Introduction:

The theory of consumer behaviour based on the ordinal approach was propounded by J.R. Hicks and R.G.D. Allen in 1934. According to this approach, utility cannot be measured in any quantifiable number. It could only be measured by giving order, ranks or preferences. Hence the ordinal utility means consumers preferences or choice for one commodity or for a basket of goods over the other. Here, the preferences could be expressed in terms of 'more' or 'less' preferable. Moreover, since the consumers have a limited income which they can spend on their consumption, therefore, in this approach, a consumer will prefer a basket of goods over the other given the prices of the goods and the income of the consumer. This would be explained with the help of budget line and indifference curve later in this chapter.

But before moving ahead let's talk about the assumptions of this theory.

- *Rationality:* A consumer is always rational i.e. he always prefers more of goods and services to derive maximum utility. Thus he always buys the commodity which gives him maximum utility first and then he buys the least utility giving commodity at the end.
- *Finite money income:* The consumers have limited money income which they spend on the purchase of all the goods and services for their living. Thus they allocate this income as their consumption expenditure on all goods and services.
- *Ordinal utility:* The utility derived from the consumption of each good or a basket of goods could be measured ordinally by giving preferences for each good over the other.
- *Transitivity and consistency of choice:* Consumer's preferences are always transitive i.e., if a consumer prefers good X over good Y and the same consumer prefers good Y over good Z then according to this assumption of transitivity, he must prefer good X over good Z also.

  If, X>Y
  If, Y>Z
  Therefore, X>Z.

  Whereas as per consistency of choice, if a consumer prefers good X to good Y in one period then he must not prefer good Y to good X in another period or must not treat both the goods as equal. Symbolically,

  If, X>Y in one period
  Then, Y > X or Y ≠ X in other period.

- *Non-Satiety:* According to this, a consumer always prefers more of a good or larger quantity of all the goods because he has not reached the saturation level nor he is oversupplied with all the goods.
- *Diminishing marginal rate of substitution:* Marginal rate of substitution refers to the rate at which a consumer substitute one good X for the other good Y so that the level of utility/ satisfaction obtained from it remains the same to him. Symbolically, MRS = $\Delta X/\Delta Y$ or $\Delta Y/\Delta X$. According to this assumption, as a

consumer continues to substitute X for Y or Y for X, his MRS diminishes/decreases. This would be explained in the later sections in more detail.

Indifference Curve:

Indifference curve is defined as the locus of the points of the different combinations of different goods which gives an equal level of satisfaction to the consumer. Therefore a consumer is indifferent between any of the combination which lies on the same indifference curve. This happens because the consumer has a power to substitute among various goods, given their prices and his income level.

For simplicity let's take the example of two goods x and y. Now given the income of the consumer and the prices of x and y, the consumer can choose different combinations of x and y to be consumed in order to maximize his satisfaction. All those combinations of x and y which gives an equal utility to the consumer forms an indifference curve (as in the following fig). Moreover the consumer can substitute between x and y and thus can either consume more of x or more of y but the main point is that the level of satisfaction arising from the different combination of x and y remains the same to him.

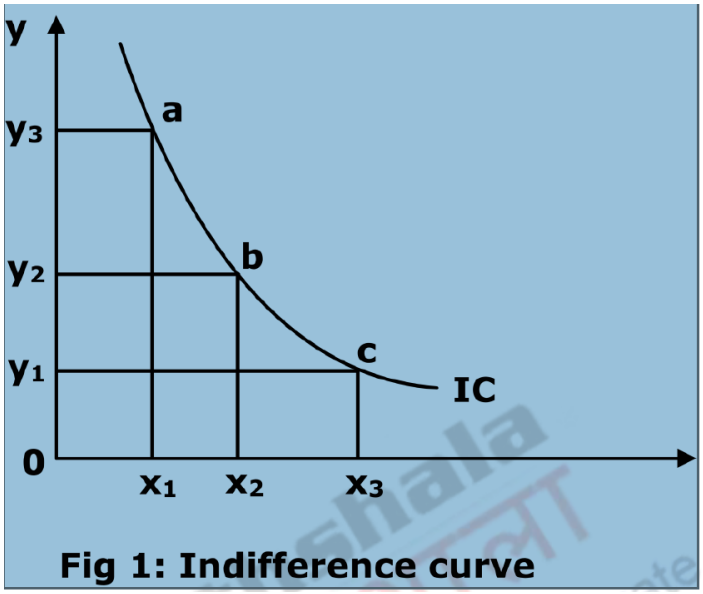

Fig 1: Indifference curve

As has been depicted in the above figure, that at point 'a' the consumer consumes y3 and x1 combination of goods, whereas at point 'b' he substitute y with x and the combination at point 'b' becomes x2 and y2, similarly at point 'c' the consumer consumes x3 and y1 combination of both the goods, given his income and Px and Py. However all the points, a, b and c, gives the consumer equal level of satisfaction. Hence, he is indifferent among a, b and c. Therefore, the curve joining a, b and c is known as indifference curve, where the consumer is indifferent of the different choice which he has as they all gives him equal level of satisfaction. Here only the

combinations of x and y are different at each point but the level of satisfaction which the consumer obtained from them is the same.

Now if the consumer either consumes more of a good or of both the goods then he would be able to increase his level of satisfaction and thus a new IC would be drawn above this IC which represents the different combinations of x and y (higher than the previous combinations) which gives him the same level of satisfaction (higher than the previous level of satisfaction). Similarly a lower IC would represent the combinations of x and y (lesser than the previous combinations) which gives him equal satisfaction (lesser than the previous level of satisfaction). Hence the higher an IC, the higher is the level of satisfaction and the lower the IC, the lesser is the level of satisfaction obtained by the consumer.

Representation of the different combinations of goods and different levels of satisfaction on a graph is known as an Indifference map.

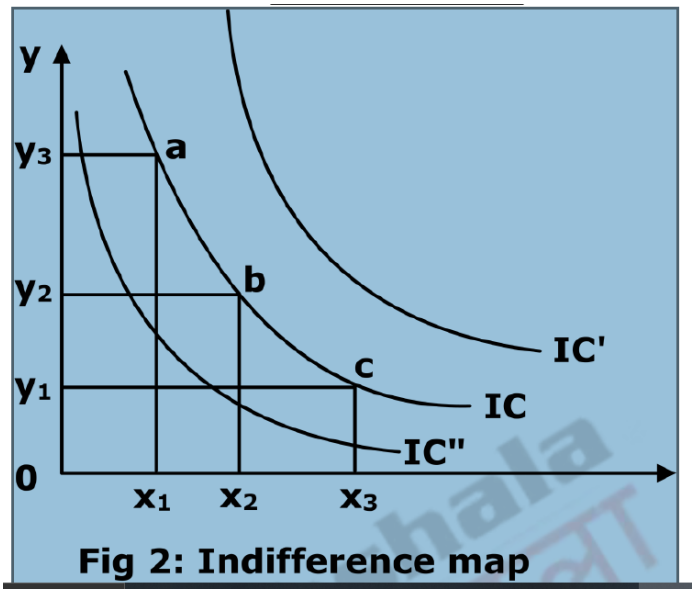

Fig 2: Indifference map

Concept of Marginal rate of substitution:

Marginal rate of substitution is defined as the rate at which a consumer substitutes one good for the other obtaining the same level of satisfaction. In this case, it is the rate at which a consumer substitute good y with good x in order to get the same level of satisfaction.

Symbolically, $MRS_{yx} = \Delta y/\Delta x$ or $MRS_{xy} = \Delta x/\Delta y$

MRS is also known as the slope of the IC.

As we can see from the diagram below, that as the consumer consumes more of x, he reduces the quantity of y from y3 to y2 in order to get the same level of satisfaction. Similarly, he further substitute y from y2 to y1 with good x in order to get more of x and

the same level of satisfaction. This rate of change in y due to the increase in the quantity of x by one unit is known as Marginal rate of substitution (MRS).
As we can see, an IC has a diminishing MRS, means that the consumer substitute x for y at a diminishing rate. In other words, as the consumer increases the consumption of x by one unit, their consumption of y reduces at a decreasing rate. Hence we can say that an IC has a diminishing slope.

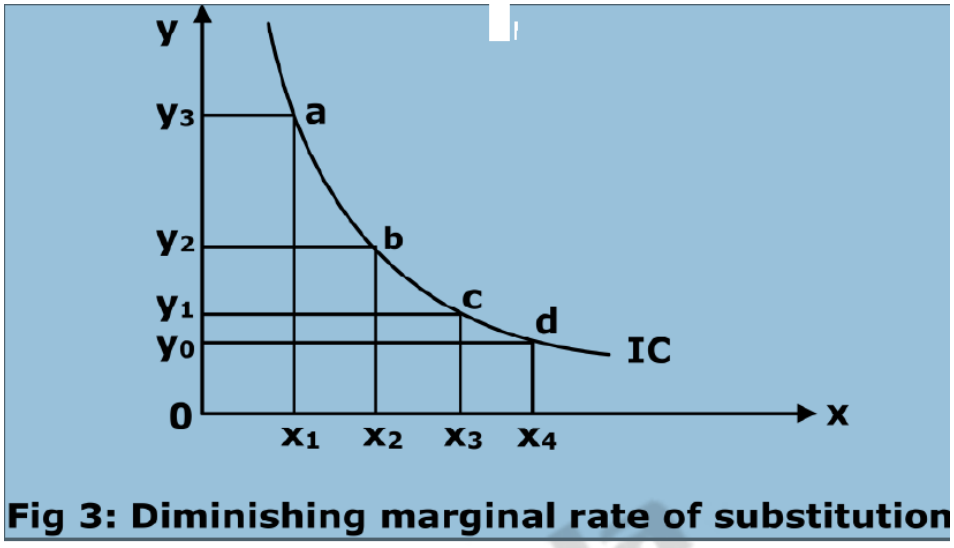

Fig 3: Diminishing marginal rate of substitution

As we can see that $\Delta x1 = \Delta x2 = \Delta x3 = \Delta x4$ but $\Delta y0 < \Delta y1 < \Delta y2 < \Delta y3$.
This MRS falls because of the following reasons:

- Diminishing MU
- The decline in the ability of the consumer to sacrifice a commodity whose quantity goes on declining.

Properties of Indifference curve:

- IC's have a negative slope because of the diminishing MRS.
- IC's never intersect with each other else they will break the assumption of transitivity.
- IC is convex to origin for the imperfect substitute goods.
- A higher IC represents higher level of satisfaction.

Concept of budget line:

We have seen that IC is tool through which a consumer can measure his utility of consuming goods. But in real life, a consumer is always constrained with two things in order to maximize his utility. One is his limited money income and the other is the price of the commodities. Both limited money income and prices of the goods act as a constraint to the utility maximizing behaviour of the consumer. This is known as budgetary constraint. Symbolically:
$Px*X + Py*Y \leq M$ …….. (a)

This equation is known as budget line of a consumer, where Px and Py are the price of the two goods X and Y, X and Y are the respective quantities of X and Y which a consumer consumes given his money income M and prices of these goods.
Hence according to this budget line a consumer always decide about how much quantity of goods to be consumed based on his money income and the prices of the consumer. Then from this set of goods he tries to choose which combination would give him the maximum utility.

Now if we just adjust the above budget line equation for X then we get:

$X = M/Px – Y*Py/PX$

Here this –Py/Px is also known as the slope of the budget line.
Now if X=0, then Y= M/Py and if Y=0, then X= M/Px

Plotting these points on a graph we get the following curve as the budget line:

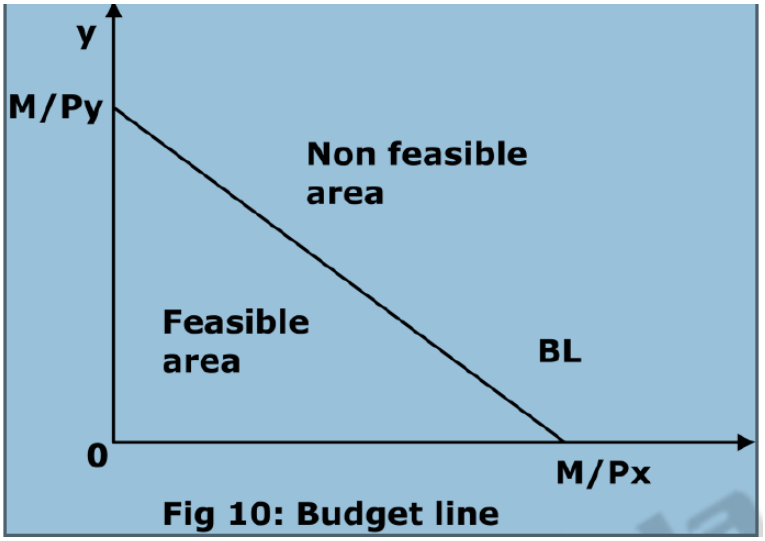

Fig 10: Budget line

Hence as per the budget line all the points which come inside or on the budget line represents a feasible area as given the income of the consumer and prices of the goods the consumer can consume any combination. But if the combination costs more than his given income then that will fall outside the budget line, which is represented by infeasible area in the above graph.

Thus, the budget line is drawn based on the money income of the consumer and the prices of the goods, therefore, if any of these factors changes then the budget line will also change.

If the money income of the consumer changes then the budget line will shift either outside or inside as follows:

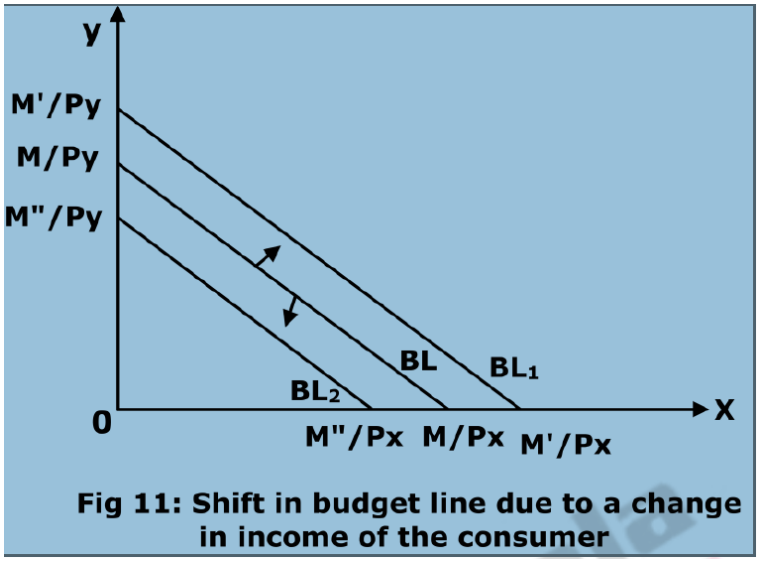

Fig 11: Shift in budget line due to a change in income of the consumer

As it can be clearly seen from the above diagram, if the money income of the consumer changes from M to M', the budget line moves upward as now with more of his income he can consume more of both the goods and vice a versa.

Now if the prices of the goods changes, then it will pivot the budget line as follows:

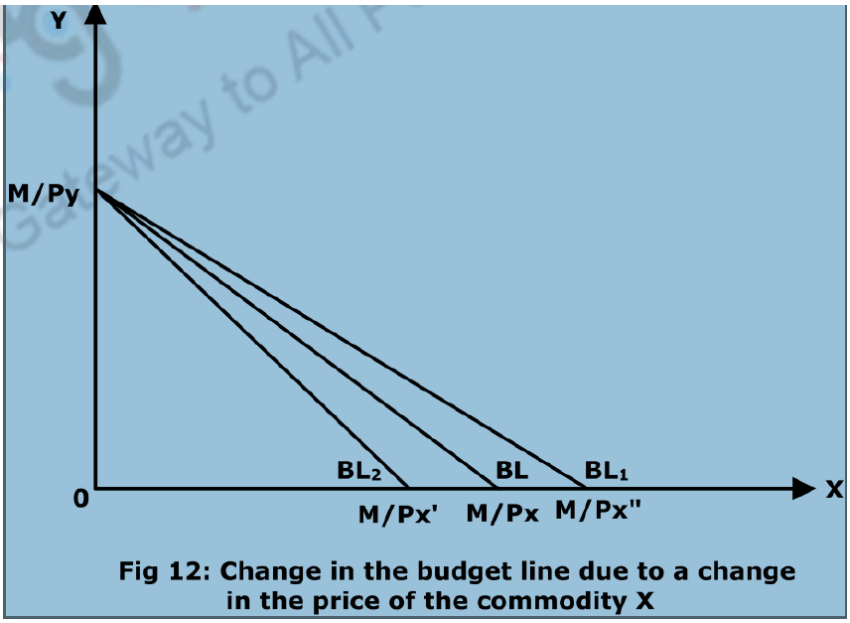

Fig 12: Change in the budget line due to a change in the price of the commodity X

As it can be clearly seen from the above graph that if the price of X increases from Px to Px', then given his money income M, he will reduce the consumption of X as now X has become expensive. However he will continue consuming the same quantity of Y. Hence the budget line will pivot inward to B2.
Similarly, if the price of X reduces from Px to Px'' then he can increase his consumption of X as now given his money income M, X has become relatively cheaper. Hence the budget line will pivot outward to BL1.

Consumer equilibrium: Ordinal approach:

A consumer attains equilibrium at a point where he maximizes his utility from the consumption of goods, given his money income and the prices of the goods. According to the ordinal utility analysis two sets of conditions must be fulfilled for a consumer to attain equilibrium. These two conditions are as follows:

- Necessary condition: as per this MRS must be equal to Px/Py, i.e. the slope of budget line must be equal to the slope of the IC.
- Sufficient condition: The necessary condition must prevail on the highest IC.

Hence, consumer equilibrium is attained where the above mentioned two conditions prevails. This is illustrated as follows:

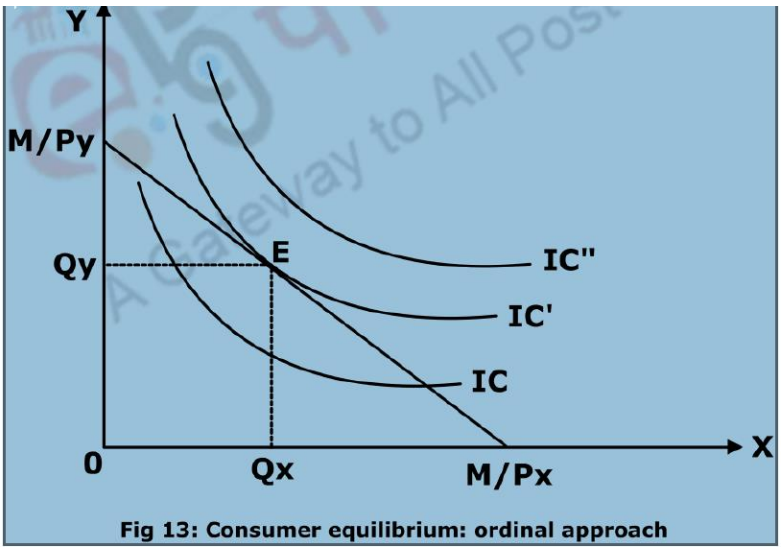

Fig 13: Consumer equilibrium: ordinal approach

As represented in the above diagram, 'E' is the equilibrium point where the slope of the budget line and that of the IC is the same. Thus, the consumer will consume Qx and Qy quantity of X and Y in order to maximize his utility, given his money income M and the prices of X and Y as Px and Py.

As we can see that the equilibrium takes place on IC', it does not take place at IC nor on IC''. The reason for this is that IC comes in the feasible area under the budget line but the consumer does not maximize his utility on IC because he has a higher income and thus using that income he can increase his consumption of both the goods and

can move to IC'. So on IC' both the necessary as well as sufficient conditions apply. However, if he further moves from IC' to IC" then all those combinations lying on IC" are not feasible because his money income is less. All the points on IC" would definitely give the consumer a higher utility as compare to the combinations lying on IC' but the combinations on IC" are not attainable. Hence the consumer equilibrium cannot take place on IC" too.

The effect of change in income on consumer equilibrium ICC:

As we have seen in the above section that consumer equilibrium happens at the point where the IC is tangent on the budget line. But when the income of the consumer changes then the budget line also changes and correspondingly the IC also changes. For instance, if the income of the consumer increases then the budget line will shift upward. This represents that now the consumer can afford more of both the goods hence his IC will also shift and the tangency of the new IC with this new budget line gives new consumer equilibrium. Similarly if the process will go on then the equilibrium points will keep on changing. If we connect all these equilibrium point with a line, then this line joining all the equilibrium points is known as income consumption curve, which shows the changes in the consumer equilibrium due to a change in the income of the consumer. This is represented in the following diagram.

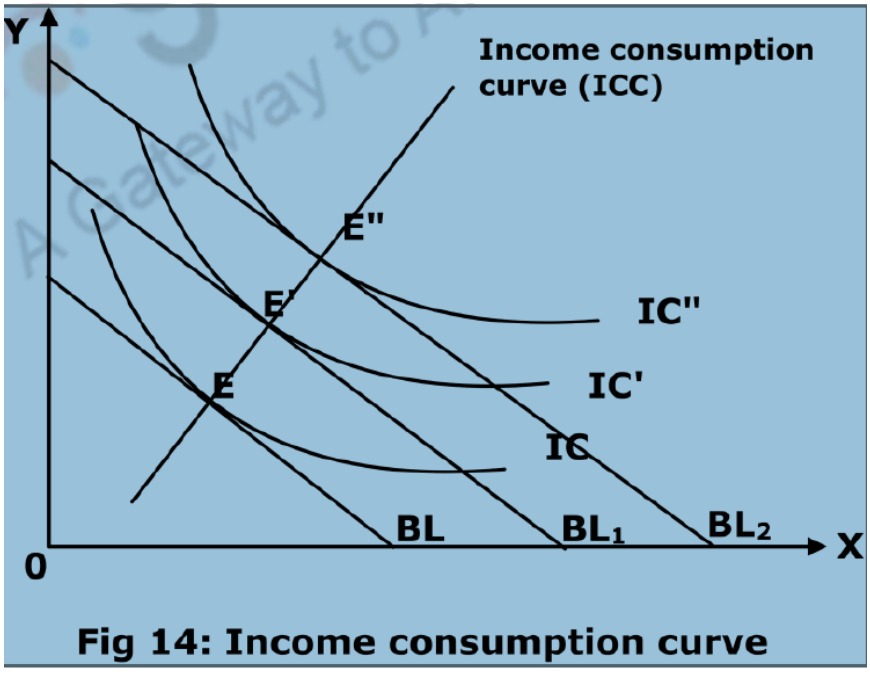

Fig 14: Income consumption curve

The above is the case of the normal goods. Here normal goods are the goods which show a positive relationship between the demand of the good and the income of the consumer, i.e. if the income of the consumer increases, his demand for normal good also increases and vice versa.

ICC is also known as Engel curve. We can further derive the demand curve for a good based on his ICC.

Note that here we are only showing how to derive the demand curve of the normal good. You can derive the demand curve of the inferior good in the same way.

Let us now derive the demand curve from the ICC of a normal good:

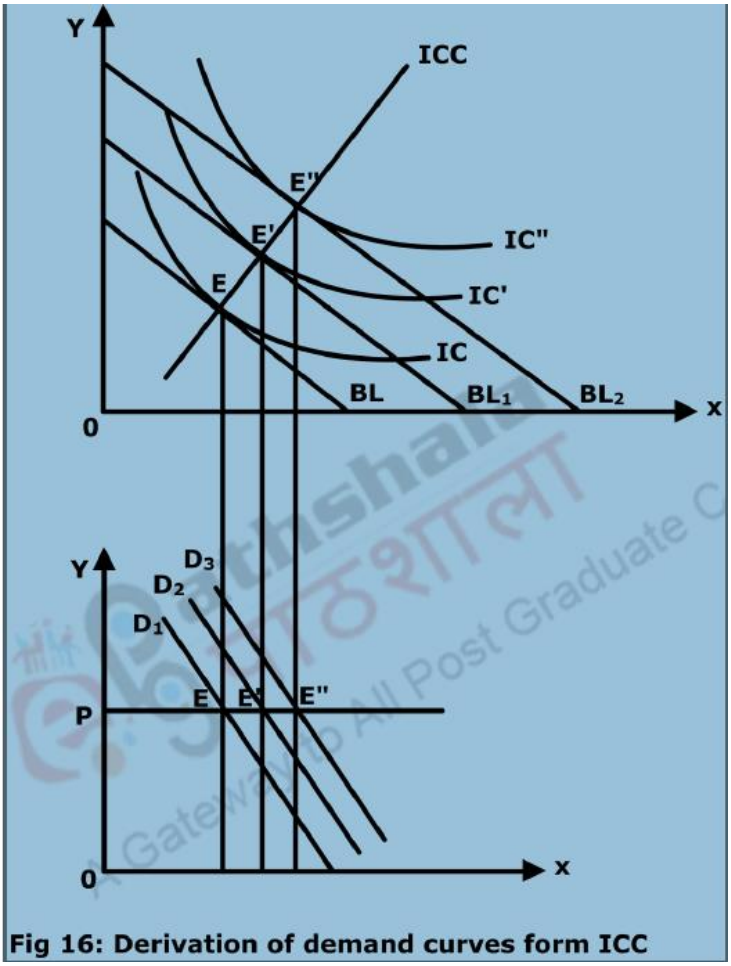

Fig 16: Derivation of demand curves form ICC

Clearly, for a given price of a good, if the income of the consumer increases, he demands more of good X. This gives point E, E' and E" and three different demand curves emerges with ICC for good X.

Note that here we can see that the demand curve is downward sloping, representing an inverse relationship between the price and quantity of the good

The effect of change in Prices of the goods on customer equilibrium: PCC:

If the price of any of the good changes, then, this leads to a change in the consumer equilibrium too. For instance, if the price of X falls, then this will make X relatively cheaper and the consumer will demand more of X and same quantity of Y and thus this will pivot his budget line outward. But when budget line pivots then consumer will change his combination of goods which will maximize his consumption. Now his new basket of goods will comprise of more of X and less or same quantity of Y, hence his IC will shift upward too. The tangency of the new IC with the new budget line gives the new equilibrium point of the consumer. Joining all such points, gives the price consumption curve (PCC). This is depicted in the following diagram:

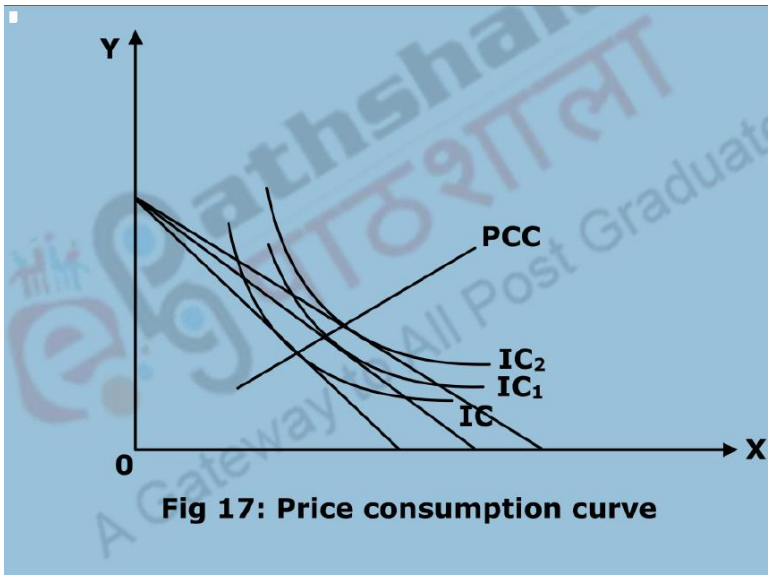

Fig 17: Price consumption curve

The above is the case of the normal good, where normal goods shows the inverse relationship between the price of the good and the quantity of the good, i.e. if the price of the consumer falls it's quantity consumed or demanded increases.

We can also derive the demand curve with the help of PCC in the following way.

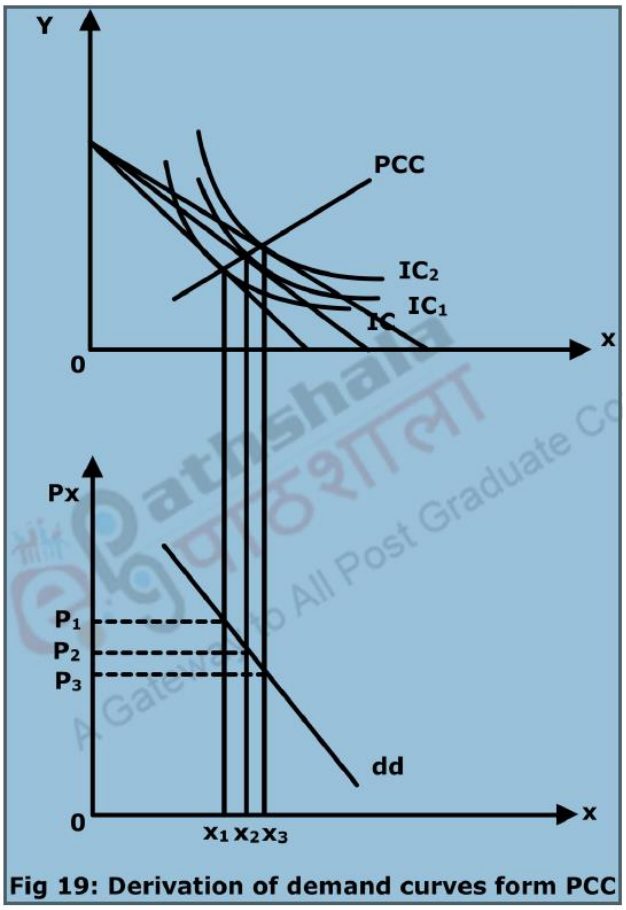

Fig 19: Derivation of demand curves form PCC

The above graph clearly shows that as the price of X reduces, budget line pivots outside and then the quantity of x increases, when these points drawn below then they form demand curve for X.

Summary:

The entire chapter has explained how the utility can be measured in terms of indifference curve. This has also explained how the consumer attains his equilibrium with the help of budget line and indifference curve. Then we have seen how the changes either in the price or in the income of the consumer affect the changes in his equilibrium and then we have derived ICC and PCC and then the demand curve.