

Consumer's Equilibrium

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Utility :- Utility is the power or capacity of a commodity to satisfy a human want. Utility can be measured in 'Utils'.

Marginal Utility :- MU is the additional extra utility derived from consumption of an additional Unit of a Commodity.

$MU = \text{Utility of one Unit (additional Unit) Consumed}$.

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

$n = \text{No.of units consumed}$

$$MU = \frac{\Delta TU}{\Delta Q}$$

ΔTU = Change in Total Utility

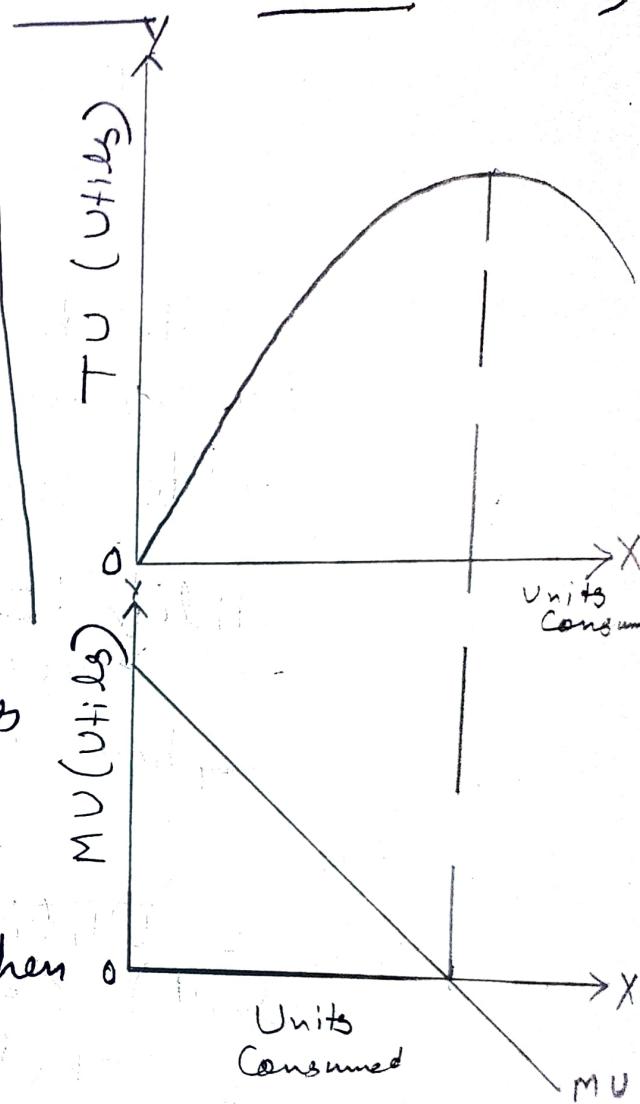
ΔQ = Change in quantity consumed

Total Utility (TU) :- It is the total psychological satisfaction derived by a consumer from Consumption of given amount of a particular commodity.

$TU = \text{Sum of all marginal Utilities}$.

Relationship between Total Utility (TU) And Marginal Utility (MU)

Units Consumed	MU (Utility)	TU (Utility)
1	10	10
2	8	18
3	5	23
4	2	25
5	1	26
6	0	26
7	-3	23



1. TU increases as long as MU is positive.
2. TU is maximum, when MU is zero.
3. TU starts declining when MU becomes negative.

Law of Diminishing Marginal Utility :→

The law states that as more and more units of a commodity are consumed, marginal utility derived from each successive unit goes on falling. For example, utility from a first Chapati to a hungry man is maximum, utility from 2nd chapati is lesser, from 3rd chapati still lesser and so on.

Assumptions of Law of Diminishing Marginal Utility:

- (i) All the units of Consumption are homogeneous and are of standard size.
- (ii) The Consumption should be continuous. There should be no time interval between the units of consumption of a commodity.

Consumer's Equilibrium

"Consumer's equilibrium refers to a situation under which the consumer spends his given income on purchase of a commodity or combination of goods in such a way that gives him maximum satisfaction or utility."

Consumer's equilibrium according to utility approach can be discussed under two situations.

- (A) When only one commodity is consumed and
(B) When two or more commodities are consumed.

In Case of One Commodity

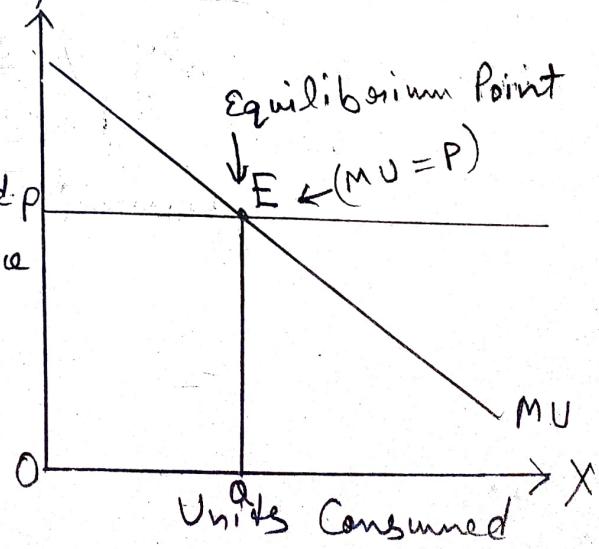
When consumer consumes one commodity he will be in equilibrium when marginal utility of a commodity (when measured in monetary units) must be equal to price of the commodity.

Units of ice-cream	MU (Utils)	MU in money MU/P (₹)	Price (₹) per unit
1	120	30	20
2	100	25	20
3	80	20	20
4	60	15	20
5	40	10	20
6	20	5	20

$$1 \text{ ₹} = 4 \text{ Utils}$$

The consumer will be in equilibrium when he consumes 3 units of ice-cream because at these level of consumption marginal utility (measured in monetary units) is equal to price of ice-cream.

In the diagram, consumer attains equilibrium at point E, where marginal utility is equal to price. At this point MU curve intersects the price line. Thus, consumer's satisfaction is maximum at OQ units of consumption.



In Case of Two Commodities:-

There are two necessary conditions to attain consumer's Equilibrium in case of two commodities.

(i) The ratio of Marginal Utility to price is same in case of both goods.

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

(ii) MU falls as consumption increases.

The position of consumer's equilibrium can be explained with the help of an example.

Suppose the price of two goods - X and Y be ₹ 10 and ₹ 5 respectively. Further, suppose that consumer has money income of ₹ 50 to spend on these goods. Marginal Utilities obtained from consumption of commodities X and Y by the consumer are shown.

Units	MU_x (Utilities)	MU_y (Utilities)	$\frac{MU_x}{P_x} = \frac{MU_x}{10}$	$\frac{MU_y}{P_y} = \frac{MU_y}{5}$
1	90	60	$\frac{90}{10} = 9$	$60/5 = 12$
2	80	50	$80/10 = 8$	$50/5 = 10$
3	70	45	$70/10 = 7$	$45/5 = 9$
4	60	35	$60/10 = 6$	$35/5 = 7$
5	50	25	$50/10 = 5$	$25/5 = 5$
6	40	20	$40/10 = 4$	$20/5 = 4$

The consumer will be in equilibrium when he consumes 3 units of commodity X and 4 units of commodity Y, because, at these level of consumption $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$ and consumer spends his entire income on both the commodities.

⇒ What happens when $\frac{MU_x}{P_x}$ is not equal to $\frac{MU_y}{P_y}$.

- Suppose $\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$. In this case, the

consumer is getting more marginal utility per rupee in case of good X as compared to Y. Therefore, he will buy more of X and less of Y. This will lead to fall in MU_x and rise in MU_y . The consumer will continue to buy more of X till $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$.

- When $\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$, the consumer is getting more marginal utility per rupee in case of good Y as compared to X. Therefore, he will buy more of Y and less of X. This will lead to fall in MU_y and rise in MU_x . The consumer will continue to buy more of Y till $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$.

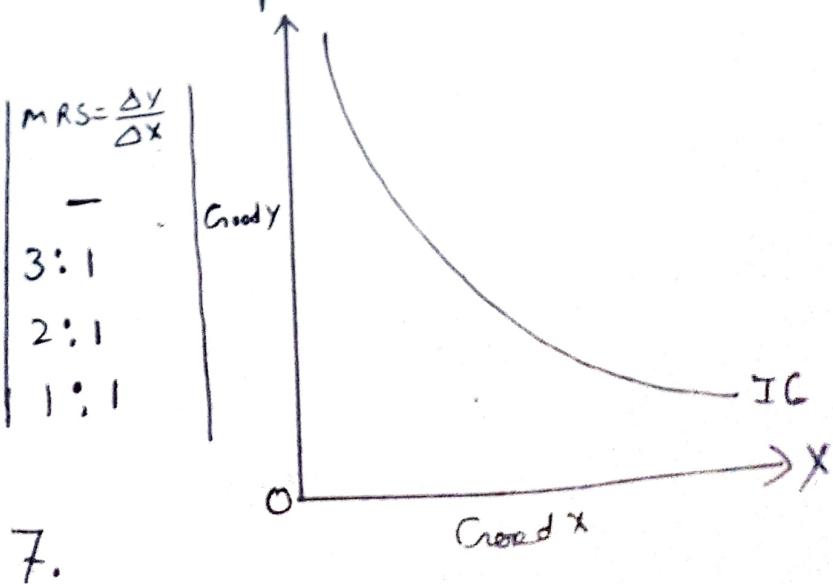
It brings us to a conclusion that $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$ is a necessary condition to attain consumer's equilibrium.

Cardinal Utility :- Utility when measured in Cardinal numbers such as 1, 2, 3, 4, 5 etc., is called Cardinal Utility. This approach was given by Alfred Marshal.

Sordinal Utility :- Utility when measured in Sordinal numbers such as 1st, 2nd, 3rd, 4th, 5th etc. is called Sordinal Utility. This approach was given by Prof. Hicks and Allen.

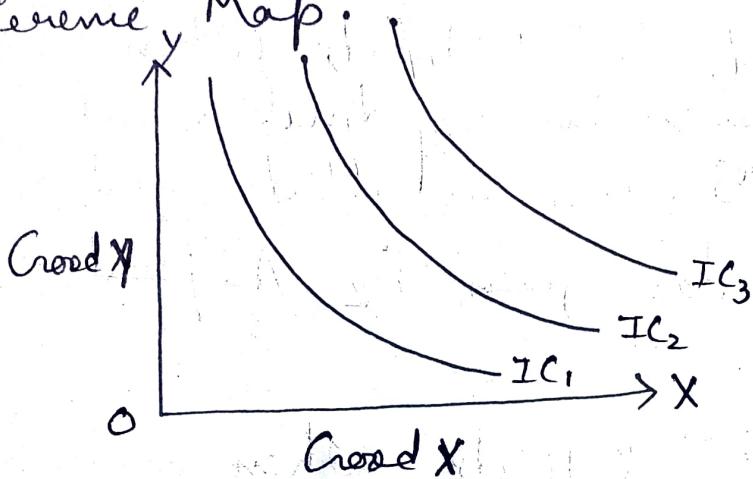
Indifference Curve :- It shows different combinations of two goods that provide the same level of utility (or satisfaction) to the consumer.

Combination	Good X	Good Y	$MRS = \frac{\Delta Y}{\Delta X}$
A	1	10	-
B	2	7	3:1
C	3	5	2:1
D	4	4	1:1



Indifference Map :- A set of ICs drawn on a graph is called

Indifference Map:



Marginal Rate of Substitution (MRS)

MRS is the amount of good Y that a consumer is willing to give up to consume an additional unit of Good X while keeping total utility unchanged.

$$MRS = \frac{\Delta Y}{\Delta X}$$

Monotonic Preference : \rightarrow A consumer prefers more Goods to less. Preferences of this kind are known as monotonic preference.

PROPERTIES OF INDIFFERENCE CURVE

- ① An Indifference Curve always slopes downwards from left to right : \rightarrow An indifference curve shows all bundles of two commodities give a consumer

equal satisfaction. It follows that if a consumer wants to have more quantity of a commodity say X, he will have to give up some quantity of other commodity say Y in order to obtain the same level of satisfaction.

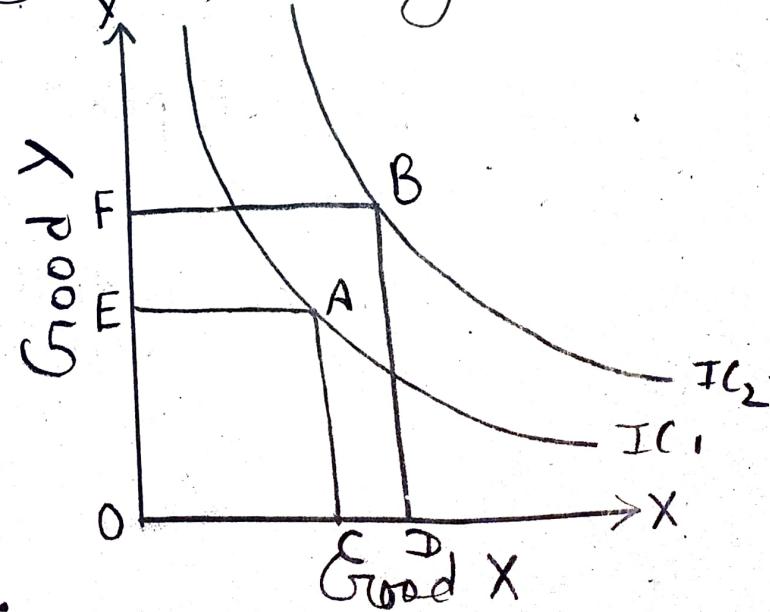
(ii) Indifference Curves are always convex to the origin :-

Convexity of the curve implies that the slope of indifference curve decreases as we move down the indifference curve. It is based on the assumption of decreasing marginal rate of substitution.

(iii) Higher the Indifference Curve represents higher level of satisfaction :- According

to Indifference Curve approach, consumer always prefer more good to less good.

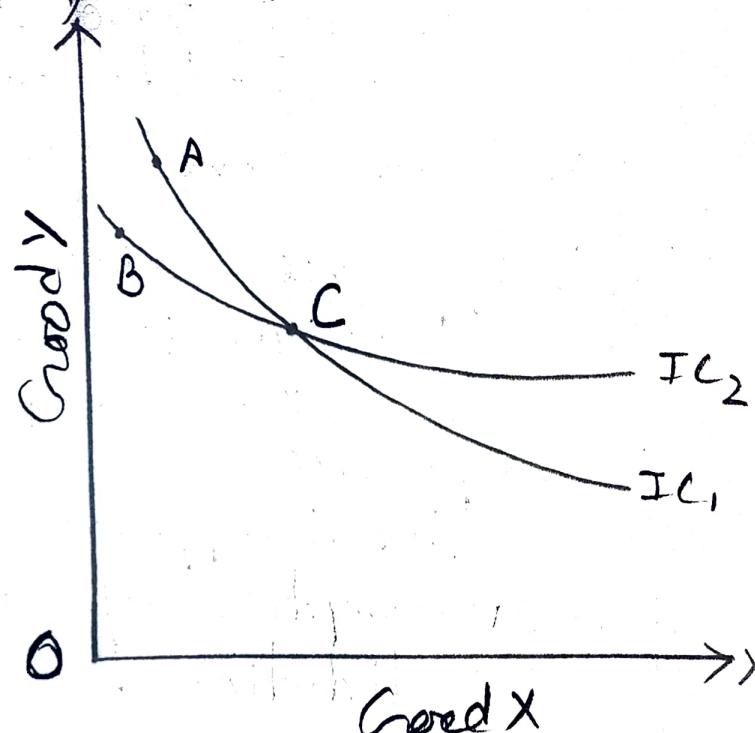
In figure, compare points A and B laying on IC_1 and IC_2 respectively. Bundle A contains OC of X and OE of Y while bundle B contains OD of X and OF of Y. This



clearly indicates that Bundle B has more of both the goods. More good implies utility. Thus, higher indifference curve represents higher level of satisfaction.

(iv) Two Indifference Curve never intersect each other !

Suppose two ICs., IC_1 and IC_2 intersect each other at point C. Satisfaction at points A and C lie on IC_1 are equal.



Satisfaction at points B and C lie on IC_2 are equal.

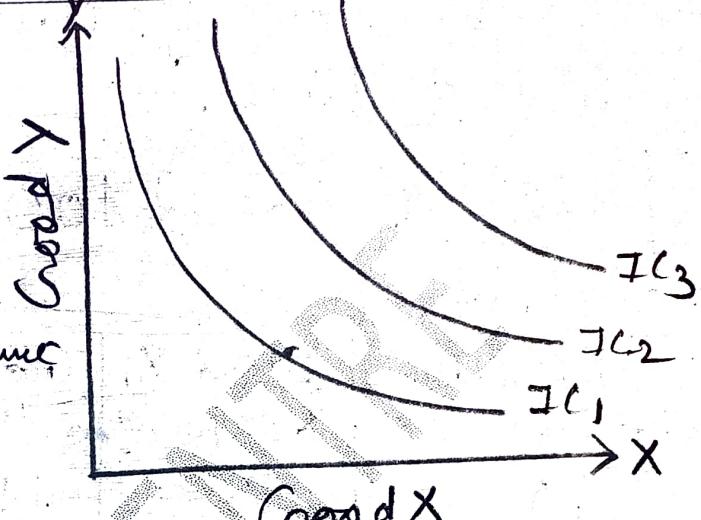
But satisfaction at $IC_2 >$ Satisfaction at IC_1
($\because IC_2$ higher than IC_1)

Satisfaction at point C on IC_2 $>$ Satisfaction at point C on IC_1

Hence, indifference curve never intersect each other.

Indifference Map:-

A set of Indifference curves drawn on a graph is called Indifference Map.



Marginal Rate of Substitution (MRS) → MRS is the amount

of good Y that a consumer is willing to give up to consume an additional unit of good X while total utility unchanged.

$$MRS = \frac{\Delta Y}{\Delta X}$$

Monotonic Preference → A consumer prefers more goods to less. Preference of this kind are known as monotonic preference.

Budget Line:- Budget line is a line that shows different possible combinations of the two goods that can be purchased by a consumer, given his entire money income and market prices of goods.

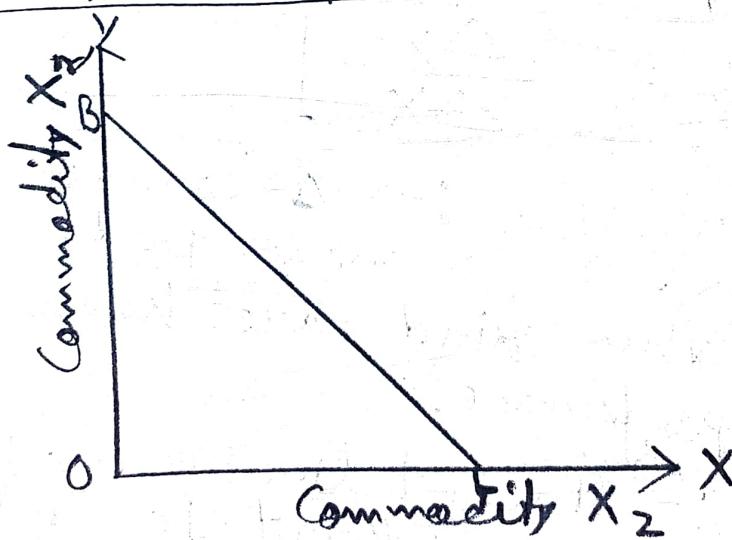
The equation of the budget line

$$P_1 X_1 + P_2 X_2 = M$$

Combination of Two Goods for Consumer's Budget Line.

Money Income £100

Combinations	Good X ₁ (£20 per unit)	Good X ₂ (£10 per unit)	Total Expenditure $P_1 X_1 + P_2 X_2 = M$
A	0	10	$20 \times 0 + 10 \times 10 = 100$
B	1	8	$20 \times 1 + 10 \times 8 = 100$
C	2	6	$20 \times 2 + 10 \times 6 = 100$
D	3	4	$20 \times 3 + 10 \times 4 = 100$
E	4	2	$20 \times 4 + 10 \times 2 = 100$
F	5	0	$20 \times 5 + 10 \times 0 = 100$



Budget Set \rightarrow It consists of all possible combinations of two goods that a consumer can buy with his income and

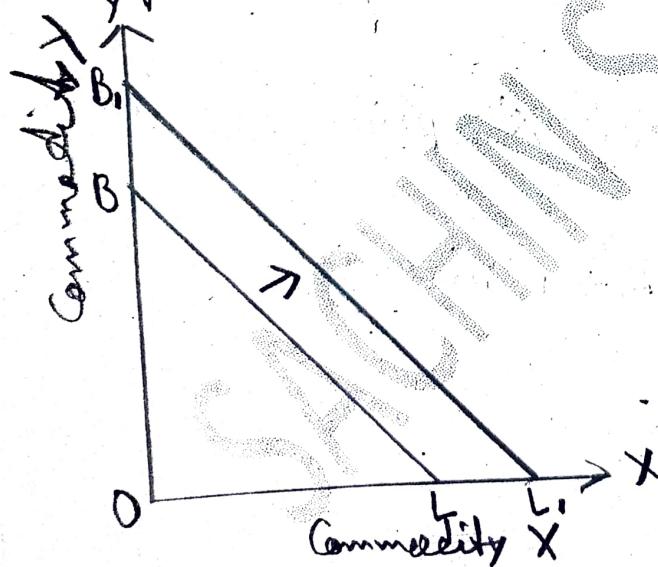
prevailing prices in the market. He can buy all those bundles of two goods that lie on or below the budget line.

$$P_1 X_1 + P_2 X_2 \leq M$$

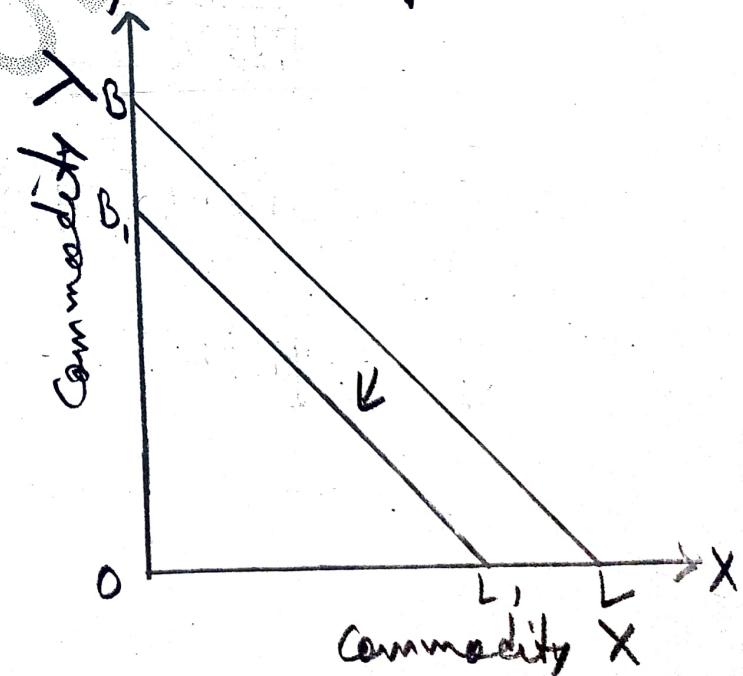
Shift in Budget Line

When Income of Consumer Change

(A) When Income of Consumer rises.



(B) When income of consumer falls.

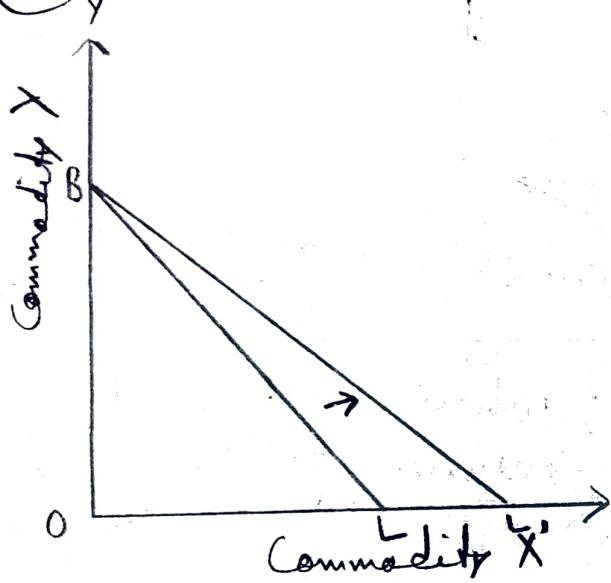


14. Rotation of Budget Line :-

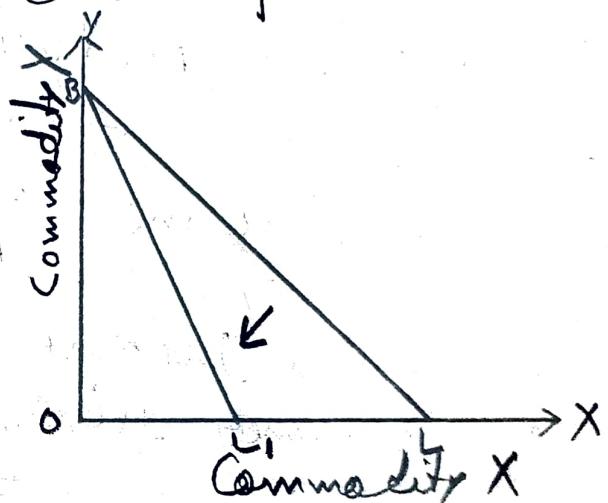
Change in price of either commodity, other's commodity price remains constant.

1. Change in Price of X and Y's price remains constant.

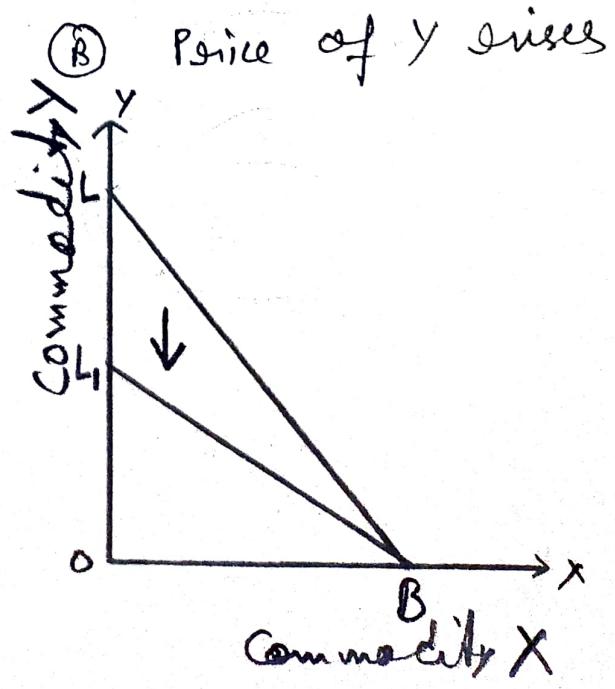
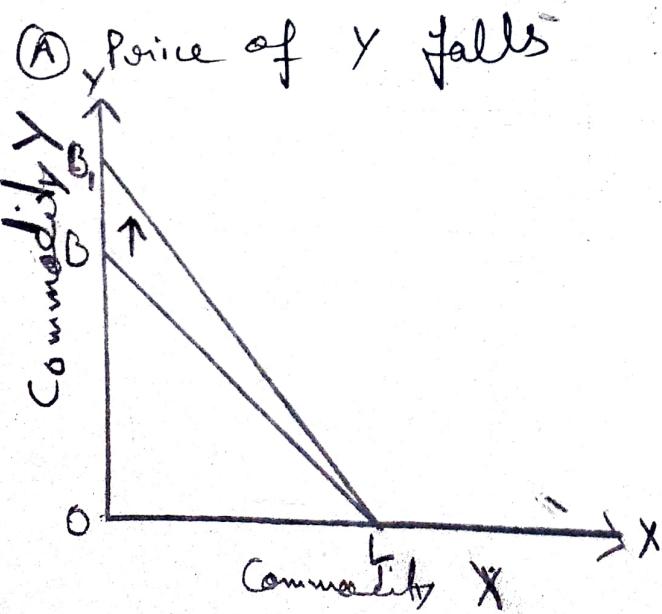
(A) When price of X falls.



(B) Price of X rises.



2. Change in Price of Y and X' price remains constant.



Consumer's Equilibrium with the help of
Indifference Curve Analysis or Ordinal
Approach : -



Condition for Consumer's Equilibrium : -



1. The first condition for consumer's equilibrium is that Marginal Rate of Substitution (MRS) should be equal to price ratio of two goods i.e. $MRS_{xy} = \frac{P_x}{P_y}$

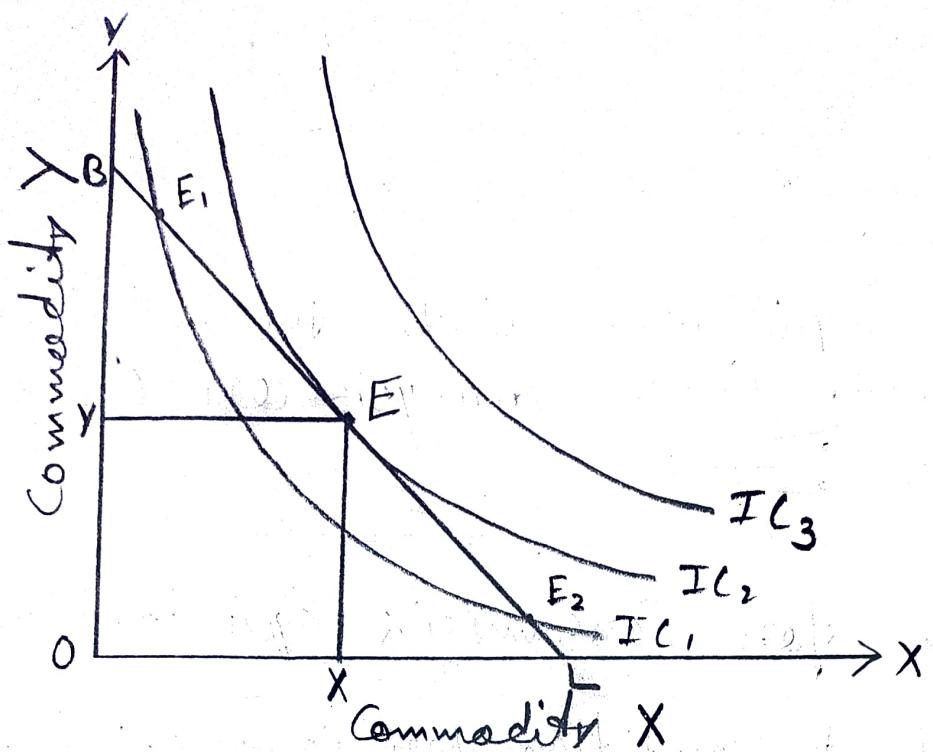
OR

The slope of Budget Line should be equal to slope of Indifference Curve.

OR

At the point of equilibrium the budget line must be tangent to Indifference Curve.

2. The second essential condition is that at the point of equilibrium, MRS should be decreasing or Indifference Curve should be convex to the origin.



In the diagram, IC_1 , IC_2 and IC_3 are indifference curves which show different level of satisfaction and BL is Budget line. With BL Budget consumer cannot afford any combination of IC_3 because it is out of budget. Consumer can afford many combinations of IC_1 but these are inferior as compared to IC_2 . Point E is the equilibrium point, where budget line BL is tangent to indifference curve IC_2 and at this point the shape of indifference curve IC_2 is convex to the origin. So consumer will be in equilibrium when he consumes OX units of commodity X and OY units of commodity Y , where he gets maximum satisfaction.

⇒ What happens when MRS is not equal to $\frac{P_x}{P_y}$?

* If $MRS_{xy} > \frac{P_x}{P_y}$, it means that to obtain one more unit of X, the consumer is willing to sacrifice more units of Y as compared to what is required in the market. It induces the consumer to buy more of X^{\uparrow} and less of Y . As a result, MRS falls and continues to fall till it becomes equal to the ratio of prices and the equilibrium is established.

* If $MRS_{xy} < \frac{P_x}{P_y}$, it means that to obtain one more unit of X, the consumer is willing to sacrifice less units of Y as compared to what is required in the market. It induces the consumer to buy less of X and more of Y. As a result, MRS rises till it becomes equal to the ratio of prices and the equilibrium is established.

Assumptions of Indifference Curve :-

- (i) Utility is Ordinal : - According to this analysis, utility is a psychological phenomenon and therefore cannot be measured in cardinal numbers such as 1, 2, 3, 4, 5 etc. Instead, utility is ordinal, ordinal utility implies that the consumer can only rank his preferences such as 1st, 2nd, 3rd etc.
- (ii) Two Goods : → It is assumed that consumer buy only two goods.
- (iii) More goods more Utility : - This assumption implies that consumer always prefer more of any good to less of it. It implies that the consumer has not reached the satiety point.
- (iv) Rational Consumer : - The consumer is rational. He always tries to maximise his satisfaction in a given situation.