UNIT: 3

ANALYSIS OF CONSUMER'S BEHAVIOUR

- Concept of utility analysis and its approach:
  Utility is defined as the one satisfying power of a commodity. Also, it is define as the satisfaction that a consumer derives from the consumption of a commodity. Every economic good has power to satisfy particular wants of a consumer whatever its nature maybe.
  The concept of utility was introduced by English philosopher Jeremy Bentham in 1789.
  There are two basic approaches of utility analysis which are as follows:
  a) Cardinal utility approach
  b) Ordinal utility approach

  a) Cardinal utility approach: According to this approach, utility can be measured quantitively. The utility is expressed as a quantity measure in a hypothetical units i.e. units.

→ Assumptions:
  i. Rational consumer: The consumer is a rational person who always tries to maximize his/her utility with his/her limited income.

ii. Cardinal measurement of utility: Utility is a cardinal concept which is measure in monetary units. It means that a consumer can express the level of utility in terms of numbers.
iii. Constant marginal utility of money: The utility is measured in terms of money. So, marginal utility of money should be constant.
iv. Diminishing marginal utility: The utility derived from the successive unit of a Commodity diminishes. In other word, the marginal utility of commodity decreases as consumer consumes larger quantities of it.
v. Independent utility: Utilities are independent in which utility obtain from the Commodity X is not dependent on the utility obtain from commodity Y. Utility is also additive i.e.

$TU = MU_{X1} + MU_{X2} + \ldots\ldots MU_{Xn}$

- Total utility: It is defined as the total satisfaction obtained from the consumption of given units of a commodity by a consumer with a given period of time.
Symbolically,

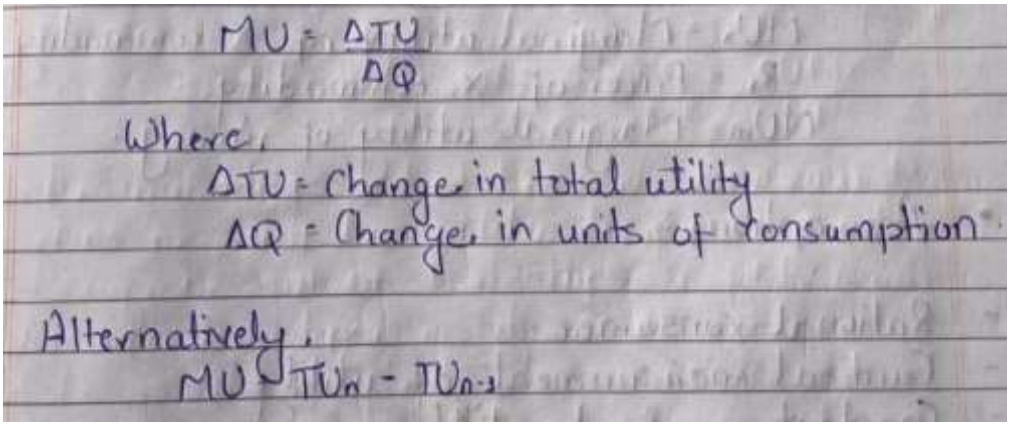
$$TU = MU_1 + MU_2 + MU_3 + \ldots\ldots\ldots + MU_n$$

Where,

TU = total utility

MU = marginal utility

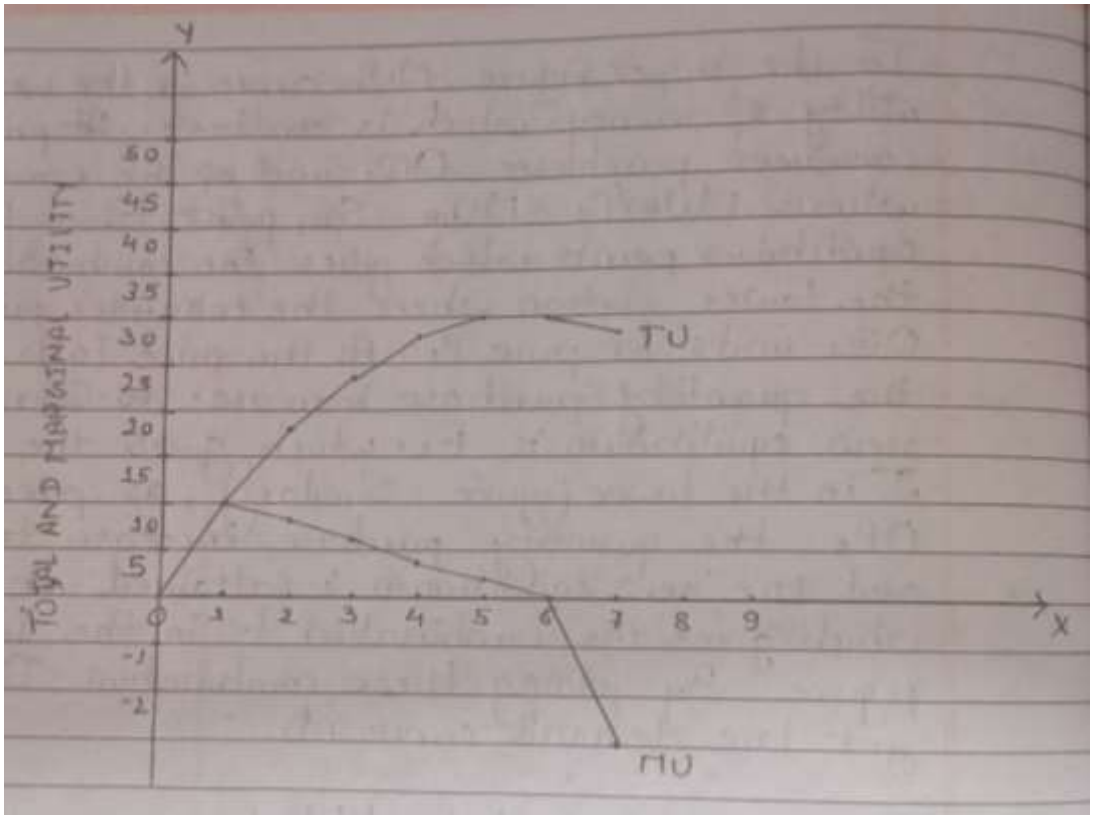
- Marginal utility: Marginal utility is defined as the addition to the total utility as a result of consumption of one additional unit of a commodity.
  Symbolically,



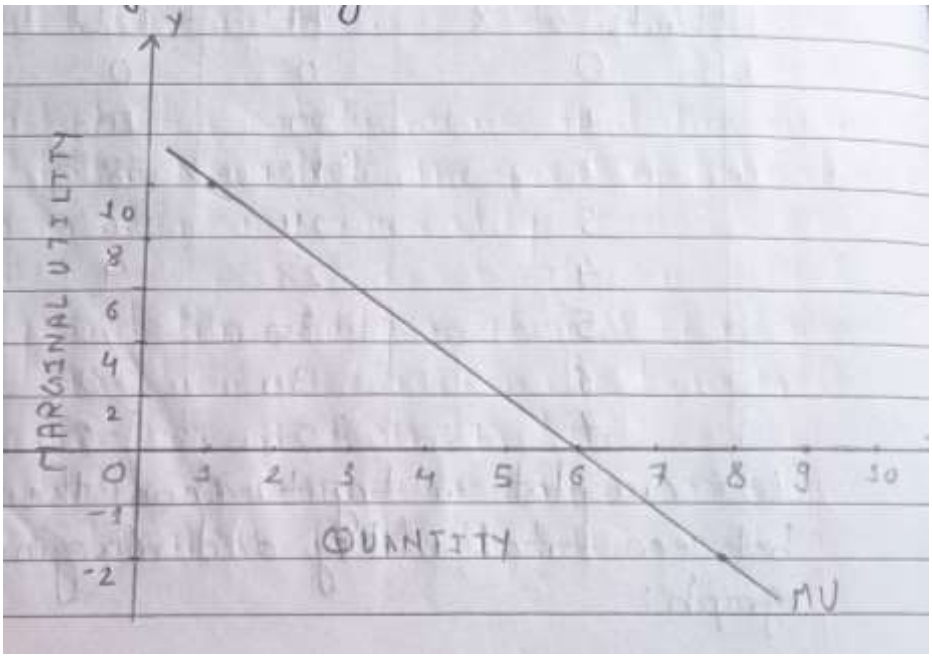
➢ Figure of total and marginal utility:

Units of X	TU	MU
0	0	0
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

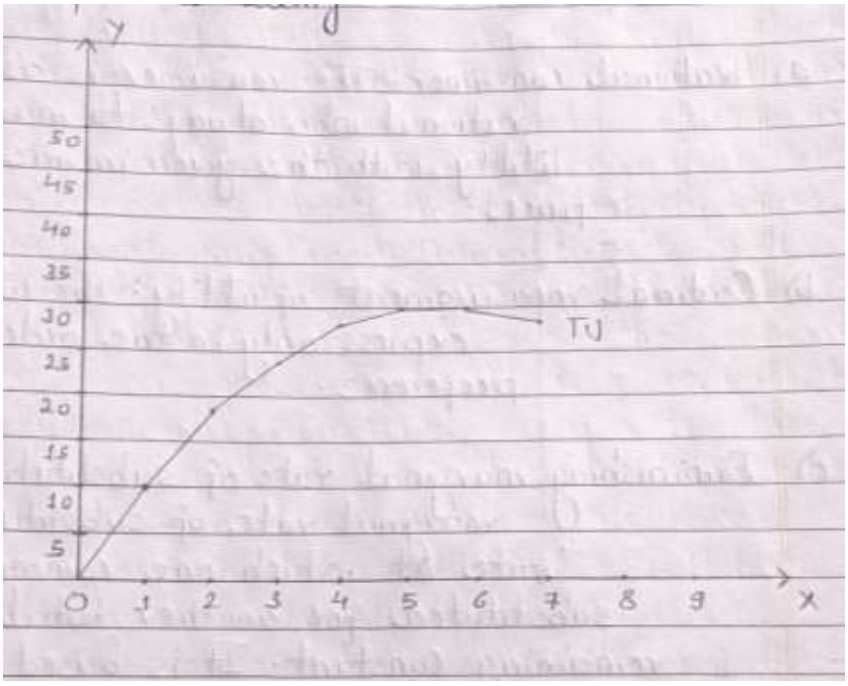
We can plot or try to show the relationship between total utility and marginal utility by graph:



- Graph of marginal utility:



- Graph of total utility:



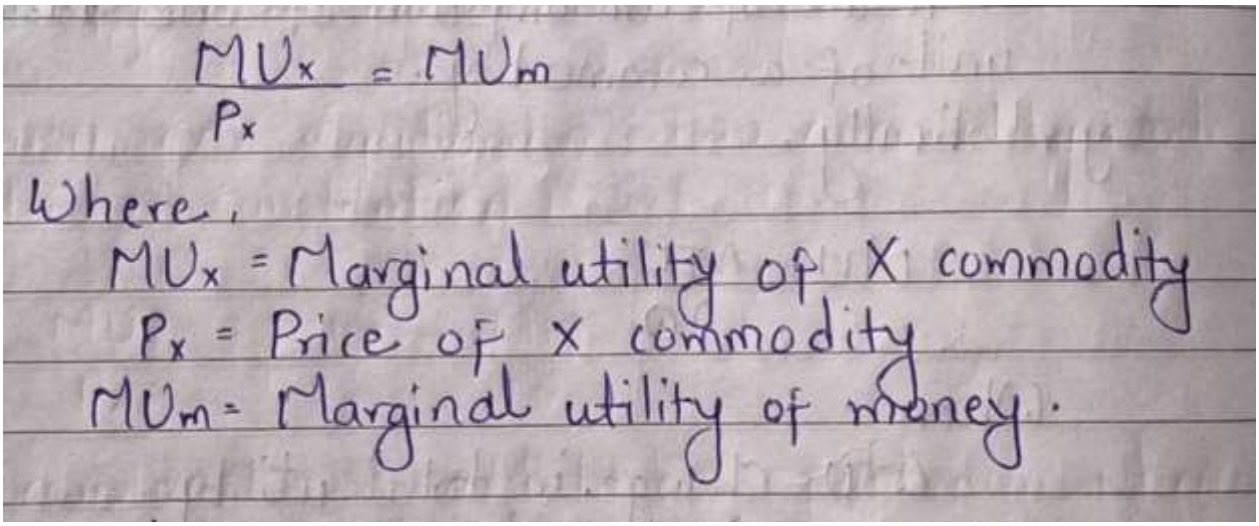
- Consumer's equilibrium under cardinal utility approach (law of diminishing marginal utility):

  i. Consumer's equilibrium : One commodity model

  A consumer is in equilibrium when he/she maximizes their total utility with given money income and market prices of consume goods. When a consumer consumes more and more units of a commodity, the marginal utility diminishes. This process is known as law of diminishing marginal utility and the consumers equilibrium under one commodity model is explain through it.

  In this model, the consumer is in equilibrium when the marginal utility of the commodity is equated to its market price.

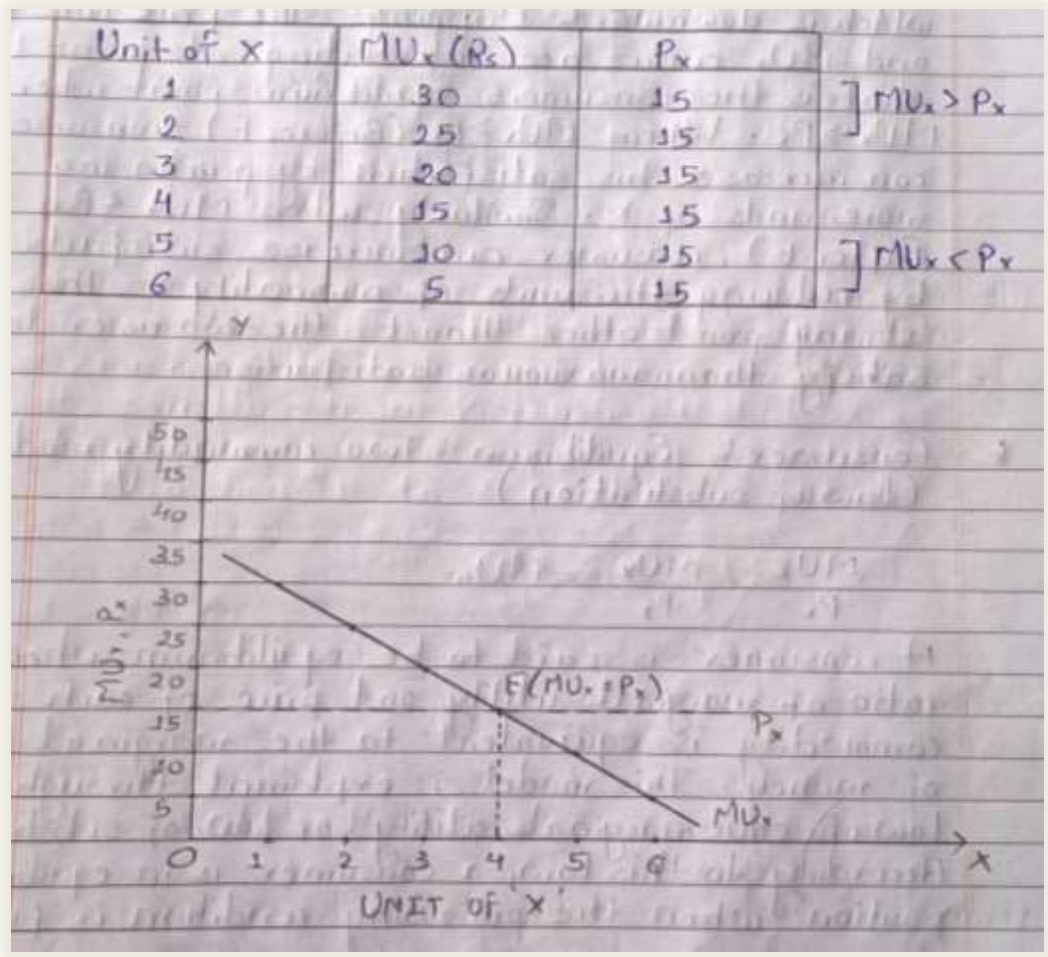
Symbolically,



→ Assumption :

- Rational consumer
- Cardinal measurement of utility
- Constant marginal utility of money
- Operation of law of diminishing marginal utility
- Prices of commodity remains constant.

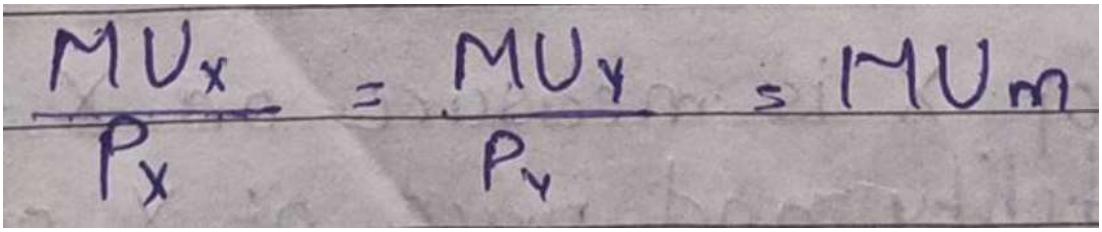
On the basis of these assumptions, the consumers equilibrium in one commodity model can be explained with the help of given table and figure:



Here, units of X is measure on X-axis and marginal utility and price of X are measured on Y-axis. P_x is the price line which shows the constant marginal utility of money and MU_X is the marginal utility of commodity X which is downward slopping. The price line P_x and MU_X curves are intersecting at point E which is the consumers equilibrium point where $MU_X > P_x$. When $MU_X > P_x$, consumer can increase his satisfaction by purchasing more units of X. Similarly, when $MU_X < P_x$, consumer can increase satisfaction by reducing the units of commodity X. Thus, at any point other than E, the consumer less satisfy than maximum satisfaction.

ii. Consumer's equilibrium: Two commodity model (law of substitution)

A consumer is said to be equilibrium when the ratio of marginal utility and price of each commodity is equivalent to the marginal utility of money. This model is explained through the law of equi-marginal utility or law of substitution. According to this law, a consumer is in equilibrium position when the following condition is fulfill.



$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = MU_m$$

Where,

MU_X = marginal utility of commodity X

MU_Y = marginal utility of commodity Y

P_X = price of commodity X

P_Y = price of commodity Y

MU_M = marginal utility of money

→ Assumptions:

- Rational consumer
- Cardinal measurement of utility
- Constant marginal utility of money
- Operation of law of diminishing marginal utility
- Prices and income remains constant.

– Consumer spent all his income in two goods

On the basis of these assumptions we can explain consumers equilibrium model in two commodity as follows:

Suppose, there are only two commodity X and Y on which consumer spends all his incomers of Rs 24 on two goods. And again, suppose price of commodity X is Rs 2 and price of commodity Y is Rs 3. In order to maximize his/her satisfaction, the consumer will equate the ratio of marginal utility and price of respective commodity and it can be explained with the help of given figure:

Units	MU_x	MU_y	$\frac{MU_x}{P_x}$ (P_x = Rs. 2)	$\frac{MU_y}{P_y}$ (P_y = Rs. 3)
1	20	24	10	8
2	18	21	9	7
3	16	18	8	6
4	14	15	7	5
5	12	12	6	4
6	10	9	5	3

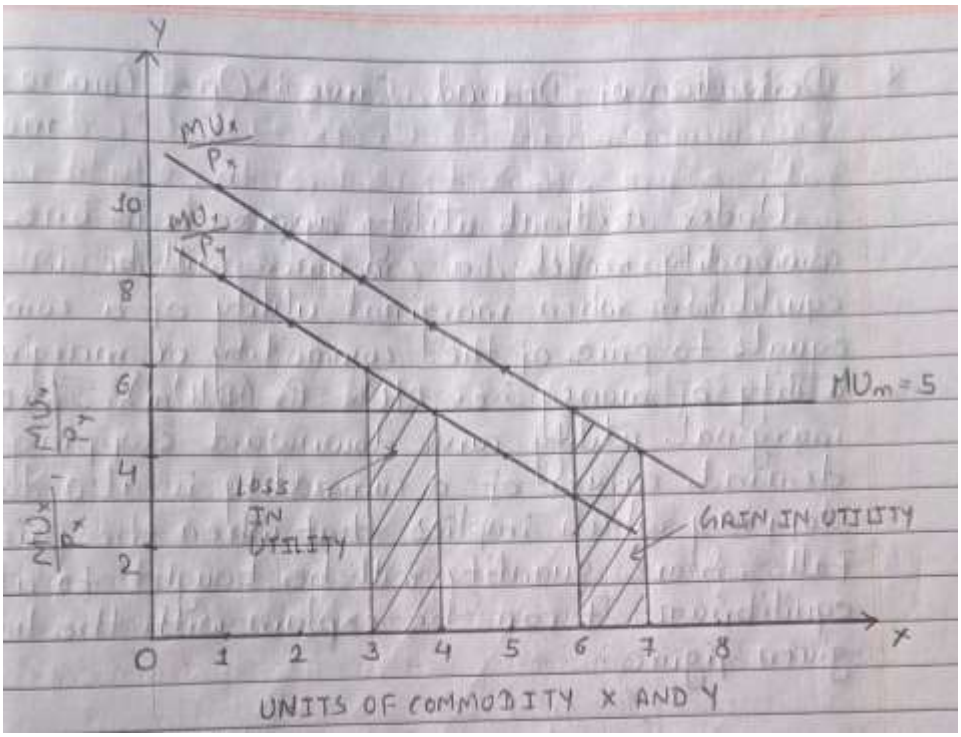
From the table, it is clear that the consumer will be equilibrium when he purchases 6 units of X and 4 units of Y as it satisfied, the condition required for the consumers equilibrium. At the 6^{th} units of X at 4^{th} unit of Y.

$$\therefore \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

$$\therefore \frac{10}{2} = \frac{15}{3}$$

$$\therefore 5 = 5$$

This model can be explained with the help of given figure:

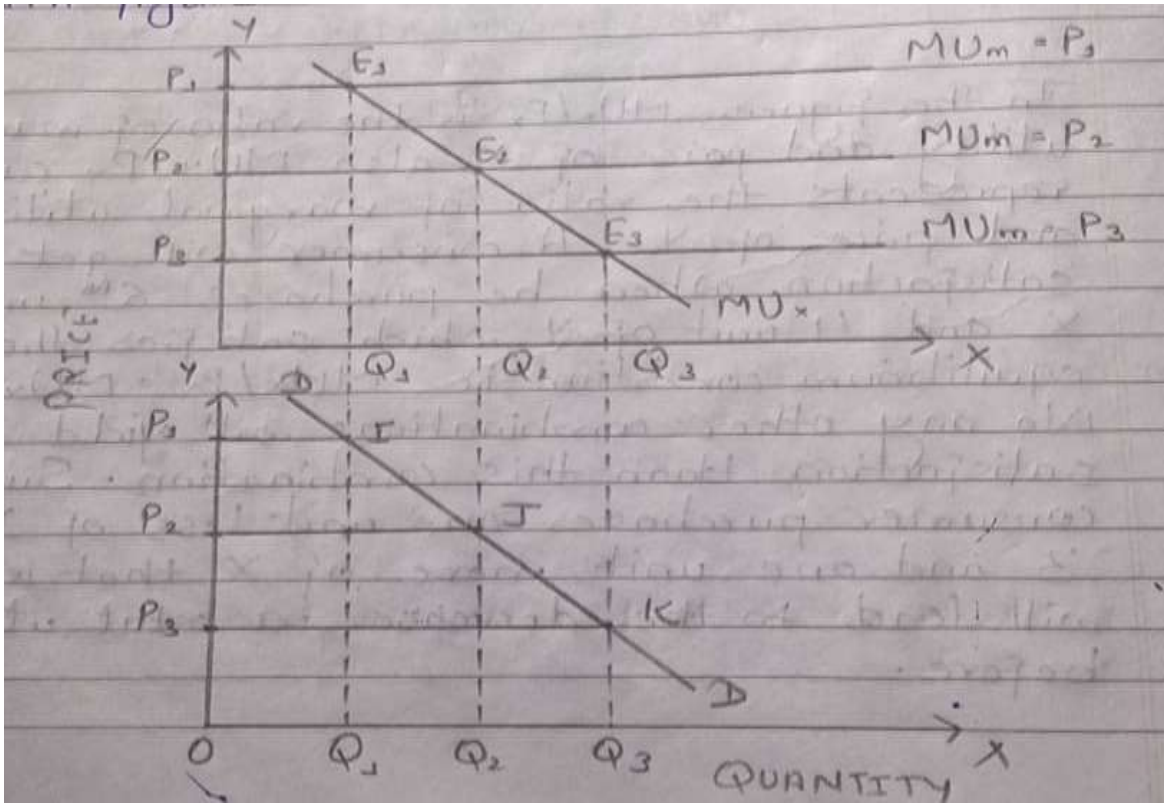


In the figure, MU_X/P_X is the ratio of marginal utility and price of X also MU_Y/P_Y curve represents the ratio of marginal utility of Y and price of Y. A consumer will get maximum satisfaction when he purchases 6^{th} unit of X and 4 unit of Y which satisfies the required equilibrium condition i.e. $MU_X/P_X = MU_Y/P_Y = MU_m$.

No any other combinations will yield higher satisfaction than this combination. Suppose, consumer purchases one unit less of Y that is 3 and one unit more of X that is g, this will lead to the decrease in total utility than before.

- Derivation of demand curve: One commodity model

  Under cardinal utility approach in one commodity model, a consumer will be in equilibrium when marginal utility of a commodity equals to price of the commodity or marginal utility of money i.e. $MU_X = P_X = (MU_m)$. Since the marginal utility curve downward slopping the demand curve of the commodity is also downward slopping which implies that when the price falls, more quantity will be bought to attain equilibrium. It can be explain with the help of given figure:



In the upper figure, MU_X represents marginal utility of commodity X. Initially, the consumer is in equilibrium at point E_1 where $MU_X = P_1$. At this point equilibrium price and quantity are OP_1 and OQ_1 respectively. If the price falls from P_1 to P_2 , the consumer will be in equilibrium at E_2 where $MU_X = P_2$. Here, equilibrium quantity is OQ_2 . Similarly, when price falls to P_3, the equilibrium quantity is OQ_3 units.

In the lower figure, DD is the demand curve which is downward slopping when price is P_1 the consumer purchases OQ_1 units of commodity X, which is shown by the point I. When price falls to P_2 the Quantity purchase increases to Q_2. Similarly, when price falls to OP_3, the quantity purchase increases to OQ_3 which is represented by point K. By joining these point IJK, we get the demand curve DD.

- Derivation of Demand curve: Two Commodity model

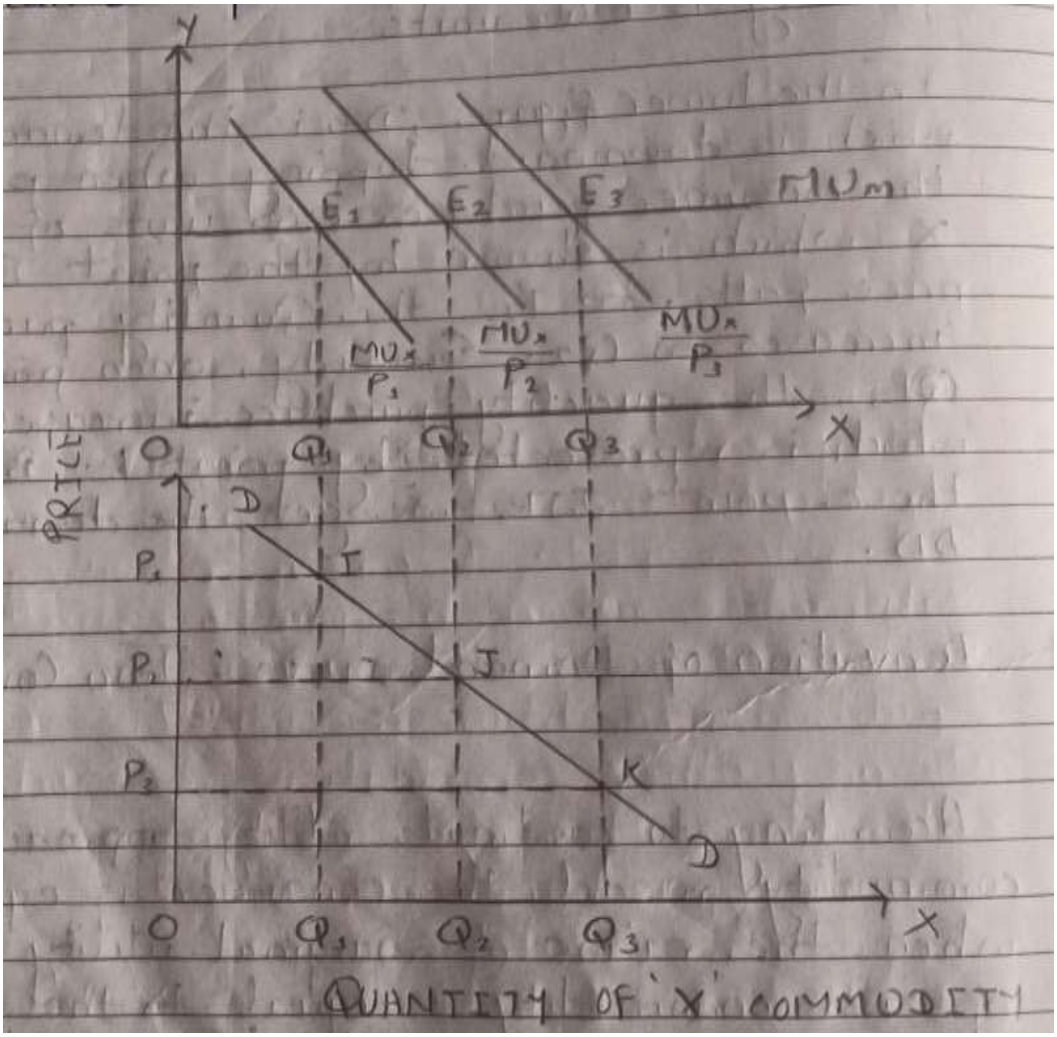
According to cardinal utility approach in two commodity model, the consumer is equilibrium when the ratios of marginal utility and price of each commodity is equal to the marginal utility of money.

i.e. $MU_X/P_X = MU_Y/P_Y = MU_m$

let us suppose, the price of X Falls price of Y remaining constant. $MU_X/P_X > MU_Y/P_Y$ due to the fall in price of X to restore the equilibrium, the marginal utility of commodity X

must be reduce which is possible by purchasing more units of commodity X.

This can be explained with the help of diagram:



In the upper figure, curve, MU_m is the marginal utility of money which is constant. At price P_1, the consumer purchases OQ, unit of the commodity X where $MU_X/P_1 = MU_m$. So, point E_1 is the initial equilibrium point which gives the combination I in the lower portion where the consumer purchases OQ_1 units at price P_1. As the price falls to OP_2 the quantity purchase increases to OQ_2 and new

equilibrium is E_2 , which. gives the combination J in the lower figure. Similarly, as price falls to OP_3, the quantify purchase Increase to OQ_3 and the new equilibrium is attained at point E_3 which gives the combination K in the lower figure. By joining these combination IJK we get the demand curve DD.

b) Ordinal utility Approach: The ordinal utility approach was first introduce by FY Edgeworth in 1881 to show the possibility of commodity change between two individuals. Later, it is explained by the economist like J.R. Hicks and Slotsky.

The concept of ordinal utility analysis is based on the following axioms:

i. It is not possible to express utility in quantitative terms but is possible to rank them.
ii. A consumer can list all the commodities she/he consumes in order to show his / her preference.

→ Assumptions:

- Rational consumer: The consumer is assume to be rational who always to maximize his/her utility with the given income and market prices.
- Ordinal measurement of utility: The utility can be express only in the order of his/her preference.
- Diminishing marginal rate of substitution: The marginal rate of substitution is the rate at which one commodity is substituted for another, total utility remaining

constant. It is based on the assumption that the marginal role of substitution diminishes when one commodity is substituted for another.

- Non-satiety: Non-satiety means that the consumer has not reached the point of saturation in case of any commodity.
- Consistency and transitivity in choice: It is assume. that consumer is consistent in his/her choice i.e. if A>B, B is not greater than A.
  Transitivity in choice symbolizes as follows : If A>B, B> C, then A>C.

- Indifference curve (IC):
  Indifference curve is defined as the locus of various combination of any two goods which yield same level of satisfaction to the consumer. Therefore, a consumer is indifferent between the combinations of goods when he/she has made choice between them. It is also called iso-utility curve.

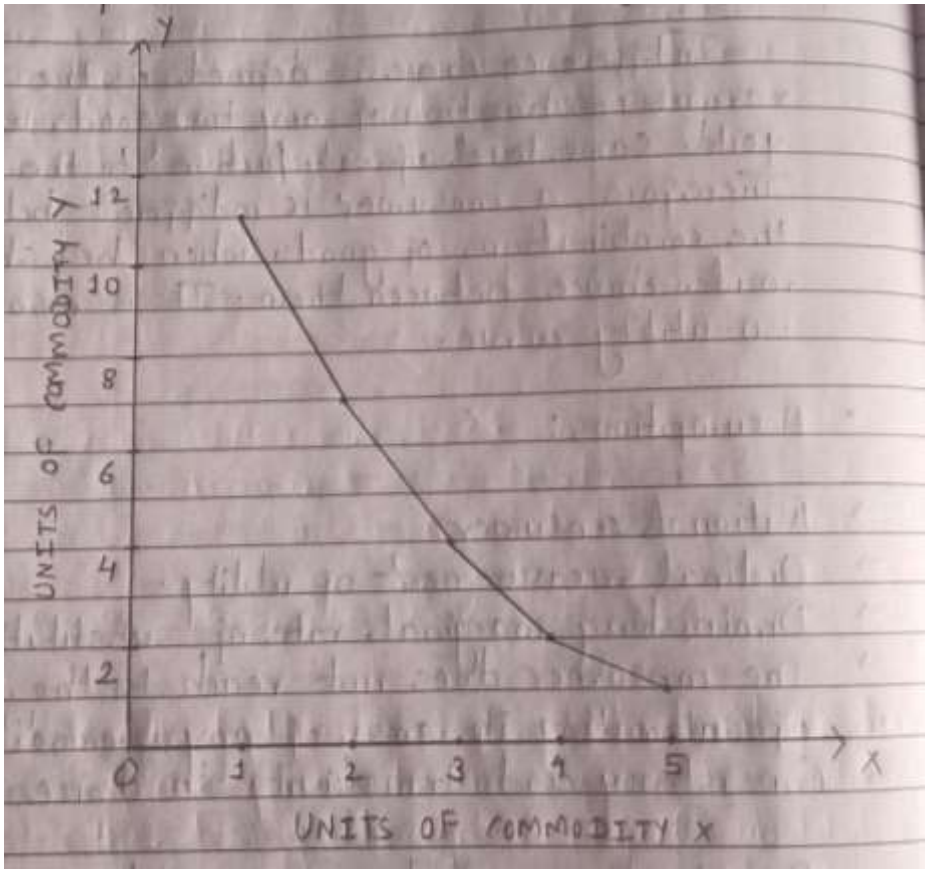
→ Assumptions:

- Rational consumer
- Ordinal measurement of utility
- Diminishing marginal rate of substitution
- The consumer does not reach to the point of Saturation in case of any commodity
- Consistency and transitivity in choice.

On the basis of these assumptions, inference curve can be explained with the help of given table:

Combinations	Commodity (x)	Commodity (Y)
A	1	11
B	2	7
C	3	4
D	4	2
E	5	1

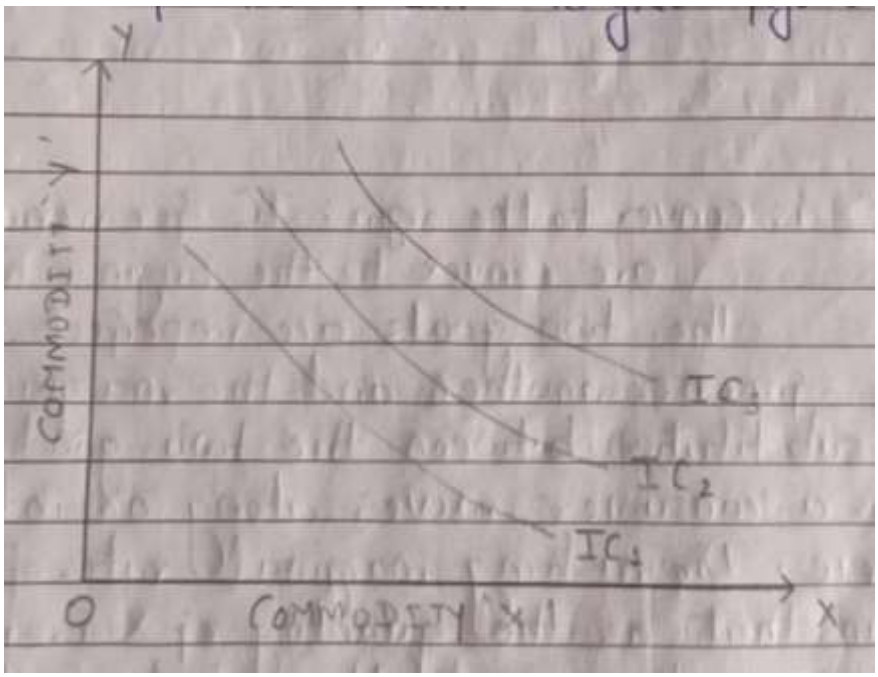
It is explained with the help of given figures:



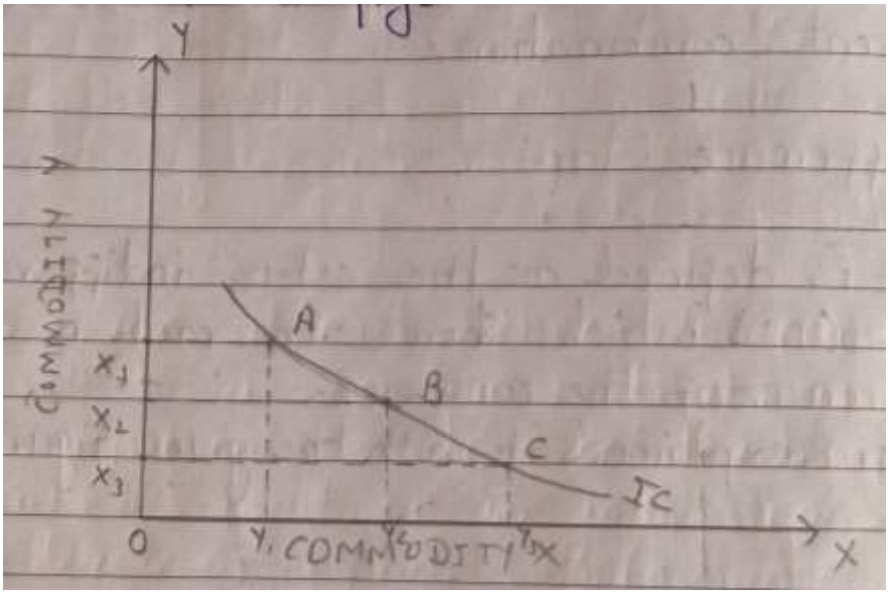
In the figure point A, B, C,D and E represents the different combination of X and Y. The combination A shows 1 unit of X and 11 units of Y. The combination B shows 2 unit of X and 7 units of Y. The combination C shows 3 units of X and 4 units of Y, the combination D shows 4 units of X and 2 units of Y and combination E shows 5 units of X and 1 units of Y. When we join points A, B, C, D and E, we get downward slopping IC curve. It is convex to the origin because of diminishing marginal rate of substitution. The any combination of this curve represents same level of satisfaction. So, the consumer is indifferent between this- different combination.

- Indifference Map:

  It is defined as the set of indifference curve (IC) which shows the rank of the preference of the consumer.
  We can explained it with the given figure:

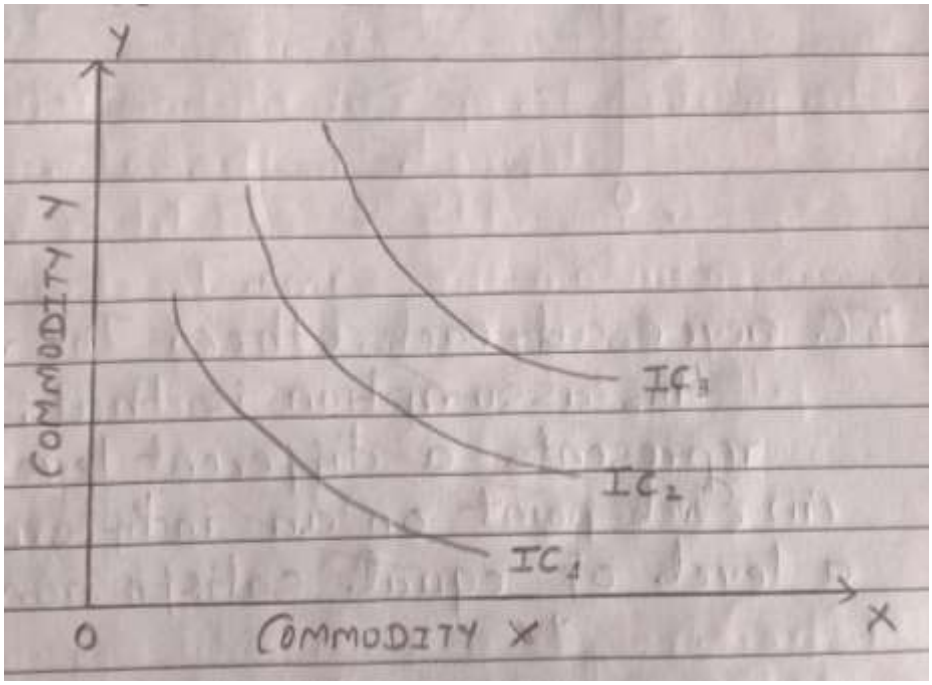


- Features or characteristics of Indifference Curve:
  a) IC is negatively sloped: An indifference curve has negative sloped which slopes downward from left to right which implies if the quantity of one commodity increases, the quantity of other commodity must decrease to stay on the same level of satisfaction. It is expressed in the figure below:

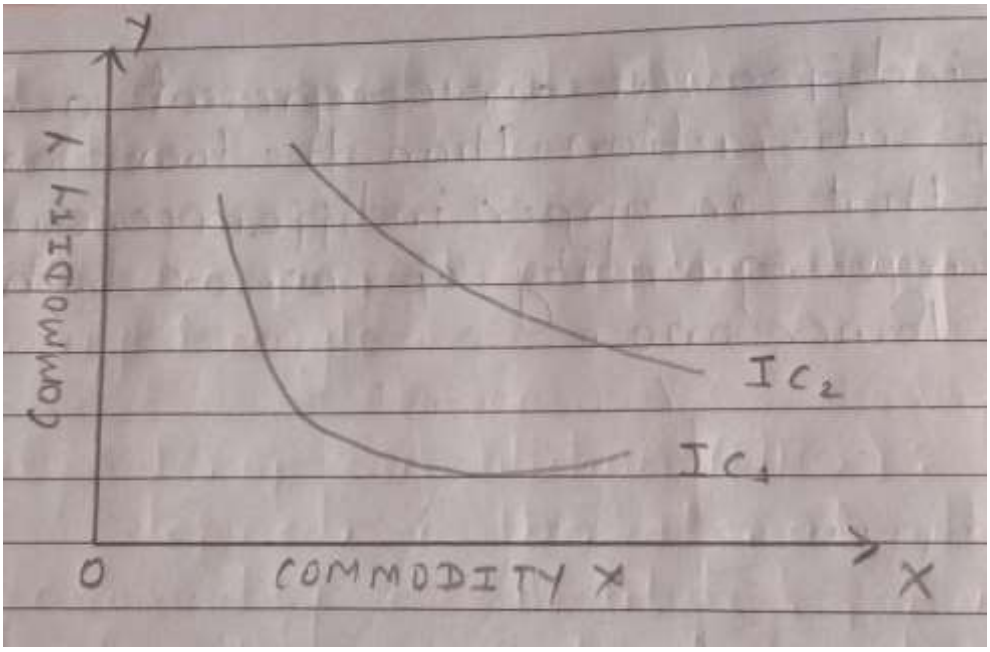


  b) IC is convex to the origin: IC for normal goods are convex to the origin. This implies that the two goods are imperfect substitutes for one another and the marginal rate of substitution between the two goods decreases as a consumer moves along an indifference curve. Diminishing marginal rate of substitution means that as the quantity of X is increased by an equal amount then that of Y diminishes by a smaller amount.
  c) Higher indifference curve represents a higher level of satisfaction than the lower ones: A higher indifference curve represent a higher level of satisfaction than the

lower one. The reason is that an upper indifference curve contains a larger quantity of one or both goods than the lower one.

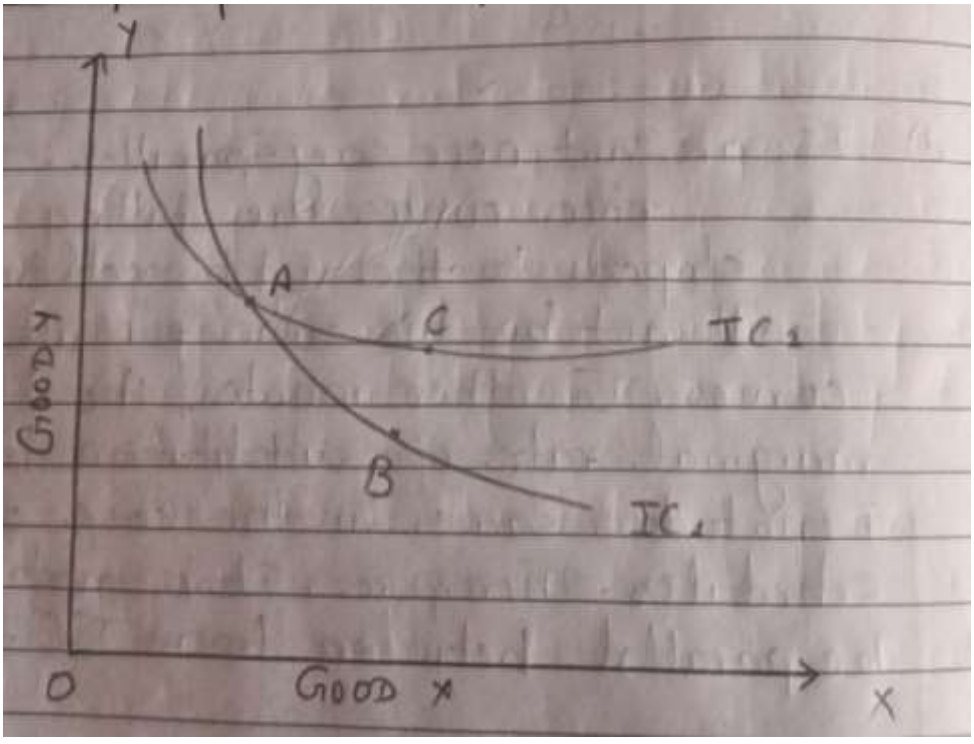


d) IC are not necessary parallel: Though indifference curves are falling, negatively sloped to the right, yet the rate of fall will not be the same for all indifference curves. In other words, the diminishing marginal rate of substitution between the goods is not the same in the case of all indifference schedules. Therefore, it is not necessary to be parallel between two IC.

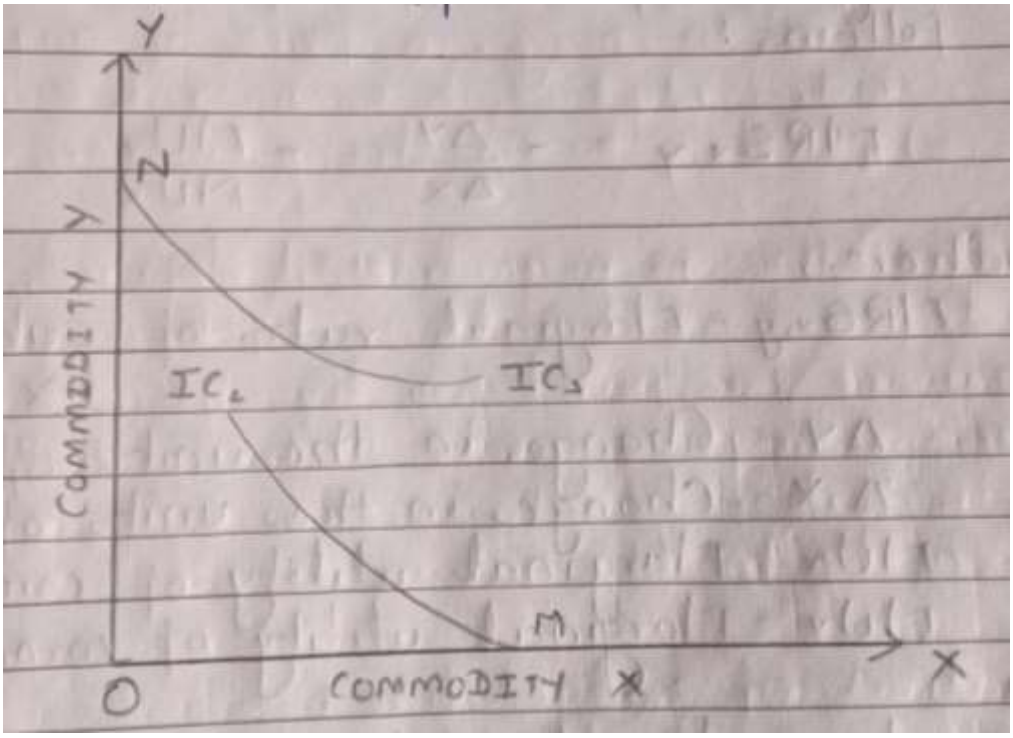


e) IC never cut each other: The reason behind this assumption is that;

i. Each IC represents a different level of satisfaction
ii. Each point on an indifference curve gives a level of equal satisfaction.



f) IC does not touch either of the axes: If IC_2 touches X-axis as shown in the figure at M, the consumer will be having OM of goods X and O of goods Y. Similarly, if an indifference curve IC_1 touches the Y-axis at N, the consumer will be having only ON of good Y and OM of good X. Such curves violets the assumptions that the consumer buys two goods in a combination. Therefore, indifference curve do not touch either of the axes.



➢ Exceptions of indifference curve:

i. If marginal rate of substitution is increasing, then IC will be concave to the origin.
ii. If goods are perfect substitute, then IC will be straight line.
iii. If goods are perfect complementary, then IC will be right angle.

- Marginal rate of substitution (MRS): It is defined as the rate at which one commodity is substituted for another to maintain the same level of satisfaction. It is given by the slope of IC which is as follows:

$$MRS_{X,Y} = \frac{-\Delta Y}{\Delta X} = \frac{-MU_Y}{MU_X}$$

Where,

$MRS_{X,Y}$ = marginal rate of substitution of X and Y

ΔY = change in the units of commodity 'Y'

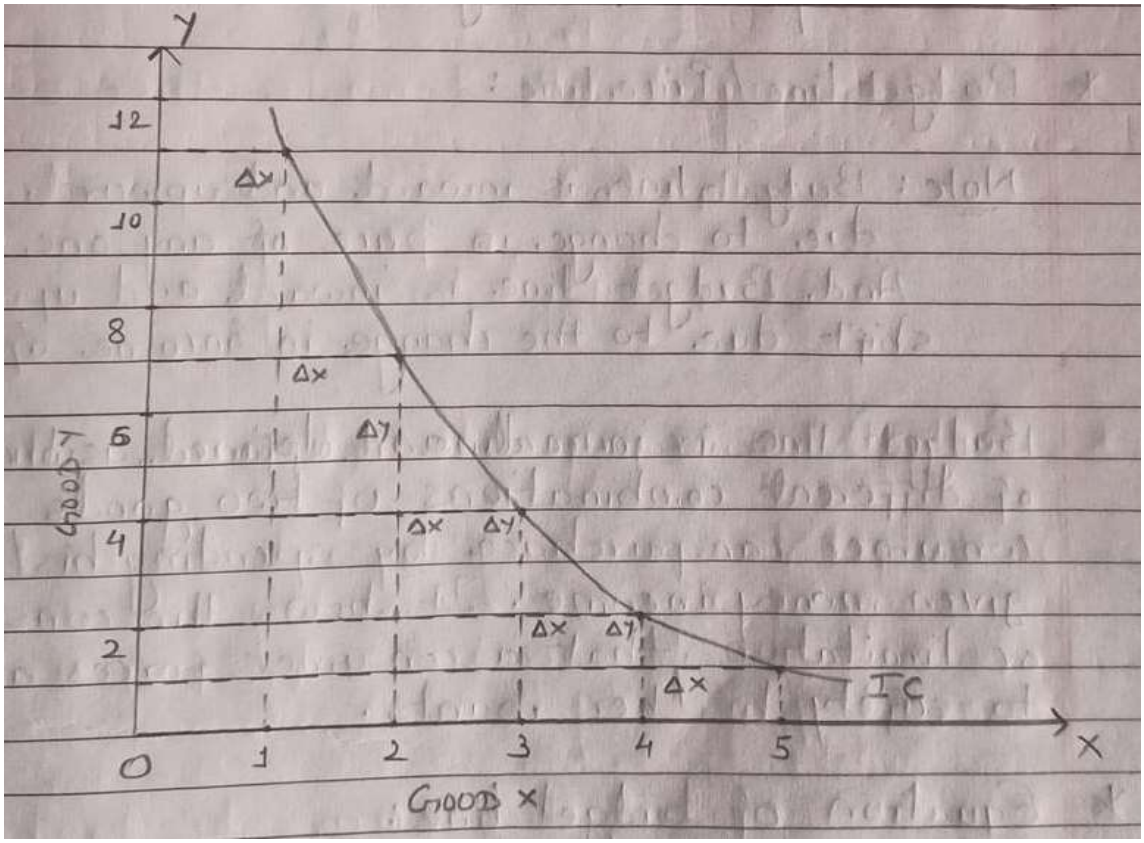
ΔX = change in the units of commodity 'X'

MU_Y = marginal utility of commodity Y

MU_X = marginal utility of commodity X

It can be explained with the help of given table and figure:

Good X	Good Y	$MRS_{x,y} = -\frac{\Delta Y}{\Delta X}$
1	11	-
2	7	4
3	4	3
4	2	2
5	1	1



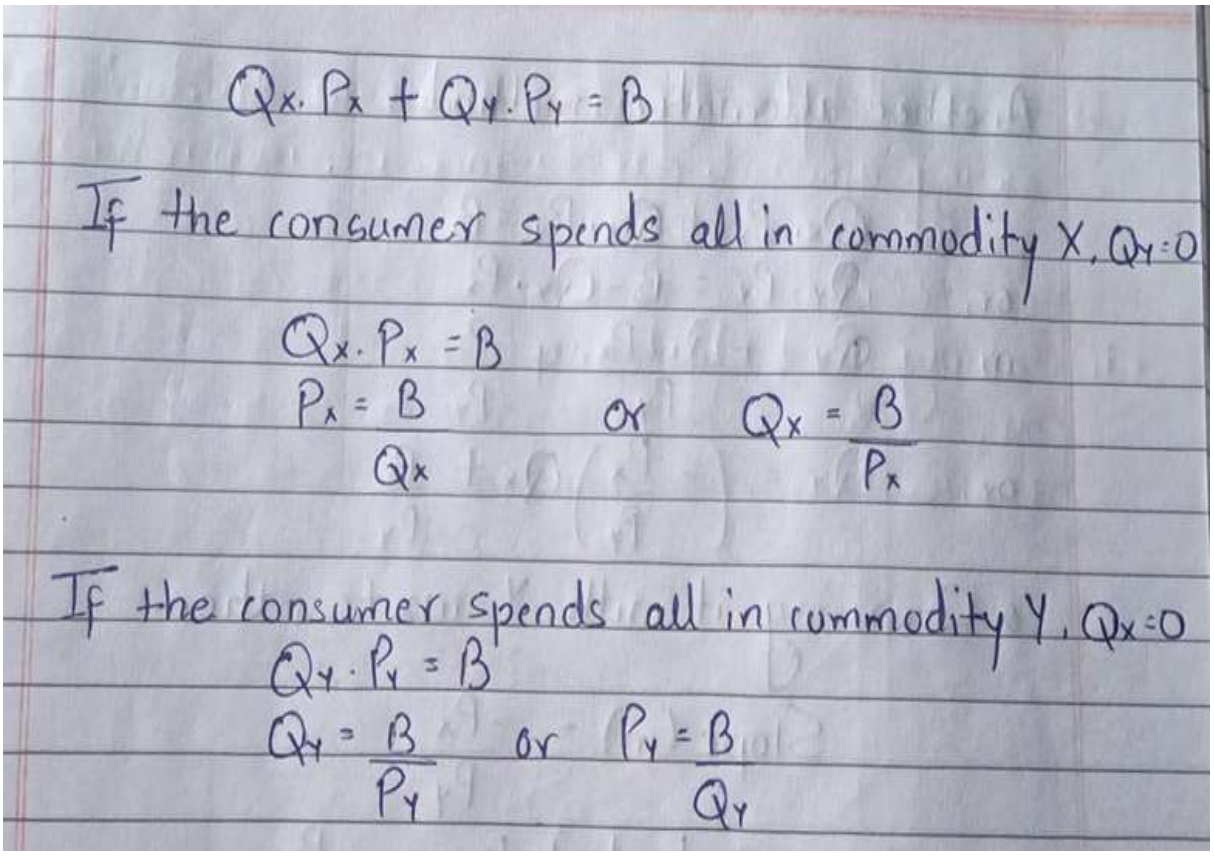
In the figure, X-axis represents the quantities of Good X and Y-axis represents the quantity of commodity Y and the convex curve IC is downward slopping indifference curve. In the figure, when there is change in quantity of Good X from 1 to 2 and quantity of good Y from 11 to 7, we got MRS 4. Similarly, when the quantity of commodity X ,0 consumption is increase by scarifying the quantity of good Y, the consumer can get MRS_{XY} . 4,3,2 and 1 by the combination of change in commodity Y and commodity Y, we can get IC curve.

- Budget line/Price line:
  Note: Budget line is inward and upward swing, due to change in price of any one commodity. And Budget line is

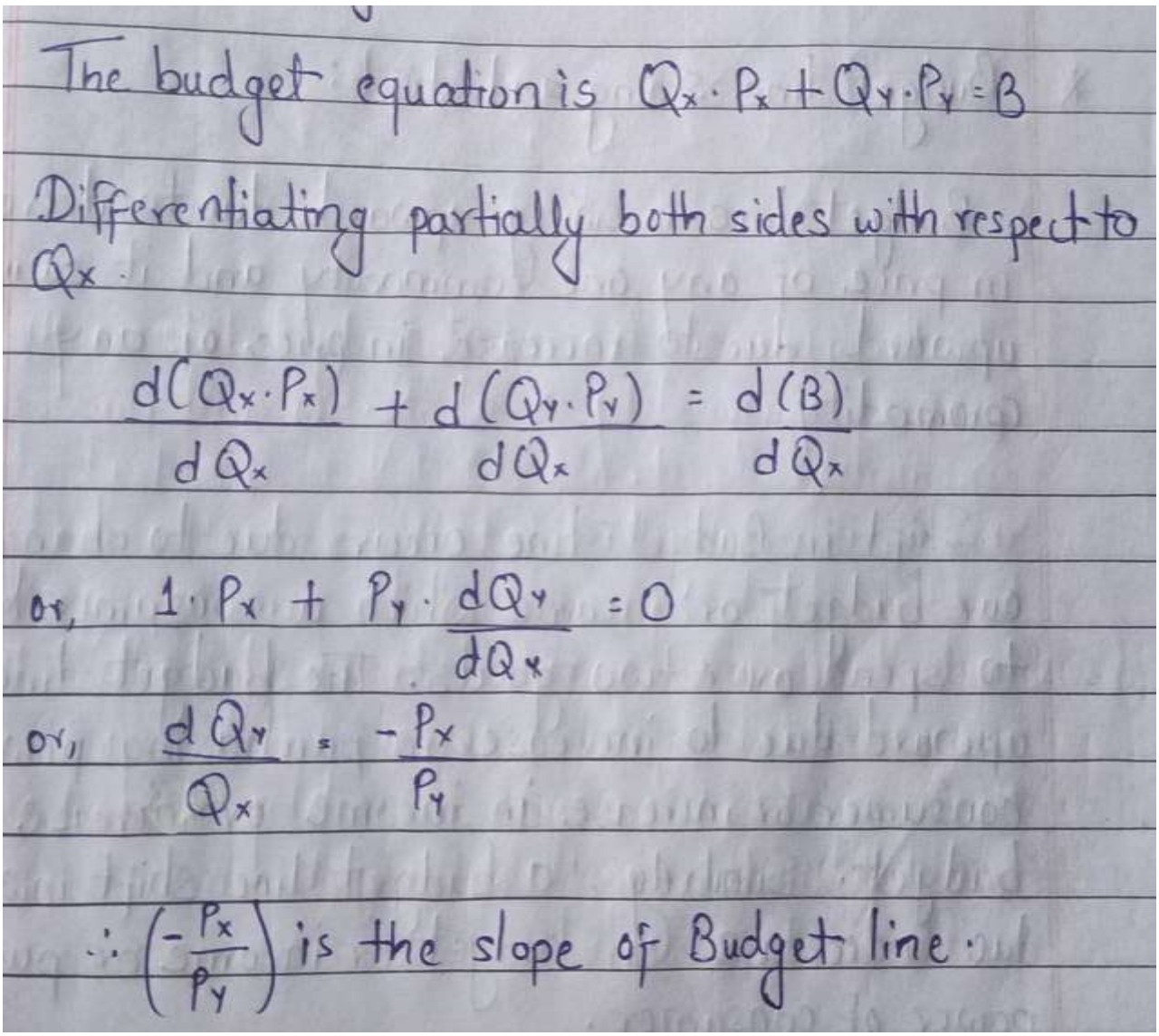
inward and upward shift due to the change in income of consumer.

Budget line or price line is defined as the locus of different combinations of two goods which consumer can purchase by spending his / her income. It shows the constraints limitation that a consumer forces attempting to safety his/her wants.

- Equation of budget-line:
  let the budget of consumer is B which is spend off on good X and good Y, then budget equation of budget constraints will be written as:



- Slope of budget:



The budget equation is $Q_x \cdot P_x + Q_y \cdot P_y = B$

Differentiating partially both sides with respect to Q_x.

$$\frac{d(Q_x \cdot P_x)}{dQ_x} + \frac{d(Q_y \cdot P_y)}{dQ_x} = \frac{d(B)}{dQ_x}$$

$$\text{or, } 1 \cdot P_x + P_y \cdot \frac{dQ_y}{dQ_x} = 0$$

$$\text{or, } \frac{dQ_y}{Q_x} = -\frac{P_x}{P_y}$$

$\therefore \left(-\frac{P_x}{P_y}\right)$ is the slope of Budget line.

- Another alternative method:

$$Q_x \cdot P_x + Q_y \cdot P_y = B$$

or, $$Q_y \cdot P_y = B - Q_x \cdot P_x$$

or, $$Q_y = -\frac{Q_x \cdot P_x}{P_y} + \frac{B}{P_y}$$

or, $$Q_y = \left(-\frac{P_x}{P_y}\right) Q_x + \frac{B}{P_y}$$

Comparing it with $Y = mx + c$, then

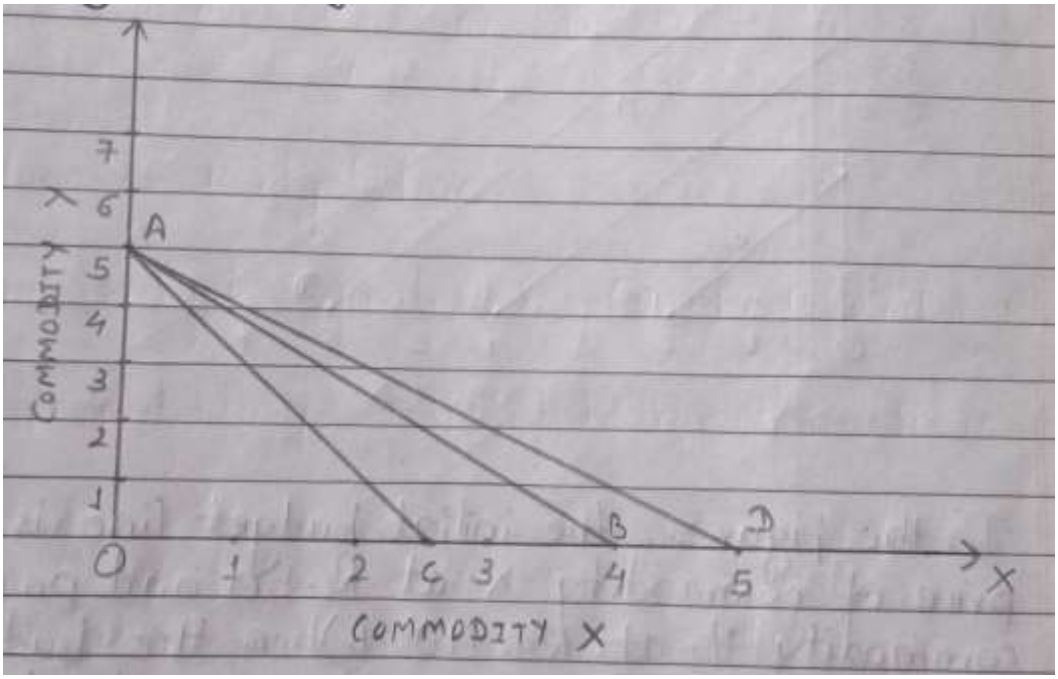
$$\text{Slope } (m) = -\frac{P_x}{P_y}$$

$$\text{Slope of budget line} = -\frac{P_x}{P_y}$$

- Budget line swing and shift:
  Budget line is swing downward due to decrease in price of any one Commodity and it swing upward due to increase in price of any Commodity.
  Shift in Budget line occurs due to change in Our budget or income which a consumer have to spend over two goods. The budget line shift upward due to increase in purchasing power of Consumer or increase in income or increase in budget. Similarly, a budget line shift inward due to decrease in budget a purchasing or income or power of consumer.

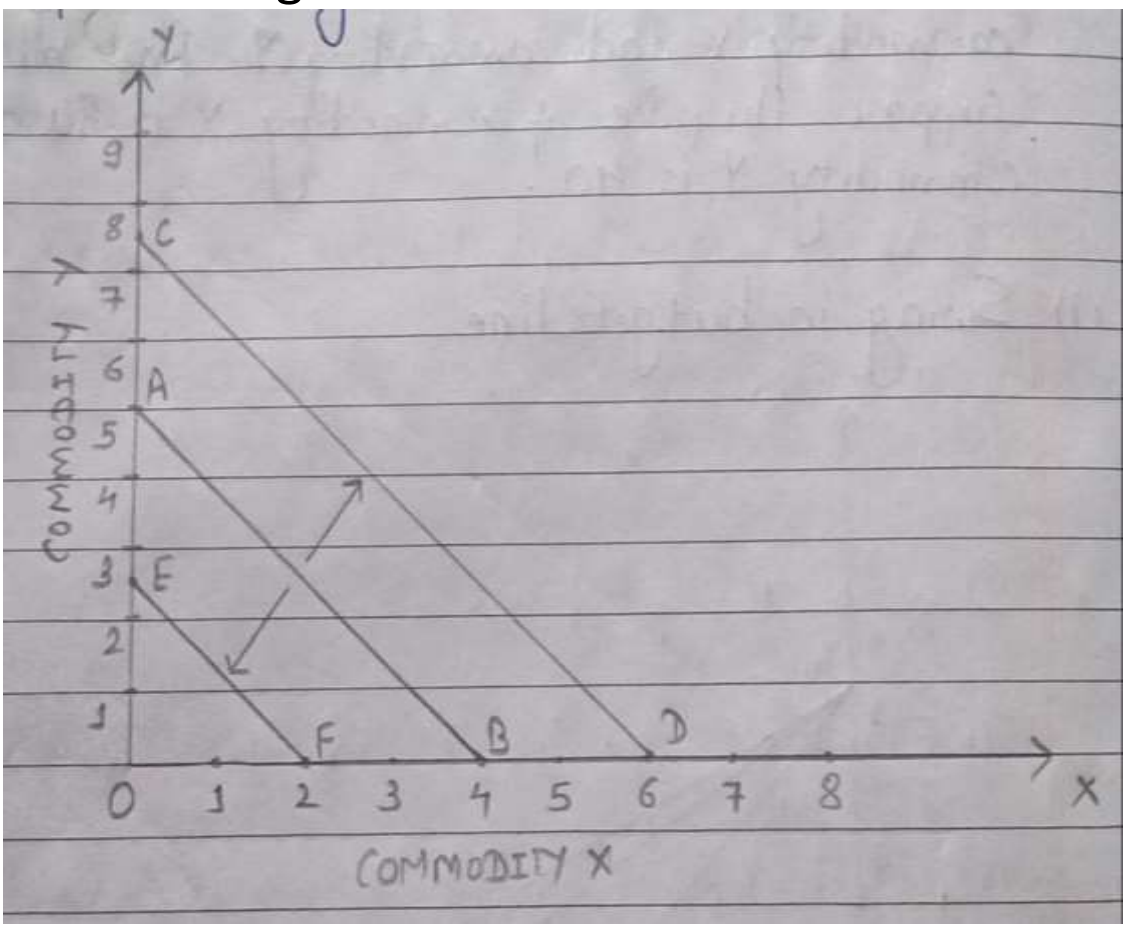
  Swing and shift in budget line is explained by the following figures:
  let us suppose a consumer have 200 income which he/she has to spend over two goods i.e. commodity X and commodity Y. And also suppose the price of commodity X is 50 and commodity Y is 40.

  i. Swing in budget line



In the figure, X-axis represent commodity X and Y-axis represent commodity Y initial budget line. When the price of commodity X increases to Rs. 80, the budget line swing inward due to decrease in purchasing power of consumer. And when the price of commodity X decreases to Rs. 40, the budget line swing upward due to increase in purchasing power of consumer.

ii. Shift in budget line



In the figure, the initial budget line is AB at price of commodity X at Rs.50 and price of commodity Y at 40. When the budget of a consumer increases to Rs.300, the budget line is shift upward while price of goods X and Y remains constraints. And, when the income or budget of consumer decreases to Rs. 100 at price of commodity X and Y constant, the Initial budget line shift inward to EF.

- Consumer's equilibrium under ordinal utility Approach/Indifference Curve:

  Consumers equilibrium is defined as the process by which a consumer reaches at the highest level of satisfaction with his limited income and given prices of goods. It gives a situation in which a consumer purchases such a combination of goods which gives maximum satisfaction at the given money income.

  - Assumptions:
    - Rational consumer
    - A consumer spends all his income in two goods.
    - Fixed consumers income and prices of goods.
    - Homogeneous and divisible goods.
    - Perfect competition in the market.
    - Transitivity and Consistency of choices.

- Condition required for the consumer equilibrium:

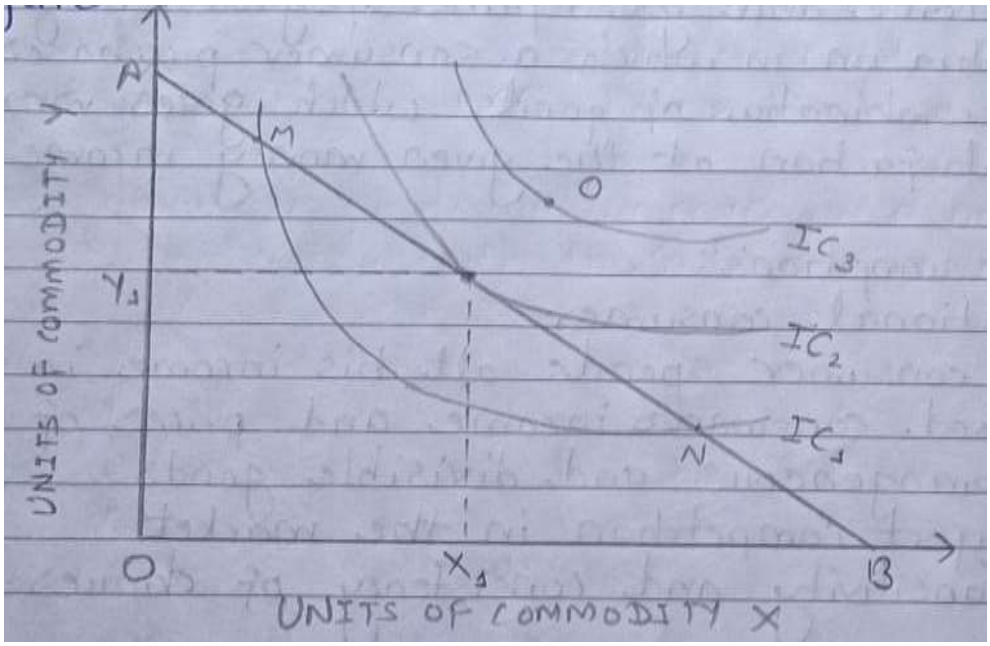
  i. First condition / Necessary Condition: IC must be tangent to the budget line/price line i.e.

     Slope of IC = Slope of Budget line

     $MRS_{X,Y} = -P_X / P_Y$

  ii. 2nd order condition / sufficient condition:

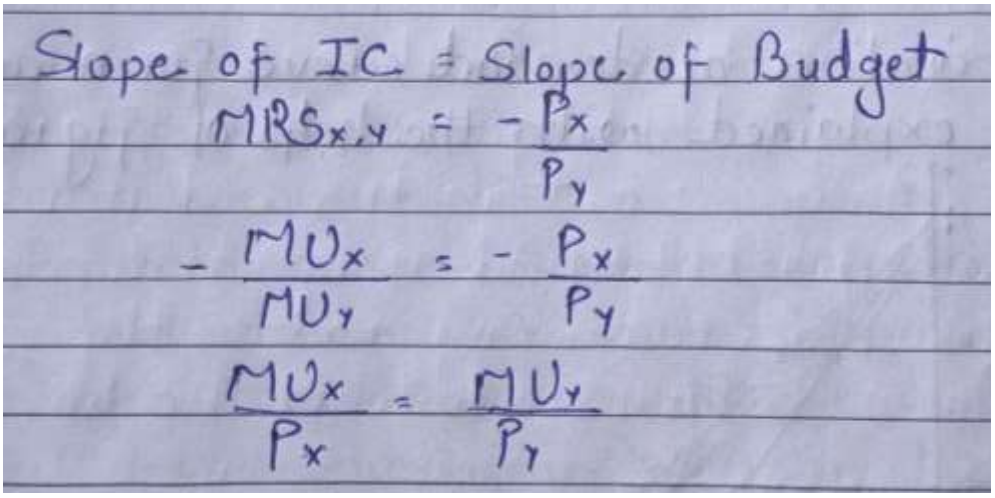
All the point of tangency IC must be convex to the origin / MRS must be dimishing. Consumers equilibrium under ordinal utility approach is explained with the help of given figure:



In the figure, X-axis represents quantity of commodity X and Y-axis represents quantity of commodity Y. The downward slopping AB is the budget line and a set of Indifference Curve IC_1, IC_2, and IC_3 represents Indifference map. E is the equilibrium point where the conditions required for equilibrium has been fulfill i.e. IC_2 is tangent to the budget line AB and at the point of tangency IC_2 is convex to the origin. So, the consumer derives maximum satisfaction by spending his/her total budget on OX_1 units of X and OY_1 units of Y. Any other points M, N & O yield lower satisfaction

or unattainable. Since the consumer is rational he does not choose the lower IC ie. IC_1 the highest IC ie. IC_3 is unattainable because of the consumer budget constraints.

At the equilibrium point

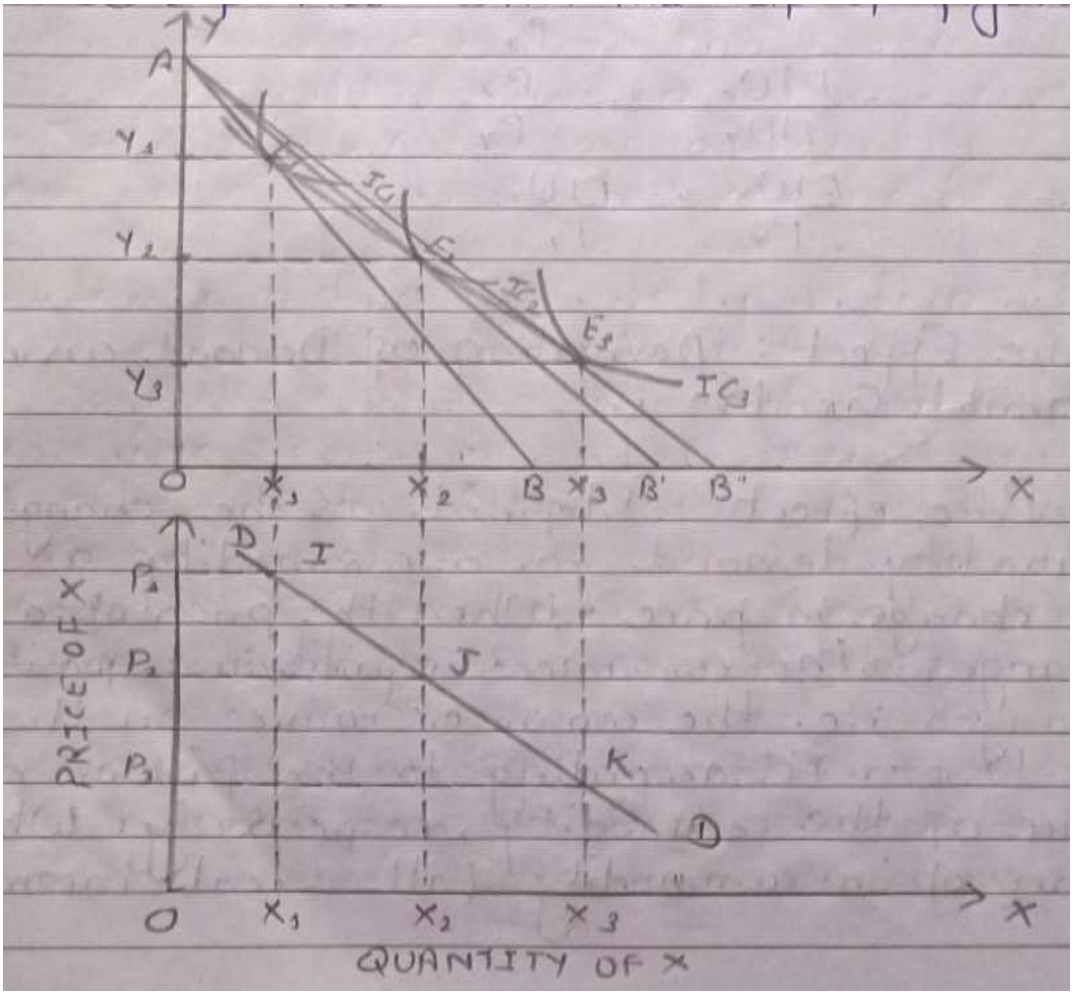


- Price effect : Derivation of demand curve for normal goods

  Price effect is defined as the change. in quantity demand for a commodity as a result of change in price. When the price of a Commodity changes, the consumers equilibrium position also changes i.e. the consumer moves on the higher or lower IC according to the fall or rise in price of the commodity, respectively. When the price of a commodity falls, real income of the consumer rises which leads to rise in purchasing power of the consumer and vice-versa.

The price effect depends on the nature of commodity. In the case of normal goods, the price effect is negative and the price consumption curve (PCC) slopes downward. In the case of substitute goods, the price effect is positive PCC slopes upward. In the case of giffen goods, the price effect is positive PCC slopes backward.

The derivation of demand curve for normal goods can be explained with the help of figures:



In the figure, X-axis represents units of commodity X, Y-axis represents unit of commodity Y, initially the consumer is in equilibrium at point E, where initial budget line AB is tangent to the west IC i.e. IC_1. This shows, the consumer consumes OX_1 units of X commodity OY_1 units of Y commodity. Suppose, price X falls than initial budget line will swing rightward to AB'. Attaining new equilibrium, E_2 on higher IC i.e IC_2. At this, the consumer consumes OX_2 units of X and OY_2 units of Y, the consumer reduces, the consumption of Y and increases consumption of X since, they are substitute goods. Again when price of X falls, the budget line AB' swing, toward right to AB" and the consumer will be in equilibrium at point E_3 on the higher IC ie. IC_3 .At this point, the consumer consumes OX_3 of X and OY_3 of Y commodity. When we join equilibrium points E_1, E_2 and E_3, we get a curve called price consumption curve (PCC) which is downward slopping indicating the elastic demand for commodity X.

In the lower figure, according to equilibrium point E_1, the consumer purchases OX_1 units of X commodity at price OP_1 which is shown the point I . In the same way according the equilibrium point E_2 , OX_2 units of commodity X is purchased on OP_2, price which is shown by the point I. Similarly, according to equilibrium point E_3, OX_3 units of X is Purchase on OP_3 price which is shown by

the point K. When we joint the points I, J and K, we get the downward slopping curve DD i.e. demand curve for normal goods.

- Critisism of indifference curve:
  a) Wrong assumptions of rational consumer: The IC technique assumes rational consumer but in the modern world, it is difficult to find a rational consumers and costly. So, the consumer behaves whatever he likes.
  b) Complexity of two commodity modern: The IC analysis is based on two commodity model. But, in the real world, the consumer consumes more than two commodities at this situation, the simplicity of IC disappears and the complexity appears which means it fails to explain where consumer consumes more than two commodity.
  c) Unrealistic assumption of perfect competition: The indifference curve approach is based on the unrealistic assumption of perfect competition which consists of homogenous goods. But in the reality consumers faces with differentiated products and monopolistic competition.
  d) Cannot explain uncertainity: The indifference curve approaches fails to explain consumer

behaviour when their is risk or uncertainity in expectation as regards the consequences of choices.

e) Income, preference and habit change: The IC approach assumes income, preference and habit of the consumer remain same over the period of time but these element change with change in time. Therefore, IC approach of utility analysis is not correct or realistic.

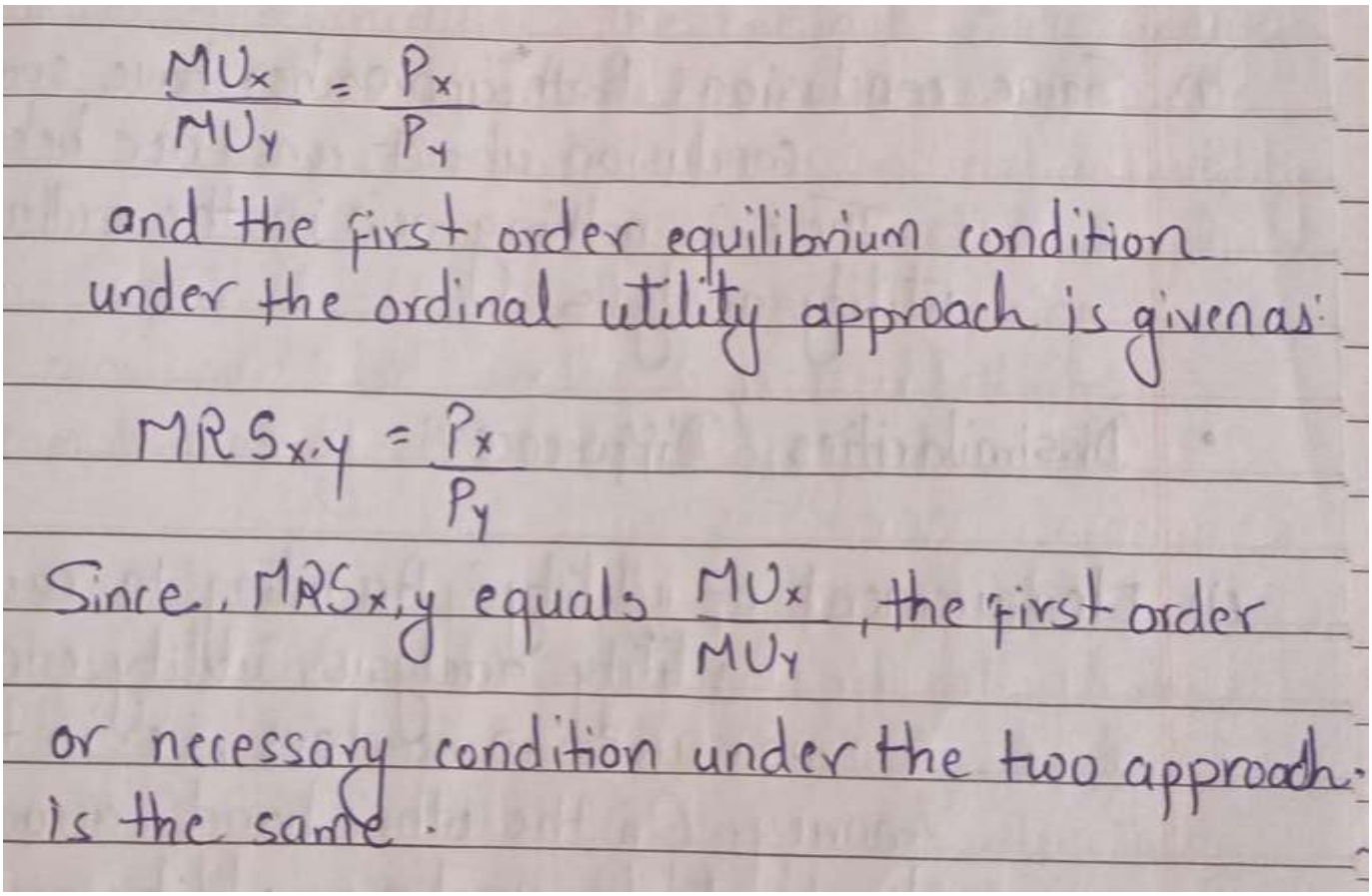
f) limited empirical research: The indifference approach of utility analysis is not based on quantitative data obtained from the empirical research of the actual behaviour of the consumer. It is based on hypothetical experiement. Therefore, it is mostly imaginary, unrealistic and unpractical approach of utility analysis.

- Cardinal utility approach verses Ordinal utility or Indifference Curve Approach:

Indifference curve analysis is an improved form of the cardinal utility analysis is claimed that the indifference curve analysis is more objective, more scientific and more practically acceptable because of its fewer assumptions. Though some economists have expressed the view that the indifference curve

analysis is just old wine in a new bottle. Both these views have truth in them. Cardinal and ordinal utility analysis have some similarities and many differences. Both these approaches of utility analysis explain the consumer's behaviour with common assumptions like limited money income and rational consumer. The similanties differences and comparative superiority between these two approaches is explained below:

- Similarities:
  i. Similar assumptions: Most of the assumptions of both approaches are similar. For example, both cardinal and ordinal approaches assume rational consumer, limited income transtivity in choice, perfect knowledge and utility maximization.
  ii. Identical equilibrium conditions: Both cardinal and ordinal utility approaches use identical equilibrin condition. The necessary equilibrium condition for cardinal is given as:



iii. Diminishing utility: An indifference curve is convex to the origin because of diminishing marginal rate of substitution. The principle of diminishing marginal rate of substitution is same as the law of diminishing marginal utility

iv. Psychological method: Both approaches use the Psychological or introspective method. For example, in marginal utility analysis, the law of demand is explained by the psychological law of diminishing marginal utility. This law is based on the introspection. In the ordinal utility analysis, the indifference curves are obtained through introspective method. Thus, both approaches are introspective.

v. Same conclusion: Both approaches have some Conclusion about consumer behaviour. There is nothing new in the ordinal utility analysis.

- Dissimilarities/Differences:
  i. Measurement of utility: According to cardinal utility analysis, uility can be measured in numbers, i.e in terms of money. On the other hand, according to ordinal utility analysis, utility cannot be measured in number. The economists like JR Hicks, R.C.D. Allen, etc. who developed ordinal utility analysis express that utility is psychological or subjective factor which can be felt but cannot be measured in a numerical form.

ii. Decomposition of price effect: The ordinal utility approach explains price effect decomposing it into income and substitution effect. But this is not possible under the cardinal utility approach.
iii. Marginal utility of money: The cardinal utility analysis assumes constant marginal utility of money where as ordinal utility analysis does not make such assumptions.
iv. Number of commodities: The cardinal utility analysis is based on the assumption of one commodity model where as ordinal utility analysis is based on the assumption of two commodity model, which explains the consumer's behaviours in case substitute, complementary and unrelated goods.
v. Traditional and modem approaches of utility analysis: The cardinal utility approach in the traditional approach of utility analysis developed by HH. Gussen and latter fully developed and popularized by neoclassical economists Alfred Marshall where as ordinal utility approach is the modern approach of utility analysis first used and invented by F.Y. Edgeworth and latter by JR. Hicks and R.G.D. Allen.