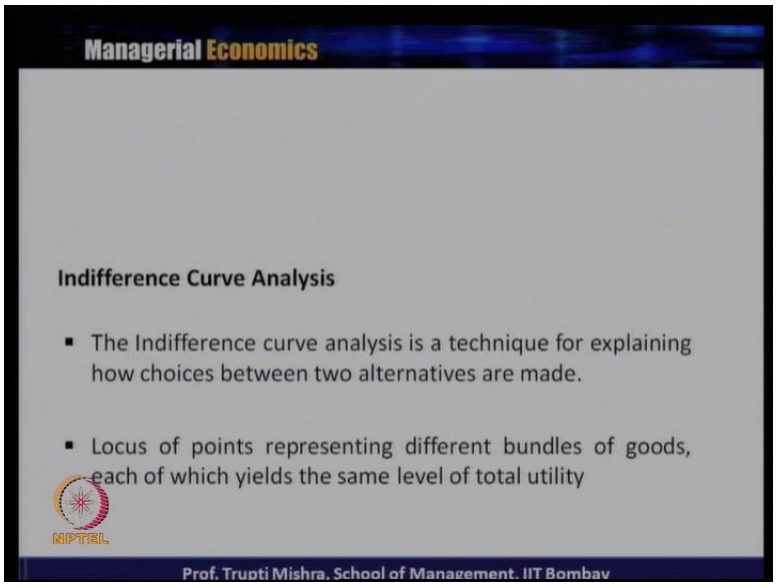

Then, we will come to the ordinal utility analysis; and this ordinal utility analysis is through the indifference curve and the basis of ordinal utility analysis is that, the consumer is not assigning any utils, rather they are ranking on the basis of their preferences.

So, indifference curve analysis is part of the ordinal utility analysis and what is indifference curve analysis? Indifference ah in difference curve is one; it is a locus of points of different combination of goods which keeps the equal level of satisfaction to the consumer. So whatever the combination between two goods, it gives the equal level of satisfaction to the consumer. So, it is a technique how choices between two alternatives are made, because it gives an exposure to the different combination what the consumer can consume. So, it is a locus of points representing different bundle of goods, each of which yield the same level of the total utility.

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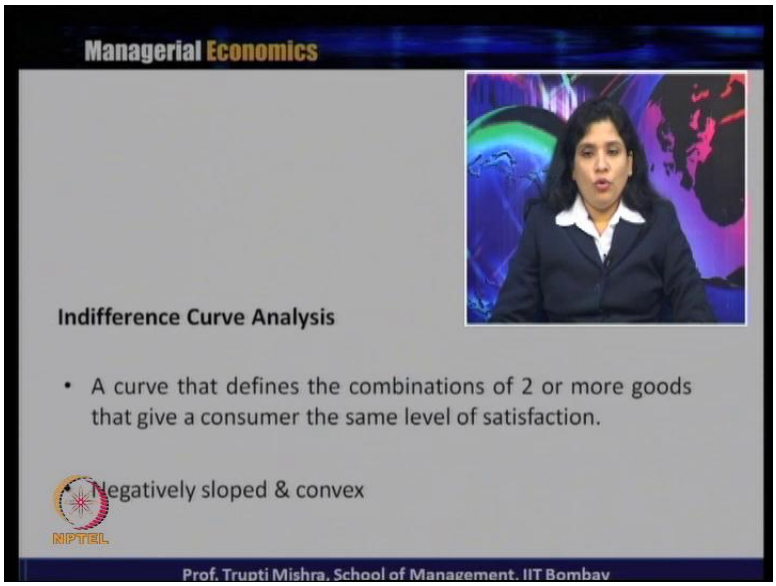

It defines the combination between two or more goods that gives the consumer the same level of satisfaction, and it is negatively sloped and convex.

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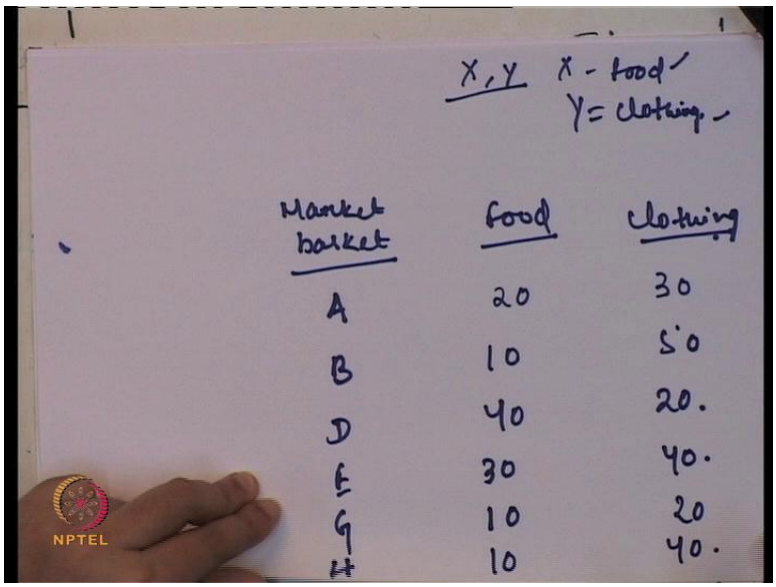

Let us take an example of indifference curve or how we can draw the indifference curve. So we are saying these are two goods. Suppose consider X and Y. X is food and Y is clothing. So there are different consumption baskets, which give different combinations of food and the clothing. So, suppose we consider this as the market basket or consumption basket. We take the one is food, second one is clothing, then A, B, D, E, G

and H; what are these A, B, D, E, G and H? These are the different consumption baskets which consist of different combinations of food and clothing.

So, A has 20 units of food and 30 units of clothing. B has 10 units of food and 50 units of clothing. D is 40 units of food and 30 units of clothing, and E is 30 units of food and 40 units of clothing. G is 10 units of food and 20 units of clothing, and H is 10 units of food and 40 unit of clothing. Now lets us see how, when we put it in a graph, how it looks like or how we can draw an indifference curve. So basically, this is a market basket which consists of both the goods and what are the two goods here; food and clothing. So if you are picking up A, it gives one combination of food and clothing. If you are picking up B, it gives another combination of food and clothing. If it is E or G, it gives again another combination of food or clothing.

The consumer can take a decision whether they have to consume the basket A, whether they have to consume the basket B or whether they have to consume the basket H; it depends on their preference that how much quantity of food they require and how much quantity of clothing they require. And it is always different for the different consumptions, different consumers, because their consumption needs are different. So, let us graphically see how these, how we can plot this indifference curve with the help of different combination of two goods and with the help of different consumption baskets.

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So, suppose we can take food here in x-axis, clothing here in the y-axis. We will take 10 20, 30, and 40; here also we can take 10, 20, 30, 40 and 50. So, combination say A is 20 units of food and 30 units of clothing, combination B is say 10 units of food and 50 units of clothing, combination D say 40 units of food and 20 units of clothing, combination E say 30 unit of food and 40 unit of clothing, combination G say 10 units of food and 20 units of clothing, and combination H says 10 units of food and 40 units of clothing.

So, if you look at them, here we have five different combinations A to H. So if you consider this as the two of box; in this segment, A will be more preferred if someone is at the point of G, because A gives us more of both the goods and more of food and clothing. But if someone in the segment E, they will always prefer E rather than A, because E gives us a better quantity of both the goods and services. So, if you join now point B point A and point D, this is one indifference curve.

Now what is the basis of this indifference curve? Any combination G and H, they will prefer G and H, then A; any consumer if they are between G and H. Any combination between E and above your any other combinations, they will prefer not A, rather than the other combination because that gives more quantity of both the goods. So, between these three points now B and A and D, the consumer will remain indifferent. Because even if at this point B, the consumer is consuming more of cloth and less of food.

In case of D, the consumer is consuming more of food and less of clothing, and this combination A, the consumer is consuming moderate amount of both food and clothing. So, this is 20, 30; this is 10, 50; and this is 40 and 20. So between these three combinations, the consumer will remain indifferent whether it is point B, point A and point D; whatever be the combination between food and clothing whether it is 10, 50; 20, 30; or 40, 20, the consumer gets the same level of satisfaction. So, U 1 is known as the indifference curve, which gives the same level of satisfaction, irrespective of whatever be the quantity of food and the clothing.

So, that goes with our basic philosophy of the indifference curve. The locus of different points which keeps the equal level of satisfaction, and what are the locus of different points, and what are the different points imply? The different points imply different combinations of goods and services. So in this case, there are two goods; food and clothing, and if you look at in the indifference curve, we got three points which gives

three different quantity, combinations of food and clothing. But it is at the end, it gives the same level of satisfaction to the consumer.

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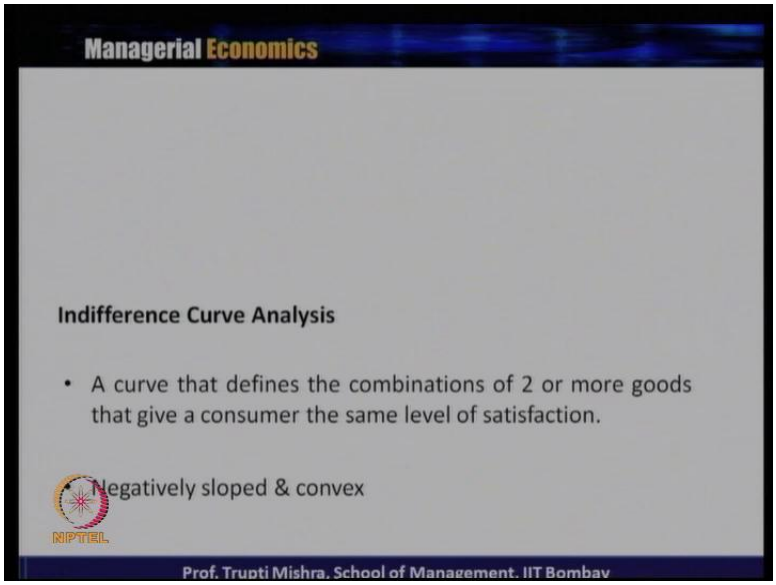

The consumer can remain indifferent between point B, point A and point D, and that is the reason it is known as the indifference curve. Because generally, the consumer remains indifferent between all these points in the indifference curve, because irrespective of the combination chosen, they are getting the same level of satisfaction.

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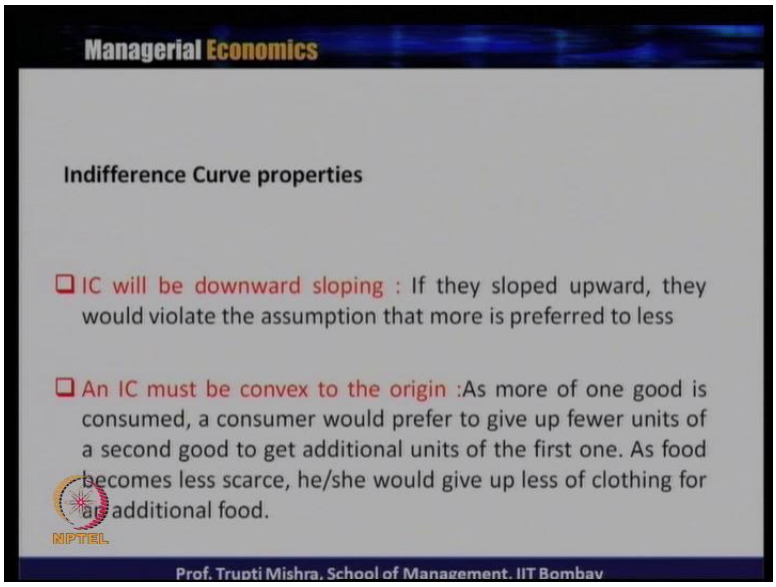

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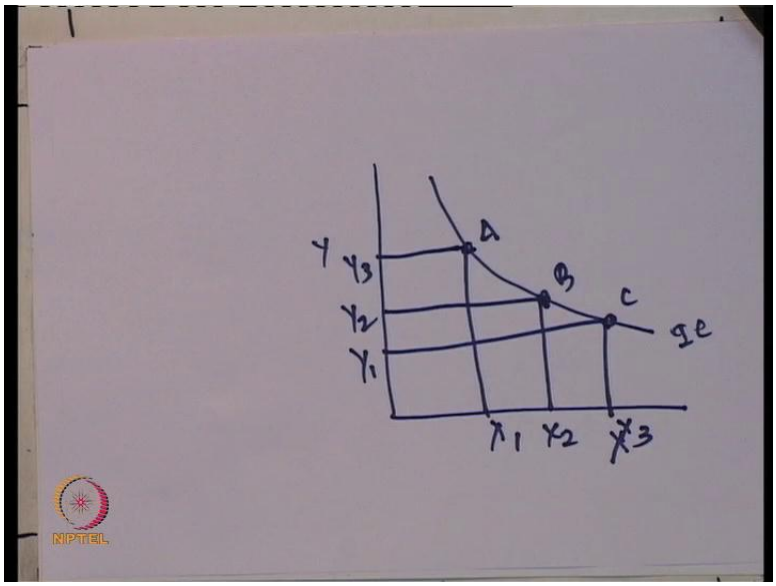

Now we will see what are the different properties of the indifference curve? The first property of the indifference curve is that it will be downward sloping. Now why it should be downward sloping? If they sloped upward, they would violate the assumption that more is preferred to less.

Now if you are saying that this is the indifference curve. Suppose here it is X, here it Y. Each point of the indifference curve gives a different combination of two goods. Suppose this is Y1, this is Y2, this is Y3. So this is point A, this is point B, this is point C. Why the indifference curve does negatively slope? The slope has to be negative because at any point of time, if the consumer is moving from point A to point B, he is consuming more of X and less of Y. So, this more of X is by sacrificing some amount of Y here. Similarly if the consumer is moving from point B to C, he is consuming more of X, and this more of X by sacrificing some amount of Y.

If the consumer has to be at the same indifference curve, when they are consuming more of one commodity they have to reduce the consumption of the other commodity; then only there can be indifference between combinations. And that is the reason, when they are consuming more they have to sacrifice some unit from the other goods. The indifference curve is negative sloped and that is first property of the indifference curve; that indifference curve is downward sloping. And if they are sloping upward, if is a positive slope, then from one point to another point it is two different quantities, and it

gives the higher level of satisfaction and the consumer has not indifferent between all these combinations.

Now, the second property is that indifference curve must be convex to the origin. As more of one good is consumed, the consumer would prefer to give a fewer unit of the second good to get additional unit of the first one. As food become less scarce, he or she would give up less clothing for the additional food.

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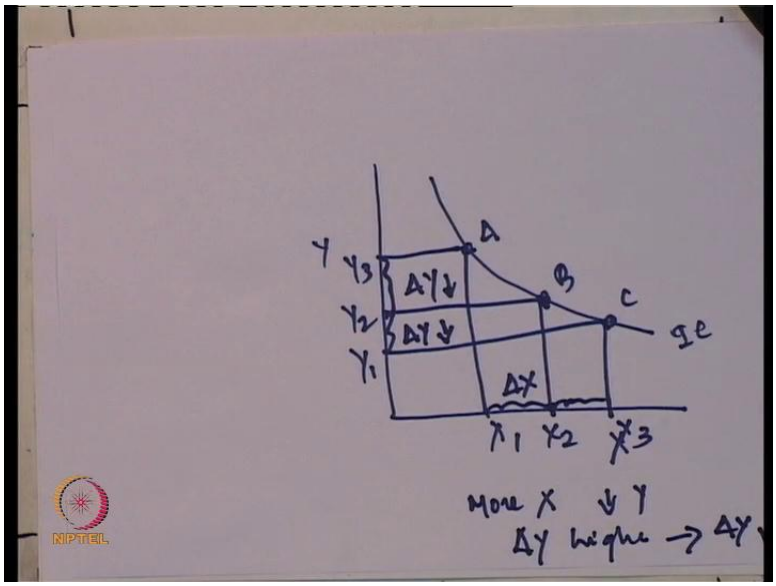

So if you are taking again, take the example of the same graph. Initially in order to get this much amount of X, the consumer was ready to sacrifice this much unit of Y. Then to get more unit of X, the consumer is sacrificing some unit of Y, which is again less than the first one. It means when you are consuming more and more of X in exchange of Y, initially this del Y is on a higher side. But when you are going on consuming the same unit by sacrificing the other one, then it slowly slowly this del Y decreases and that is the reason the slope decreases.

And if you are taking the typical example of food and clothing again; when the consumer has enough of food and still if he is getting more food in exchange of clothing, the trader between the clothing and food and whatever the amount of clothing he is going to sacrifice, that will become less and less when he is going to consume more and more of the food. So initially, the consumer is ready to sacrifice more amounts of the other good in order to get one additional unit of one of the good. But slowly slowly when he is going

on consuming more of one good that takes less amount of sacrifice, less amounts from the other goods. That is the reason the slope goes on. The rate of change in the slope is decreasing and indifference curve is convex to origin.

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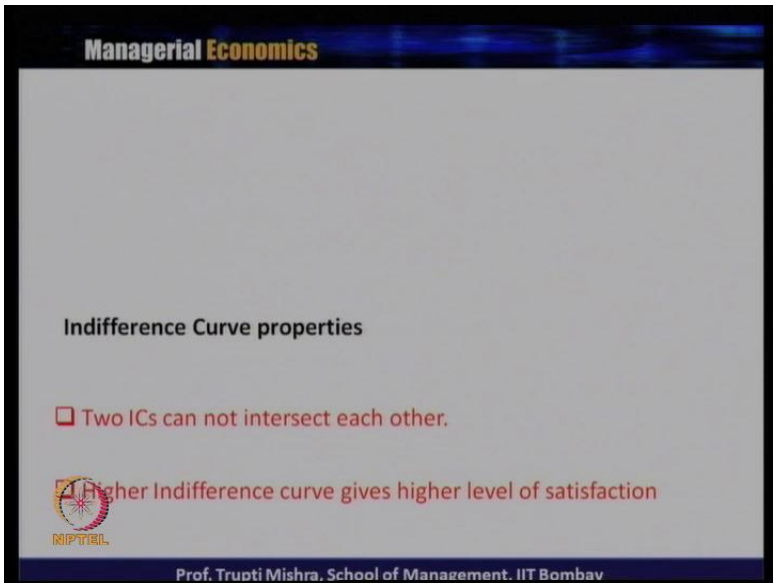

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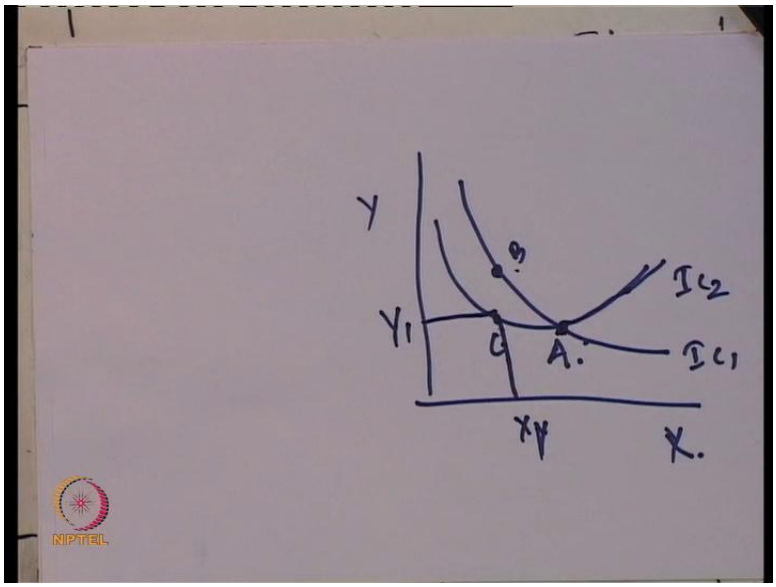

There are two different, two other properties of indifference curve. The first one is two indifference curve cannot intersect each other. Now if you take the example of two indifference curve why they cannot intersect each other ; suppose this is Y, this is X, this is our indifference curve one, that is IC 1 and this is our indifference curve two IC 2,

now why they cannot intersect each other. Point A is corresponding to also IC 1 and corresponding to IC 2. So, suppose if you are taking a different point. Suppose B and C this is not following or the basic transitivity assumption, that if any time of any point of time if A is preferred B and A is preferred to C, B also preferred to C.

That is not going to happen, because if A and B if you are considering under one indifference curve, may be A is preferred B. But in case, similarly if A and C in the second indifference curve IC 2 to A is preferred to C, but B cannot be preferred to C because C is lying on a lower indifference curve which gives less unit of combination of goods and services.

That is the reason two indifference curve cannot intersect each other because the level of satisfaction between two points are different, even if they are lying on the same indifference curve. So, that takes our third property of indifference curve that two indifference curves cannot intersect each other, because it is highlight the basic assumption of the consumer theory. Then the fourth assumption is higher indifference curve gives higher level of satisfaction.

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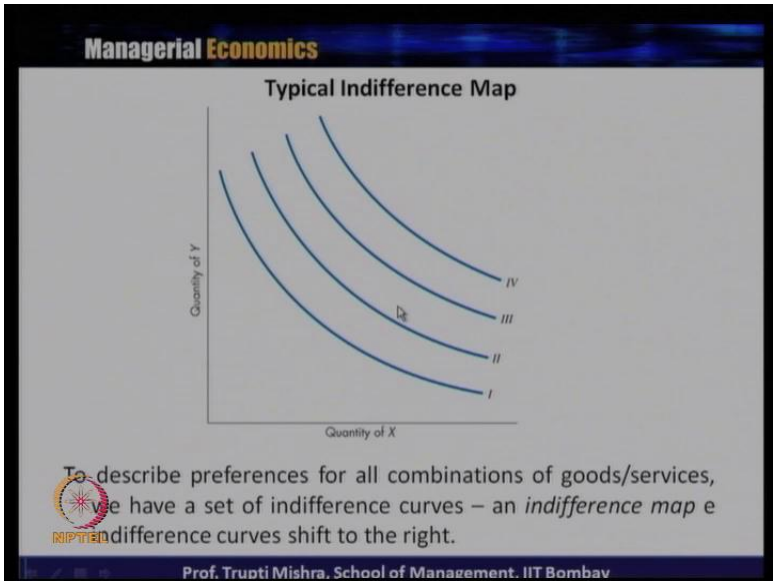

So this we can explain through an indifference map, which generally consist of different indifference curve of different quantity of goods x and y. So, to describe the preference of all combination of goods and services, we have set of indifference curve, an

indifference map. When there is an increase in the quantity of goods and both the goods, quantity X and Y the indifference curve shift to the right.

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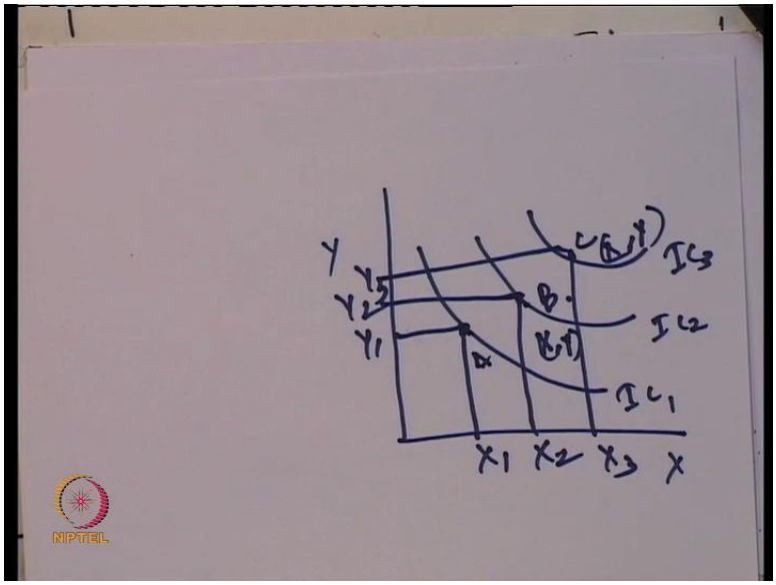

Let us us see how through this indifference map, we can prove our fourth property of indifference curve; that is higher indifference curve gives a higher level of satisfaction. So, suppose let us find out first the indifference map. We have IC 1, we have IC 2, and we have IC 3. Now suppose we take a point here, point here, and point here; this gives us one combination, this gives us the second combination, and this gives us the third combination. So if you look at, when you are moving from one indifference curve to another indifference curve it gives. So suppose from point A to point B, point B consist of more of both X and Y; again between point B to C, again it consists of more of X and more of Y.

So, if the consumer is taking a point in C; taking the point C. Since it consumes more of both of X and Y it always gives us a high level of satisfaction as compared to point B and point A. Because when the consumer moves to higher indifference curve, it helps them to consume more of both of the goods and services and that is the reason they are moving from when they are moving from one difference curve to another indifference curve, they are getting a higher level of satisfaction and that goes with our fourth property of indifference curve; that higher indifference curve gives a higher level of satisfaction and lower indifference curve gives a lower level of satisfaction. Higher

indifference curve consist of more of both the goods and lower indifference curve consist of less of both the goods.

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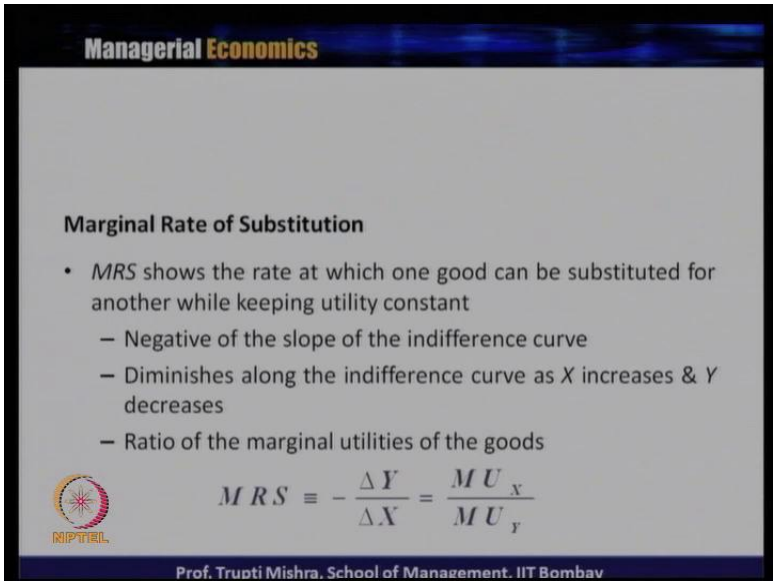

Then we will see what is the rate of at which both the goods gets substituted for one another. If you look at in the typical indifference curve we have said that, when they are consuming more of one good they have to sacrifice some amount of the other good. How this is possible or what is the rate at which the marginal rate of substitution at which the both goods gets substituted to each other. And the rate at which one good can be substituted for another is the marginal rate of substitution and here the precondition is that we have to keep the utility level constant.

So the combination gets changed, but they have to in the same indifference curve because we have to keep the utility remain constant. Now what is marginal rate of substitution? This is the rate at which one good gets substituted for another good. While keeping the utility level remains constant, it is the negative of the slope of the indifference curve. It diminishes along the indifference curve as X increases and Y decreases and this is the ratio of marginal utility of goods and services. So, marginal rate of substitution is the change in the Y with respect to change in the X and this can be also considered as the marginal utility of X and Y.

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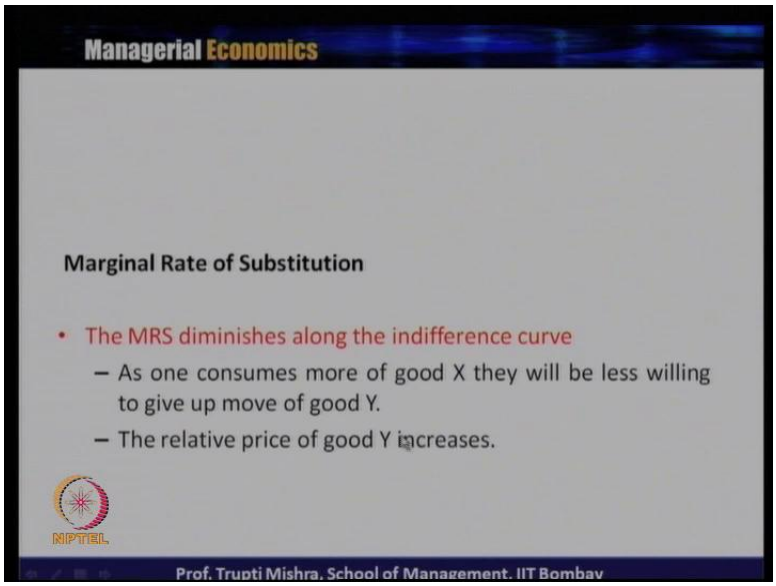

The marginal rate of substitution diminishes along the indifference curve, as one consumes more of good X they will be less willing to give up move of good Y and the relative price of good Y increases. And that is the reason the indifference curve is generally convex to origin, because the marginal rate of substitution of generally the slope that diminishes along the indifference curve.

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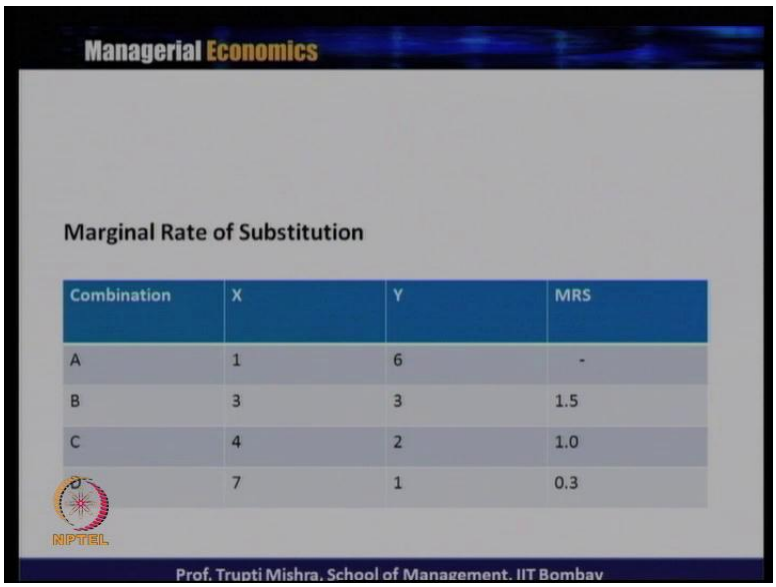

So, this is the numerical example that how the marginal revenue generally decreases when you are moving from one to another. So the combination A gives us 1 unit of X

and 6 unit of Y. When the move from combination A to combination B, combination X is combination B consist of 3 unit of X and 3 unit of Y. So for additional 2 unit of X, the consumer is sacrificing 3 unit of Y. When they are moving from point B to point C, for additional 1 unit of X, the consumer is sacrificing 1 unit of Y and for moving from combination C to combination D, for additional 3 unit of X the consumer is sacrificing 1 unit of Y. So, if you look at what is the rate of substitution? The rate of substitution is change in the Y with respect to change in the X. So in the first case, this is 1.5. In the second case, this is 1 and the third case, this is 0.3; so the marginal rate of substitution decreases, when the same good gets substituted for another good for typical time period.

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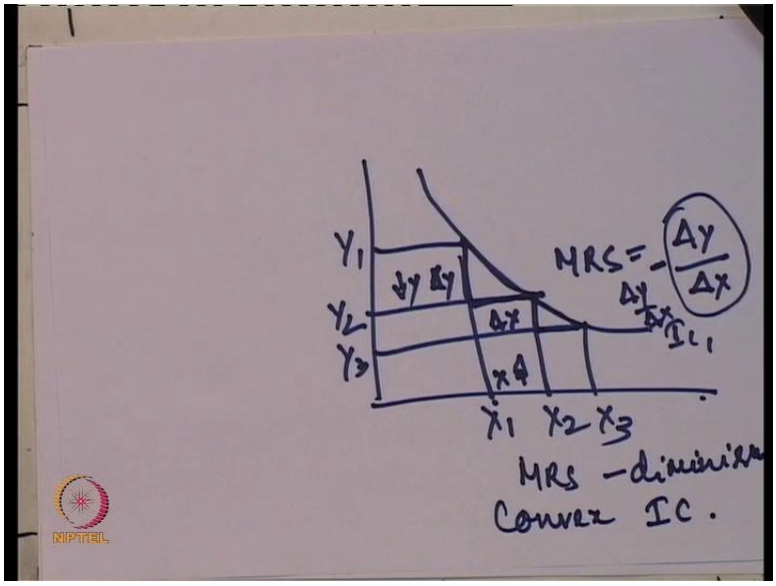

So graphically, this marginal rate of substitution is if this is the indifference curve, graphically this is nothing but the slope of the indifference curve. So, moving from point this to point this, this is the slope. So, this is del Y, this is del X. So, marginal rate of substitution is the rate at which one could get the substituted between another. So, there is an increase in the x due to decrease in the Y. We have to decrease in the y and that is the reason the marginal rate of substitution is the del Y by del X and this is nothing but the slope of the indifference curve. And when we move further, you look at the slope the change in the Y, and A is again smaller than the initial change in Y and X and that is the reason the marginal rate of substitution goes on diminishing, and we get a convex indifference curve because of this.

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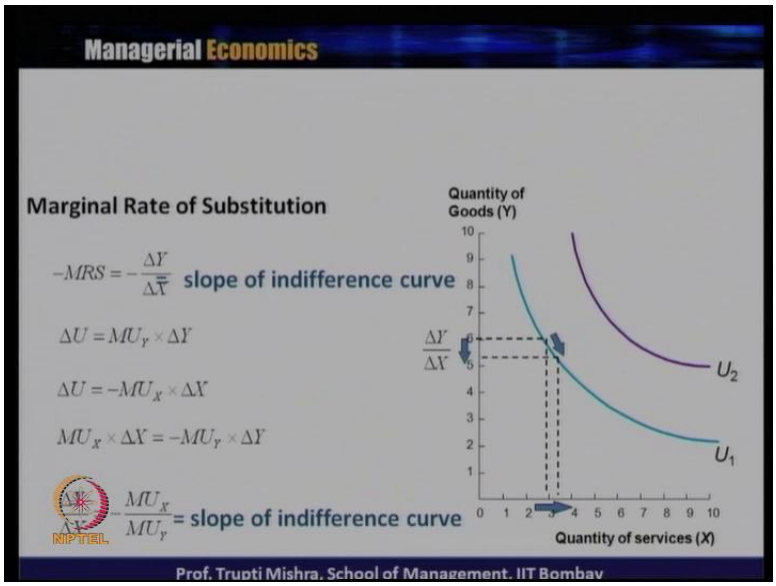

So next, we will see how this marginal rate of substitution is also equal to the ratio of marginal utility of X and Y. So, marginal rate of substitution is the change in the Y with respect to change in the x and this is also the slope of the indifference curve, and when there is an increase in the X that leads to decrease in Y. Now what is the change in the utility when there is a decrease in the Y? That is marginal utility of Y multiplied by change in the Y and what is the change in the utility when there is an increase in the X? That is marginal utility of X multiplied by the change in the X. So, marginal utility of X multiplied by del X, marginal utility of Y divided by del Y and if you simplify this we get del Y by del X is equal to MU x by MU y which is the slope of the indifference curve and this is again also the marginal rate of substitution.

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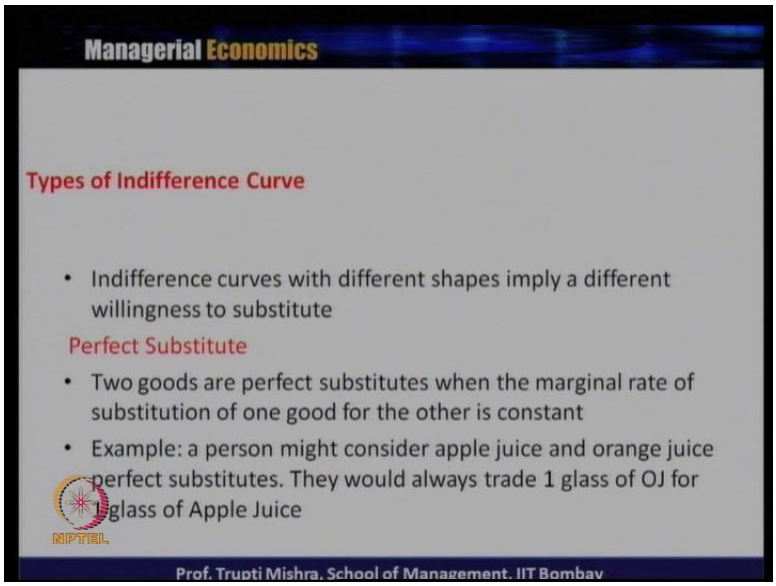

Then we will see what are the different types of indifference curve. In the first case, if you remember there are two types of good; one is the substitute goods and other is the complimentary goods. So, indifference curve with a different shape imply a different willingness to substitute for both the goods. So, perfect substitute is one when the marginal rate of substitution of one good for the other is constant. Because they are perfect substitute to each other, it is like tea and coffee. So, one is cup of tea is just equal to one cup of coffee. If someone is having one cup of tea, he has to reduce the consumption of the one cup of coffee. Like a person might consider the apple juice and orange juice is perfectly substitute. They would always trade one glass of orange juice for one glass of apple juice.

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In case of complimentary goods when the indifference curves for the goods are shaped as the right angle. So, like if you 1 left shoe and 1 right shoe, you are indifferent between having more left shoe than having more right shoe. Must have one right for one left and that is why we always get a pair of shoes, not one by one.

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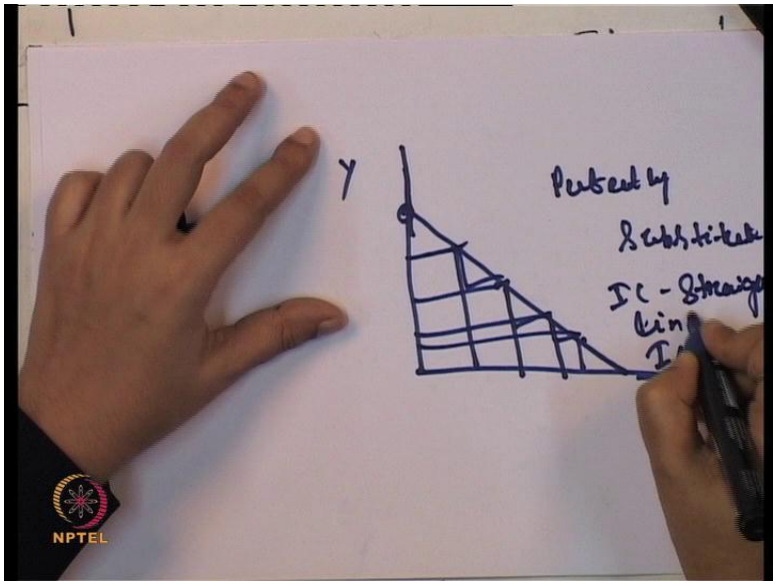

Now, we will see what shape it takes when it comes to the perfectly complimentary and perfectly substitute. So in case of perfectly substitute goods, we get the indifference curve which is straight line and both of them they are perfectly substitute to each other.

So, one unit is the slope has to be constant. So this is the slope, this is the slope and so on this is the slope. So in case of perfectly substitute, the indifference curve is straight line and in case of complimentary, the indifference curve is right angle.

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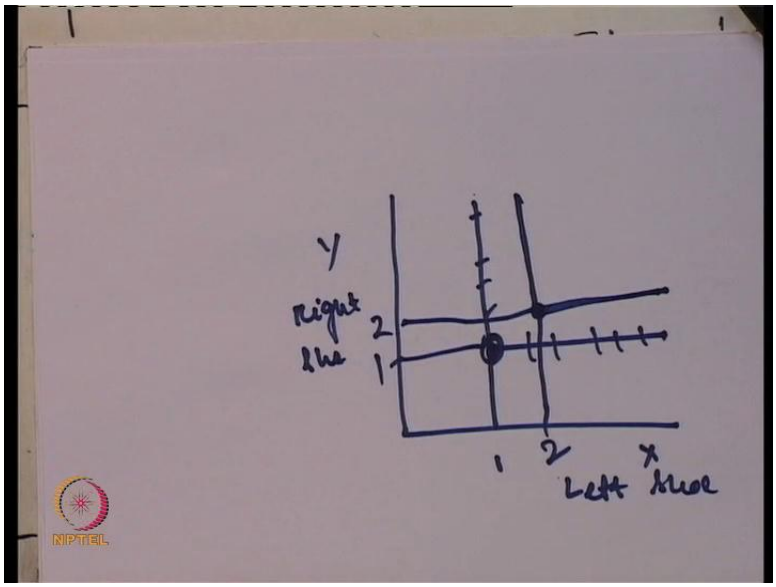

Because if you are considering X as the left shoe, and Y as the right shoe. If you have only one of left shoe irrespective of how many right shoes you have, there is only one pair valid. Similarly if you are having only one pair of right shoe irrespective of whatever the pair of the left shoe, still it is only one point is valid. Similarly, if you are getting another indifference curve, when you have two unit both the left shoe and the right shoe; in this case, again you get an indifference curve which is at a higher level, higher satisfaction, but it still gives the only one valid point where there is a matching between two products. Because it will not have any effect even if you have ten left running shoe and if you have only one right shoe, and you have ten right running shoe and you have only one left running shoe.

So we will continue our discussion for the budgets line, how the consumer reaches the consumer equilibrium, then the income substitution effect and finally the consumer surplus, which comes under the theory of consumer behavior in the next class.

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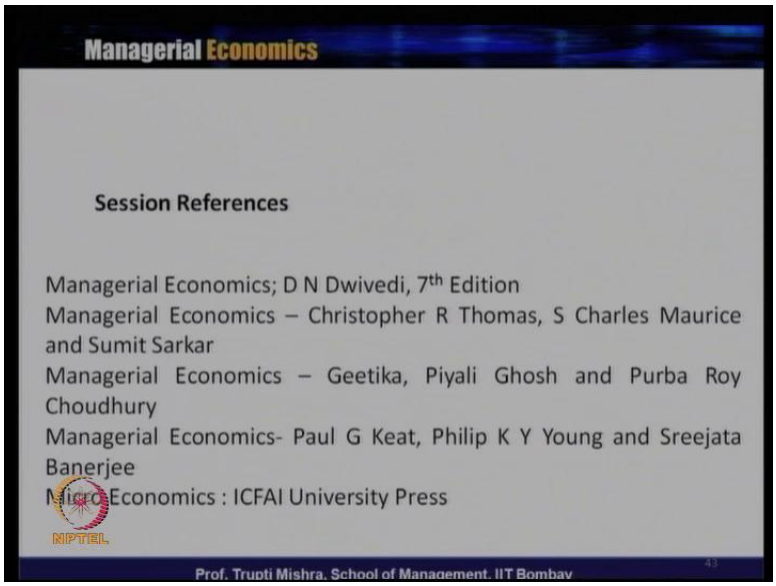

These are the session references for this specific session where we discussed about the utility analysis, and indifference curve analysis.