LESSON 2

CONSUMER'S EQUILIBRIUM

Introduction

A consumer is one who buys goods & services for his satisfaction. His main objective is to spend his income on various goods and services in such a way that he gets maximum satisfaction.

In this chapter to understand consumer's behaviour, Cardinal and Ordinal approach are used to explain consumer's equilibrium.

Equilibrium

Cardinal analysis was propounded by economists like Marshall, Pigou etc. According to this analysis utility is measurable. Utility is a subjective and introspective concept. In reality, it is very difficult to measure utility in physical form. To overcome this drawback of cardinal approach Prof. J.R. Hicks and Prof R.G.D. Allen propounded an alternative analysis called as Ordinal Analysis with the help of indifference curve. This approach is based on preferences which consumers show while choosing between commodities. Indifference curve is used for the purpose of analysis. First of all we will study the utility analysis also called cardinal analysis.

Utility Analysis (Cardinal Approach)

Meaning and measurement of utility-

Utility is the power of commodity to satisfy human wants. In economics utility is expressed as a mathematical score which a consumer gets from the consumption of a basket of goods and services. For example if the satisfaction from buying 2 books is more than that of buying one shirt, then we say that books give more utitlity to a consumer. It is difficult to measure utility because it is a psychological concept. The utility derived by one person from consuming a commodity can differ from the utility derived by another person from the same commodity. Thus utility differs from person to person, place to place and time to time. According to Edgeworth(1881) Antoneeli(1886) and Irving Fisher(1892) utility could not be measured and it depends on the consumption of various goods.

Utility function can be written as follows.

$U = f(X_1, X_2, X_3, X_i...., X_n)$

Where X is quantity of a goods and and U stands for utility. This is a functional relationship which shows the preference pattern of a person. It is different for every person.

According to William Stanley, Jevons, Karl Menger, Leon Walras and Alfred Marshall, utility can be measured in same way as milk in litre, height in metre distance in kilometre and temperature in degrees. According to these economists utility can be measured in 'Utils'.

Assumptions of Utility Analysis:

Utility analysis is based on following assumptions:-

1. Consumer is a rational man. He measures, chooses and compares the utilities of different units of various commodities and aims at maximization of utility among them.

2. A consumer maximizes his utility.

3. He has full knowledge of various prefrences and choices. Utility can be measured in terms of money. The Marginal Utility of money remains constant.

Utility and satisfaction

A commodity can have utility before consumption but satisfaction is otained only after its consumption. Utility can be called as 'Expected utility' and satisfaction as 'Realised utility'. Utility can be measured in 'Utils

but satisfaction is unmeasurable. In utility analysis both these words are synonymous.

Types of utility :-

Total utility

In a given time the total satisfaction obtained from the consumption of all the units of a commodity at the disposal of a consumer is called as total utility. For eg. if a consumer consumes one banana and gets 30 Utils of utility, and gets 22 utils of utility on consuming second banana, which is less than previous unit. Thus the total utility derived from consumption of two bananas is 30 + 22 = 52 Utils, hence total utility can be measured as follows.

$TU_n = U_1 + U_2 + U_n$

TU_n - Total utility to the consumer from 'n' units of a commodity

U_1 - Utility from the first unit of commodity

U_2 - Utility from the second unit of commodity

U_n - Utility from the n unit of commodity

In this way on continuous consumption of successive units of a commodity, total utility increases till a certain point but at a diminishing rate.Then it gets maximum. The point at which the total utility is maximum is called the point of satiety. If a consumer is forced to continue consumption of a commodity even after the point of satiety then total utility starts decreasing.

2. Marginal utility

In a given time, the change in the total utility, on increasing the consumption of a commodity, is called marginal utility. The consumption of other goods is taken as constant. Symbolically-

$MU_n = TU_n - TU_{n-1}$

Here MU_n = Marginal utility of n unit

TU_n - Total Utility of n unit.

TU_{n-1} - Total Utility of (n-1) unit

On marginal utility we can see the effect on total utility of a change in the consumption (increase or decrease) of a unit of commodity. If the change in consumption is more than one unit then Marginal utility can be measured as follows-

$$MU = \frac{\text{Change in Total Utility}}{\text{Change in the quantity of a goods consumed}} = \frac{\Delta Tu}{\Delta Q}$$

Total utility is the sum of marginal utility from all units of commodity.

$TU_n = MU_1 + MU_2 + ... MU_n$

$TU_n = \Sigma MU$

Relation between total utility and marginal utility

The relationship between total utility and marginal utility can be explained with the help of following table 2.1.

Table 2.1

Units of Banana	Total Utility (Tu)	Marginal Utility (Mu)
0	0	0
1	10	10
2	16	6
3	20	4
4	22	2
5	22	0
6	20	-2

As evident from the table 2.1 and Figure 2.1 (a) & 2.1 (b) the relation between total utility and marginal utility is as follows.

1. The point Q at which total utility is maximum, the marginal utility is zero (E). This point is called the point of satiety (as shown at point Q in the Figure), Before reaching this point marginal utility is positive where as total utility increases but at a diminishing rate.
2. If the consumer continues the consumption of a commodity even after the point of satiety then marginal utility becomes negative and total utility starts declining.

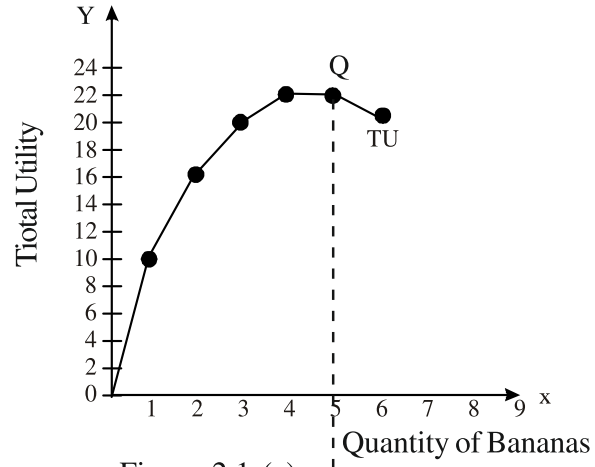

Figure 2.1 (a)

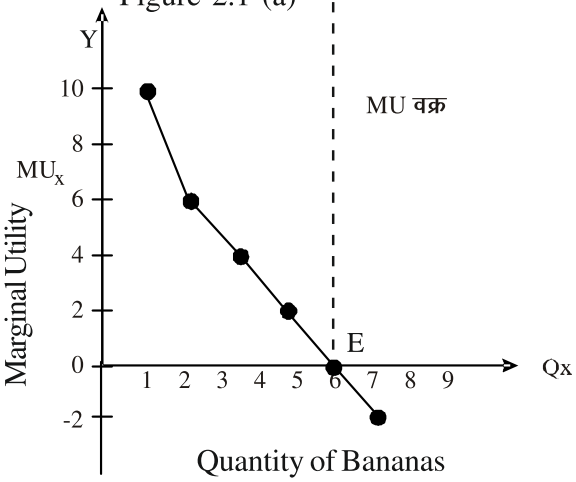

Figure 2.1 (b)

In fig. 2.1(b) on X axis the quantity of bananas and on Y axis the marginal utility derived from the banana is depicted. The slope of marginal utility curve in Figure 2.1 (b) is shown sloping from left to right which shows that marginal utility of a commodity declines on its continuous consumption, and on consumption of 5th unit it becomes zero. TU curve which increases at a diminishing rate till point Q (point of satiety) and then starts declining.

Law of diminishing marginal utility–

This law was propounded by Gossen in 1854 so Jevons calls it the "Gossen's first law". Marshall gave a detailed analysis of this law.

Meaning and definition of the law:

Law of diminishing marginal utility is a universal law. This law is based on the behaviour of a consumer, where the marginal utility of variable commodity decreases as he increases the consumption of any one commodity, keeping constant the consumption of all other commodities.

In words of Marshall- "The additional utility which a person derives from an increase of his stock of a commodity diminishes with every increase in the stock that he already has."

As the consumer consumes additional unit of a commodity to fulfill his needs, then the additional unit becomes less useful to him.

If this process continues for a longer period a situation arises when he does not get any satisfaction from the consumption of additional unit of a commodity If a consumer still persists to consume that commodity, then the marginal utility derived from that commodity becomes negative. Economists call this tendency as law of diminishing marginal utility.

Assumption of law -

1- The behaviour of consumer is rational, he is an economic man.

2- Utility is measurable in terms of money.

3- The marginal utility of money remains constant.

4- The units of commodity consumed should be of a suitable size and they should be alike in size and quality (homogenous).

5- The process of consumption is continuous without any time interval.

6- The income, habits and fashion of a consumer should remain constant in the given time.

Causes of diminishing marginal utility.

According to Prof. Boulding this law operates due to following reasons:-

1- The different goods are not perfect substitute of each other that's why the marginal utility of a commodity decreases on increasing its

consumption.

2- Specific want is satiable We may increase the consumption of a particular commodity upto a certain point. But after that point we can not increase its consumption. The consumption of salt has to be stopped after a certain point. Table 2.1 & Figure 2.1(B) can be used for the interpretation of this law.

Importance of law-

1- The law of demand and the law of equi-marginal utility are based on the law of diminishing marginal utility.

2- This law is used in public finance. We know that the marginal utility of money is less for rich and more for poor. Thus social welfare can be increased by imposing tax on the rich and spending that money on poor.

3- The diamond - water paradox can be explained with the help of this law. According to the paradox water which is essential for life is cheaper while diamond which is not essential for life is expensive.

Diamond - Water Paradox

To understand this paradox, water which is essential for life has more total utility than that of diamond but the price of a commodity depends on marginal utility and not on its total utility.

As we consume water in a large quantity the marginal utility of the last unit is very less thus we are ready to give less price for the last unit of water since all units of water are similar we give less price for additional units. Whereas diamonds are found in scarcity so their marginal utility of last unit is very high, hence they have high price.

Law of Equi-marginal utility and Consumer Equilibrium

Equilibrium means state of rest and there is no tendency to change. When a consumer is in state of equilibrium, he does not change his level of consumption which depicts that he is obtaining maximum satisfaction.

At the time of consumption of a good the consumer can either buy a good or keep his money income with him. According to cardinal approach for consumer equilibrium, it is necessary that the marginal utility of X good equals to the market price of X good or $MU_x = P_x$

If the marginal utility of good X is more than the price of X, then consumer will buy more quantity of X and increase his welfare. On the contrary if marginal utility is less than the price of X then the consumer will buy less quantity of X to maximize his welfare. Thus to maximize his satisfaction, a consumer fulfills the condition. $MU_x = P_x$

In real life a consumer consumes more than one good, the law of equi marginal utility helps him in optimum allocation of his income. Equi-marginal utility is known by various names such as Gossen's second law of substitution, law of income allocation, law of maximum satisfaction etc.

In simple words this law states that, the consumer will distribute his income between the goods in such a way that the utility derived from the last rupee spent on each good is equal or almost equal. In this way the consumer will get maximum satisfaction and will be in equilibrium.

If a consumer consumes more than one good then he will be in equillbrium when the following condition is fulfilled.

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \cdots \frac{MU_n}{P_n}$$

On spending an extra unit of money the marginal utility derived should be equal for all goods. If a consumer gets more utility from expenditure on one good then to increase his satisfaction he will spend more on that

good and will decrease his expenditure on other goods till the above condition is fulfilled

Beside above condition the income condition is also necessary to be fulfilled -

$X \cdot P_x + Y \cdot P_y + ...= M$

$X \cdot P_x + Y \cdot P_y = M$

According to this condition the expenditure on X good i.e X.P and expenditure on Y good i.e. Y.P should he equal to consumer's income. Consumer's equillibrium in marginal utility analysis can be explained with the help of following table 2.2.

Table 2.2

Marginal Utility

Quantity of good (in kg)	Banana (30 Rs Per kg)	Apple (90 Rs Per kg)
1	385	1150
2	355	1035
3	300	985
4	270	900
5	200	840
6	185	730

We take two goods banana and apple whose price is Rs. 30 per kg and Rs. 90 per kg respectively. Consumer has to spend Rs. 450 on both goods. He will purchase 3 kgs of bananas whose marginal utility per rupee is $\frac{300}{30} = 10$ units

Further he will purchase 4 kg apples whose marginal utility per rupee is $\frac{900}{90} = 10$ units.

Thus in order to fulfill the necessary condition of $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$ to maximize his satisfaction for two goods consumer will purchase 3 kg of bananas and 4 kg of apples. This fulfills the first condition of consumer's equilibrium. The second condition of consumer's equllibrium is X.P +Y.P = M

Thus $3 \times 30 + 4 \times 90$ = Rs.450 Rs.

90 + 360 = Rs.450

Thus both the conditions of consumer's equilibrium are fulfilled by the above example.

Limitations of the law-

1- This law is based on the assumption that a consumer has full knowledge of the alternative preferences. In reality a consumer is unaware of the alternative choices.

2- This law assumes the consumer to be rational which is not true in actual behaviour. Consumer has to make lots of calculation in order to compare marginal utility of various commodities which is very difficult. The habits of a consumer and advertisement has lot of influence on his consumption. This in turn affects his purchase of commodities. All this shows that it is not necessary that a consumer is always rational.

3- It is assumed that all goods are divisible while in reality goods like house and car are indivisible as they can be bought in fixed quantity only. In a given time two cars can be bought but not $1\frac{1}{2}$ car. Thus due to indivisibility of goods there is lot of difficulty in application of equi- marginal utility.

4- This law is based on assumption that utility is measurable and the marginal utility of money is constant which is quite unrealistic. Hence Hicks has refuted both these assumptions and has explained consumer's equllibriuim with the help of indifference curve analysis.

5. There is no fixed accounting period for the consumer in which he can buy and consume goods. Generally period is taken as one year while the

consumption of durable goods continues in next accounting period also. Hence the utility gained by these goods in future has to be compared with the utility of other goods in the current year.

Importance of Equi-marginal utility -

Law of Equi-marginal utility is applicable in various fields of economics. Consumption, production, exchange and distribution. Previously, we have seen that how a consumer attains maximum satisfaction by spending his money income according to law of equi-marginal utility.In similar manner a producer also uses this law to maximize his production and minimise cost per unit.

It can also be applied to allocation of income between consumption and savings. Though the law is important in the utility analysis, as it is not possible to measure utility, hence an alternative approach was propounded by Hicks and Allen known as Ordinal approach.

Indifference curve Analysis and Consumer Equilibruim

According to modern economists utility is a psychological concept and have refused the cardinal analysis, as it was based on many fallacious assumptions. Many economics like Eugen Slutsky, Wilferedo Pareto, John R-Hicks and R.G.D. Allen have stated that consumer cannot measure utility. According to them utility is an individual perspective and it is impossible to measure it quantitatively. Utility differs from person to person. Thus according to modern economists, utility cannot be measured precisely, but it is possible to observe the preferences which a consumer shows while choosing between commodities and giving ranks to his preferences.

In comparison to cardinal analysis, ordinal analysis is based on less restricted assumptions. Ordinal analysis dose not emphasize on the relative measure of utility from various goods. According to it, it is sufficient to know that a consumer gets more satisfaction from apple in comparision to pomergranate. It is not necessary to know the amount of utility.

Meaning of Indifference Curve

An indifference curve shows the various combinations of two commodities which yield equal level of satisfaction to a consumer.

Indiffernece curve can be defined as locus of various combinations of two commodities which give the same total satisfaction to the consumer so he remains indifferent between them.

Indifference Sehedule and Indifference Curve

To make an indifference curve there should be an indifference schedule which shows the various combinations of X and Y goods between which the consumer remains indifferent.

Table 2.3

Combination	X	Y	Satisfaction
First	1	25	x
Second	2	20	x
Third	3	16	x
Fourth	4	13	x
Fifth	5	11	x
Sixth	6	10	x

On the basis of above table Indifferenes curve can be drawn as follows -

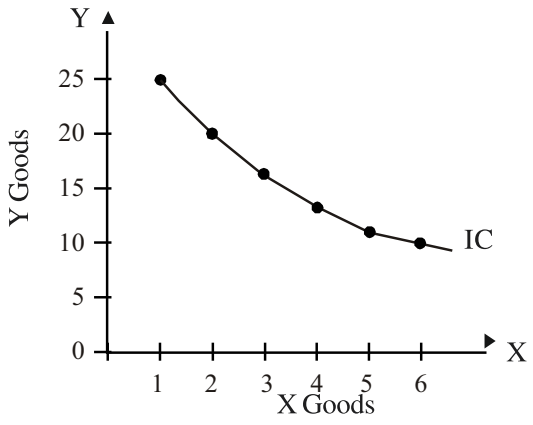

Figure 2.2

Indifference Map

One indifference curve depicts one specific level of satisfaction. A set indifference curve in a figure depicts different levels of satisfaction. When many indifference curves are shown in one figure we call it an indifference map. Higher the indifference curve, higher the level of satisfaction.

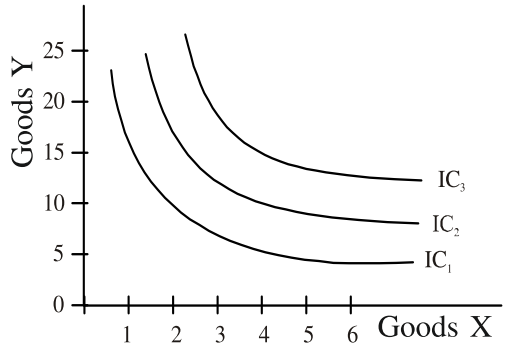

Fig 2.3

Mathamatical equation of indifference curve:

Symbolically the indifference curve equation can be given as follows -

$$U = f(X_1, X_2, X_3, ..., X_n) = k$$

Here k is a constant value. If two goods are X and Y then indifference curve will depict the various combination of two goods, which give equal level of satisfaction to a consumer.

$$U = f(X, Y)$$

Here U shows level of satisfaction in ordinal form and is a constant value.

By giving different values to U different indifference curves can be obtained. A higher indifference curve shows higher level of satisfaction while lower indifference curve shows lower level of satisfaction in the below figure-

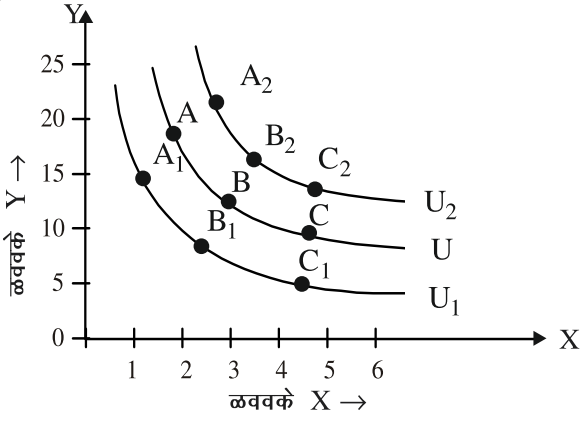

Fig 2.4

In the figure 2.4 X good is depicted on X axis and Y good on y axis. Indifference curve shows the various combinations of goods having same level of satisfcation. If any combination of X and Y gives more satisfaction then U_1,then it will be situated on higher indifference curve U_2. If a combination of X and Y gives less satisfaction then U, then it will be situated lower on indifference curve U_1. In the Figure, point A, B, C, are sitiuated on same level of indifference curve U and gives same level of satisfaction to the consumer A_2, B_2, C_2 depicts higher level of satisfaction and are situated on higher indifference curve U_2. In the same way the combination lying on U_1 depicts lower level of satisfaction than U, U_2. A consumer is indifferent to the various combination on a specific indifference curve but he gives more preference to higher indifference curve than to lower one.

Assumption of indifference curve analysis.

1. **Rationality -** A consumer is assumed to be rational i.e. when he knows his level of income and price of two goods, he maximises his satisfaction. The consumer has complete information about the prices of goods in the market.
2. Utility is ordinal, it is assumed that a consumer can give rating to the group of goods on basis of his liking. The consumer is supposed to rank the basket of goods in order of the preference.
3. Preferences are Transitive-consumer behaviour is consistent. It means that if a consumer prefers A to B and B to C, then he will prefer A to C.
4. The total utility of a consumer depends on the quantity of various goods consumed $U = f(Q_1, Q_2, ... Q_n)$
5. The marginal rate of substitution is assumed to be decreasing. On the basis of this assumption, indifference curves are convex to the origin. The slope of indifference curve, depicts the marginal rate of substitution.

Marginal rate of substitution

The marginal rate of substitution represents the amount of commodity Y, which the consumer has to give up for one additional unit of other commodity X, so that his level of satisfaction remains the same.

Marginal rate of substitution can be explained by following table 2.4 & Figure 2.5

Table 2.4

X good	Y good	MRS = Δy / Δx
1	25	-
2	20	5y : 1x
3	18	2y : 1x
4	17	1y : 1x

Thus the movement on indifference curve from left to right, the marginal rate of substitution decreases. Due to decreasing marginal rate of substitution the indfference curve, is convex to the origin.

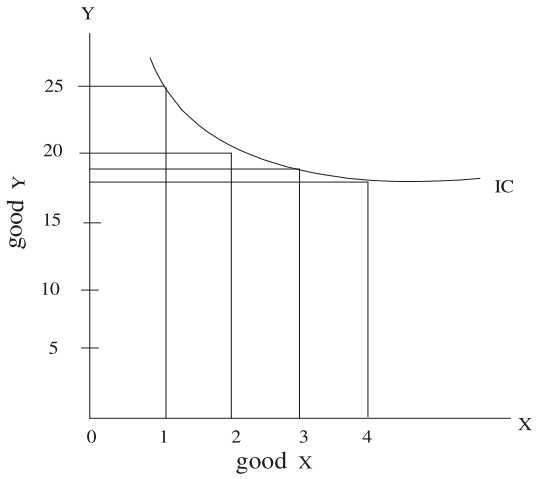

Figure 2.5

When the consumer moves from point A to B on indifference curve he sacrifices 5 units of Y to get 1 unit of X Thus MRS_{xy} is 5y : 1x. Similiarly the movement to point C from point B the MRS is 2y : 1x Thus MRS_{xy} is diminishing.

Features Of Indifference Curve

1.Indifference curve has a negative slope- It slopes downward to the right. The reason for it is that if the consumer wants to remain on the same level of satisfaction he has to reduce the amount of one good in order to increase the amount of the other good. Indifference curves can neither be horizontal nor vertical straight line. Indifference curve cannot be of positive slope.

According to the Figure 2.5(a) indifference curve cannot be horizontal. In the Figure, point A depicts OX_1 quantity of X good and OY_1 quantity of Y good where as B point shows OX_2 quantity of X good and OY_1 quantity of Y good. If the bundle of goods on point A is compared with that of B point it is found that a consumer will choose bundle on B point because he gets more quantity of X goods, on B point than on A point. Thus the level of satisfaction is not equal on A and B point, so indifference curve cannot be a horizontal line.

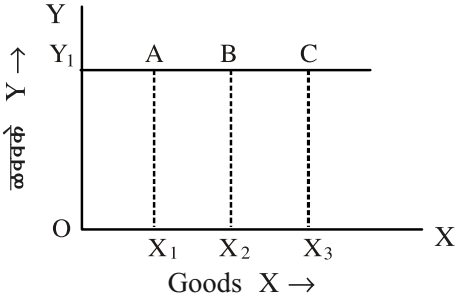

Figure 2.5 (a)

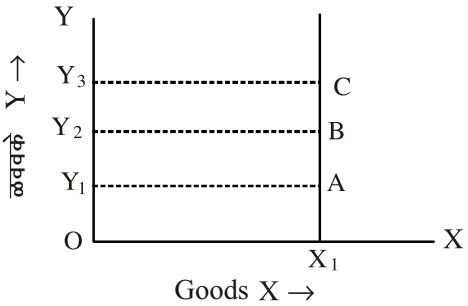

Figure 2.5 (b)

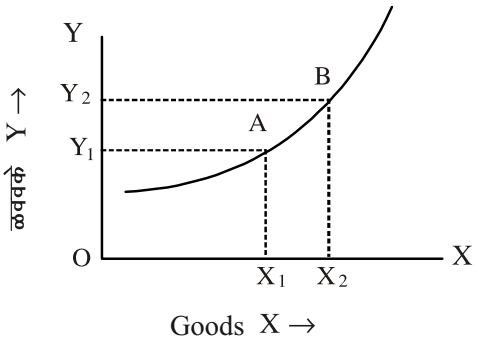

Figure 2.5 (c)

Indifference curve cannot be a vertical line as in Figure 2.5(b). According to this figure the bundle depicted on A point, the quantity of X good is OX_1 and that of Y is OY_1. On point B the combination of goods, OX_1 of X good and OY_2 of Y good If a consumer has to select from bundles of A point and B point, then he will definitely select B point because here he gets more of Y good than on A point. The level of satisfaction is not same on A & B point so an indifference curve cannot be vertical.

A consumer prefers basket of goods offered at B piont than at A point as in Figure 2.5(c). According to this Figure a consumer will choose the bundle on B point in comparison to a bundle on A point because on B point, the quantity of X good is OX_2 and that of Y is OY_2 which is more than that of the quantity of X good on A point OX_1 and Y good OY_1, hence the level of satisfaction is not the same on A & B point, so the slope of indifference curve cannot be positive with an upward slope.

2. Indifference curve is convex to the origin-

This property of indifference curve is due to the dimnishing marginal rate of substitution.

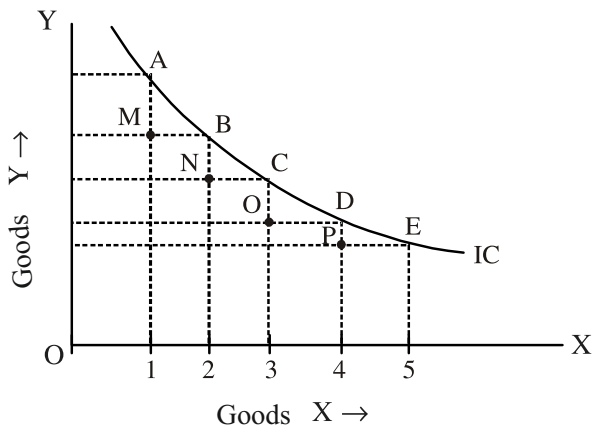

Figure 2.6

The above figure shows that a consumer in order to get two units of good X gives AM quantity of good Y. In order to get three units of X good, BN amount of Y good is sacrificed. As he gets more and more of X good for each additional unit of good X he is willing to give less and less of good Y. This is due to diminishing marginal rate of substitution. The level of satisfaction remains same at all points on indifference curve.

3. Indifference curves cannot intersect each other-

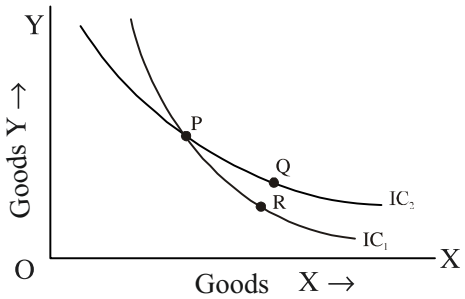

Figure 2.7

What absurdity follows from such a situation can be explained with the help of Figure 2.7. Two indifference curves IC_1 and IC_2 are intersecting each other on point P. R and P point are situated on same indifference curve so they depicts equal level of satisfaction i.e. consumer is indifferent between P and R bundle i.e. P = R.

At P and Q, level of satisfaction is same as they are on same indifference curve. A consumer is indifferent on both these combinations as P = Q

This means that Q = R i.e. a consumer should not be indifferent between Q & R This is not possible as Q is situated on IC_2 and R on IC_1. Thus, it is proved that two indifference curves cannot intersect each other.

Budget line

So, far we have discussed about the indifference curve which shows the various combinations of two commodities that consumer would like to prefer. But what particular combination of two commodities he would get actually purchase depends on his money income and respective prices of two commodities.

If there are n goods in market and their prices are P_1 P_2 .... Pn respectively and a consumer's income is M then the equation will be as follows -

$M = P_1.x_1 + P_2.x_2 + ... + P_n.X_n$

Here P_1, P_2, P_n are price of goods and X_1 X_2 ..... X_n are quantities of goods. To make a budget line we take two goods X & Y whose price per unit is P_X & P_Y then the budget equation will be

$M = X . P_x + Y. P_y$

The budget line can be drawn as follows -

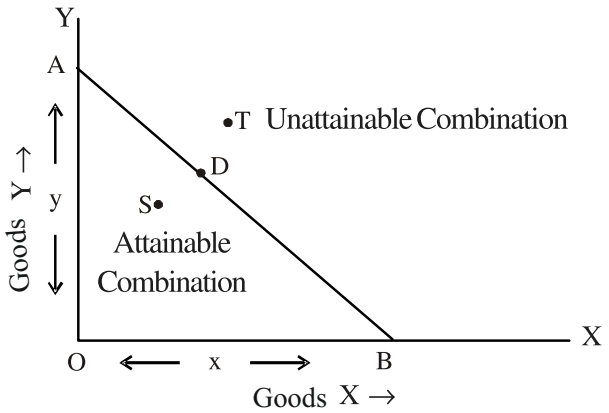

Figure 2.8

Good X is depicted on X axis and good Y on Y axis. It is assumed that the consumer's income is (M) 80 Rs. and price of X good is P_X = 2 Rs. per unit and price of Y good is P_Y =1 Rs. per unit. If he spends his entire income on good X then he gets 40 units of good X. Here the value of X is 40 Rs. If the consumer spends his entire income on Y good then he will get 80 units of Y good i.e. Y = 80

This budget line depicts various combinations of two goods which the consumer can buy with his given money income and the price of two goods.

In the above Figure 2.8 the line joining points A and B is called the budget line, total outlay curve, budget constraint or Price line.

A consumer spends his entire money income on various combinations of two goods located on the points on line AB. The slope of budget line can be given as follows -

$M = X . P_x + Y . P_y$

$Y . P_y = M - X . P_x$

$$Y = \frac{M}{P_y} - \frac{P_x}{P_y} . X$$

It we compare this equation to the general equation of straight line y = a + bx

$$a = \frac{M}{P_y}, \quad b = \frac{-P_x}{P_y}$$

$$b = -\frac{P_x}{P_y}$$

Thus the slope of budget line is equal to price ratio of two goods.

Consumer's Equilibrium

A consumer is said to be in equilibruim at the point where he maximizes his satisfaction. According to indifference curve analysis, the three conditions necessary for the consumer's equillibrum are as follows -

1. A consumer's equilibrium is at the point where indifference curve is tangent to the budget line this is the point of maximum satisfaction.
2. The second condition of consumer equilibrium is that slope of indifference curve i.e. MRS_{xy} should be equal to slope of the price line $P_x \backslash P_y$.
3. The third condition necessary for equilibrium is that at the point of equlibruim marginal rate of substituton i.e. MRS_{xy} should be diminishing . In other words, indifference curve should be convex to the the origin.

Illustration of consumer's equilibrium is shown with the help of a Figure 2.9. In order to explain consumer's equilibrium the indifference map and budget line are taken together. The indifference curve closer to point of origin represents lower level of satisfaction while the indifference curve further from point of orgin depicts higher level of satisfaction. With the given price line a consumer aims to reach the highest possible indifference curve.

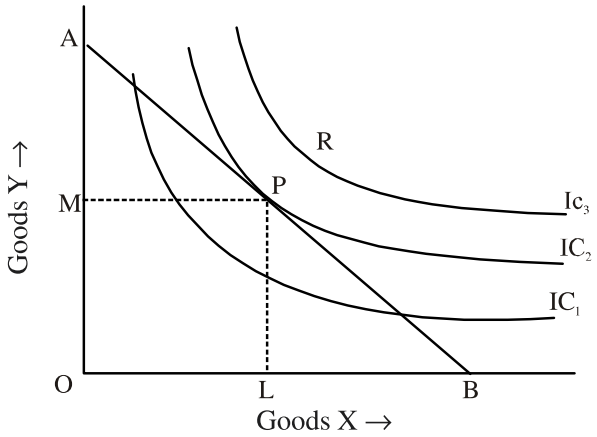

Figure 2.10

In the above Figure AB is the budget line and IC_1, IC_2, and IC_3 are three indifference curves in the indifference map. With the given budget line a consumer can achieve the highest indifference curve IC_2, at point P. The indifference curve is tangent to budget line and the other two necessary conditions are also satisfied on this point. Thus P is the point of consumer's equilibrium. At this point consumer buys OL quantity of X and OM of good Y.

Conclusion - Ordinal Analysis is based on more realistic assumptions so it is regarded superior to Cardinal analysis.

Important points

- A consumer buys a good to fulfill his wants and his main aim is to maximize his satisfaction.
- The sum of utility obtained from all the units of a good is called total utility.
- The change in total utility due to to increase in consumption of an additional unit of good is called as marginal utility.
- As we increase the consumption of a good the marginal utility decreases with every additionl unit of consumption.
- A consumer is in equilibrium where he gets maximum satisfaction from his purchase.
- The condition of equilibrium in case of one good is $MU_x = P_x$.
- The basic condition of equilibrium in case of two goods is that marginal utility of both goods and their price ratio should be same and this will be equal to the marginal utility of money. Price ratio should be the same for the two commodities.

i.e. $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$.

- An indifference curve shows various combinations of two goods which give equal level of satisfaction to the consumer.
- The marginal rate of substitution of Y for X represents the amount of Y which the consumer has to give up for the gain of one additional unit of X so that his level of satisfaction remains the same.
- With the help of indifference curve a consumer's equillibrium is at a point where indifference curve is tangent to budget line, where the slope of both are same and indifference curve is convex to its origin.

Exercise Questions

Objective Type Questions :-

1. The marginal utility of unit can be calculated as follows -

(A) $MU_n = TU_n - TU_{n-1}$

(B) $MU_n = TU_n - TU_{n+1}$

(C) $MU_n = \frac{TU_n + TU_{n+1}}{2}$

(D) $MU_n = TU_n + TU_{n+1}$

2. According to Cardinal approach the condition for consumer's equilibrium in case of two goods is.

(A) $MRS_{xy} = \frac{P_x}{P_y}$

(B) $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$

(C) $MU_x = MU_y$

(D) None of the above.

3. According to Cardinal approach what is measured in utils :-

(A) Marginal utility

(B) Utility

(C) Total utility

(D) All of the above

4. The property of utility is :-

(A) It changes from one product to another product

(B) It changes from one time to other time

(C) It changes from one person to other person

(D) All of the above

5. The slope of indifference curve is -

(A) Declines from left to right

(B) Increase from left to right

(C) Horizontal to X axis

(D) Vertical to Y axis

Very Short Answer Type Questions :-

1. Define indifference curve.
2. Write the condition for consumers equillibrum in case of two goods, according to cardinal analysis.
3. Define marginal rate of substitution.
4. Why is indiffernce curve convex to its origin?
5. Write the mathamatical equation for budget line.

Short Answer Type Questions :-

1. Write assumptions of indifference curve.
2. Write the assumptions of law of diminishing marginal utility.
3. Write the main properties of indifferenc curve.

Essay Type Questions :-

1. Explain consumer's equilibrium according to cardinal analysis.
2. Explain the condition of consumer's equilibrium with the help of indifference curve analysis.
3. Explain three properties of indifference curve analysis.
4. Explain the law of Equi-marginal utility.

Answer Table

1	2	3	4	5
A	B	D	D	A